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A Tonal Grammar of ETS AKO

Baruch Elimelech

U.C.L.A.

No. 35
A Tonal Grammar of Etsako

by

Baruch Elimelech

Working Papers in Phonetics 35
August 1976
University of California, Los Angeles
For Portia
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Finally, to my wife, Portia, for her continued understanding and support, I express my deepest thanks and love.

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ABSTRACT OF THE DISSERTATION

A Tonal Grammar of Etsakọ

by

Baruch Elimelech

Doctor of Philosophy in Linguistics

University of California, Los Angeles, August 1976

Professor Victoria A. Fromkin, Chairman

The aim of this study is to describe the tonal system of Ekpheli, a dialect of the Etsakọ language. Etsakọ is spoken in the Etsakọ Division of Bendel State of Nigeria (formerly Mid-West State of Nigeria).

Although this study is primarily descriptive, it will address itself to certain theoretical questions now being debated among generative phonologists. In particular, it will argue that the lexical representation of each morpheme or formative in Etsako should be in the form of two matrices, a segmental matrix (SM) and a tone matrix (TM) as first suggested by Leben (1971b). As will be discussed in the dissertation, the systematic phonetic matrix is to be derived by a set of mapping rules, after the phonological tone and segmental rules have been applied.

While the focus of the study is on the tone system of Etsakọ, with emphasis on the Ekpheli dialect, Chapter II will present a summary sketch of the segmental phonology which provides necessary background for understanding the examples presented. Chapter III focuses on general tonal phenomena. Chapter IV discusses the tone alternations in nouns and noun phrases. Chapter V deals with the tone alternations in verbs and verb phrases. As will be seen in Chapters IV and V, the grammar of Etsakọ is characterized by a complexity of morphophonemic alternations. To better understand the synchronic alternations, diachronic aspects are considered. Thus, while the aim of the study is focussed on the synchronic grammar, some historical reconstructions are presented as well as a discussion of the various tone changes that have occurred. Only in this way is the synchronic analysis which recognizes 'floating tones' meaningful.

Finally, a comparative wordlist of 542 forms -- nouns, verbs, adjectivalis, adverbs, and particles in eight dialects of Etsakọ is given in the Appendix A.
CHAPTER I

Introduction

The aim of this study is to describe the tonal system of Ekpheli, a dialect of the Etsako language. Etsako is the name of a Division of Bendel State of Nigeria. Etsako means 'those who file their teeth' in the language of the people of this region. Earlier in history the filing of one's teeth was a cosmetic practice among the Etsako people. Even today someone who has gaps between the teeth is considered to be a very beautiful and attractive person.

The Division is divided into thirteen Clans: Auchi, Avlanwu, Aviele, Awain, Ekpheli, Ijagbe, Okpekpe, South Ibie, South Uneme, Ukpilla, Uzairue, Weppa-Wano, and Three Ibie. Each clan is further sub-divided into villages. Uzairue, for example, has sixteen villages.

The language of the people of this Division is also called Etsako. Etsako is generally considered to have thirteen major dialects, each corresponding to one of the clans. Thus, the Ekpheli dialect of Etsako is the dialect spoken by the Ekpheli clan. Each major dialect can be further divided into sub-dialects or dialect variants corresponding to the individual villages. Most of the dialects are mutually intelligible. Seven of the eight dialects investigated in this study were found to be so. Despite the mutual intelligibility certain systematic differences between these dialects exist. Thus, for example, in cognate forms, /p/ in some dialects corresponds to /t/ in others, and a low tone in some dialects corresponds to a high tone in others. Lexical items may also differ from dialect to dialect. Similar differences are found in the dialects which are not mutually intelligible but they are more extensive.

In the early part of the twentieth century, Etsako was studied to some extent by Thomas (1910, 1914, and 1917) and Strub (1917). Both authors referred to the language as Kukuruku, the name given to the formal Division which included the present Etsako Division and two other divisions. Greenberg (1963) classifies Etsako as Niger-Congo Kwa, Kukuruku, I.A.4. B-E3. Laver (1967, 1969) describes some aspects of the phonological system of the Aviele dialect of Etsako. Elugbe (1973) discusses the phonological systems of two other Etsako dialects, Auchi and Avlanwu. Elugbe refers to Etsako as Iyekhe. Both descriptions while insightful are rather sketchy and lacking in detail, particularly in relation to tonal phenomena. Welmers (1973), using data from the Ekpheli dialect, discusses the doubly articulated stops /kp, kph, gb, gbh/ of Etsako. The 'h' of /kph/, /gbh/ is used to differentiate the lax consonants (those with 'h') from the tense consonants. This reflects the present orthographic system. Steveson (1974) published comparative wordlists collected in the Etsako Division. The lists consist of approximately 120 words from five dialects.

These papers constitute the entire literature on the Etsako language except for my earlier paper (Elimelech, 1973) which deals with a limited part of the tonal complexities. The data analyzed in that paper was elicited from only one informant. Except for this paper
previous studies were primarily concerned with segmental phonology.

The dialects considered in this study are as follows:

<table>
<thead>
<tr>
<th>Dialect</th>
<th>Henceforth abbreviated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ekpheli</td>
<td>E</td>
</tr>
<tr>
<td>Avianwu</td>
<td>Av</td>
</tr>
<tr>
<td>Weppa-Wano</td>
<td>W-W</td>
</tr>
<tr>
<td>Uzairue</td>
<td>U</td>
</tr>
<tr>
<td>South Uneme</td>
<td>SU</td>
</tr>
<tr>
<td>South Ibie</td>
<td>SI</td>
</tr>
<tr>
<td>Auchi</td>
<td>Au</td>
</tr>
<tr>
<td>Aviele</td>
<td>Avie</td>
</tr>
</tbody>
</table>

The data were collected in the Etsakọ Division during the months of December 1974 to September 1975, under a Ford Foundation Fellowship. I conducted my investigation and analysis of Etsakọ phonology by combining intensive field work with on-going analysis of the data elicited. I worked with native speakers of Etsakọ in elicitation sessions. Elicitation sessions were held as often as five days a week in villages within close proximity to Auchi. On the other hand, language consultants of far away villages were met with twice or three times a week.

During this period, I resided at Auchi which is the Divisional Headquarters of Etsakọ. From Auchi I commuted to the various clans and villages covered in this study. I met with the clan chief as well as the village chief who introduced me to a speaker representative of the dialect of the clan. A map outlining the clans, the clan head-quarters, and the villages (where I worked) is given below.

While the focus of the study is on the tone system of Etsakọ, with emphasis on the Ekpheli dialect, Chapter II will present a summary sketch of the segmental phonology which provides necessary background for understanding the examples presented. Chapter III focuses on general tonal phenomena. Chapter IV discusses the tone alternations in nouns and noun phrases. Chapter V deals with the tone alternations in verbs and verb phrases. As will be seen in Chapters IV and V, the grammar of Etsakọ is characterized by a complexity of morphonemic alternations. To better understand the synchronic alternations, diachronic aspects will be considered. Thus, while the aim of the study is focused on the synchronic grammar, some historical reconstruction will be presented as well as a discussion of the various tone changes that have occurred. Only in this way will the synchronic analysis which recognizes 'floating tones' be meaningful.

A wordlist of 542 forms -- nouns, verbs, adjectivals, adverbs, and particles in the eight dialects examined is given in the Appendix A.

The description of the tonological system of Etsakọ will be presented within the framework of generative phonology (Chomsky and Halle, 1968). Although this study is primarily descriptive, it will address itself to certain theoretical questions now being debated among generative phonologists. In particular it will argue that the lexical representation of each morpheme or formative in Etsakọ should be in the form of two matrices, a segmental matrix (SM) and a tone matrix (TM) as first suggested by Leben (1971b). As will be discussed below, the systematic
The phonetic matrix is to be derived by a set of mapping rules, after the phonological tone and segmental rules have been applied.

CHAPTER II

Segmental Phonology

1.0. Phonemic and phonetic inventory of consonants

The consonant system of Ekpheli includes the following inventory of systematic phonetic segments, as would be traditionally diagrammed in an IPA chart. The feature analysis of these consonants will follow a discussion of the phonetic correlates of these phones.

(1) Consonant chart:

<table>
<thead>
<tr>
<th></th>
<th>Labials</th>
<th>Labio-dentals</th>
<th>Denticals</th>
<th>Alveolars</th>
<th>Palatals</th>
<th>Labio-velars</th>
<th>Velars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops</td>
<td>p</td>
<td>t</td>
<td>k</td>
<td>kp/kph</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>d</td>
<td>g</td>
<td>gb/gbh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affricatives</td>
<td>ts (č)</td>
<td>dz (ȷ)</td>
<td>f  ŋ  s (§)</td>
<td>x</td>
<td>v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricatives</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximants</td>
<td>u</td>
<td>n (n)</td>
<td>v</td>
<td>Y</td>
<td>w</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The symbols in parentheses (e.g., (č)) are allophonic (derived) segments. All other symbols represent systematic phonemes. The list of morphemes given in (2) reveal that there are twenty six consonantal phonemes necessary to distinguish morphemes.

(2) /p/ : /pa/ → [pa] 'to clean'
/b/ : /ba/ → [ba] 'to plait'
/t/ : /ta/ → [ta] 'to sting'
/d/ : /da/ → [da] 'to drink'
/k/ : /ka/ → [ka] 'to dry'
<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Grapheme</th>
<th>Pronunciation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>/g/</td>
<td>/ga/</td>
<td>[ga]</td>
<td>'to worship'</td>
</tr>
<tr>
<td>/kp/</td>
<td>/kpa/</td>
<td>[kpa]</td>
<td>'to vomit'</td>
</tr>
<tr>
<td>/khp/</td>
<td>/kpha/</td>
<td>[kpha]</td>
<td>'to pluck'</td>
</tr>
<tr>
<td>/gb/</td>
<td>/gba/</td>
<td>[gba]</td>
<td>'to build'</td>
</tr>
<tr>
<td>/gbh/</td>
<td>/gbhale/</td>
<td>[gbhale]</td>
<td>'to think'</td>
</tr>
<tr>
<td>/ts/</td>
<td>/tsa/</td>
<td>[tsa]</td>
<td>'to purge'</td>
</tr>
<tr>
<td>/otsie/</td>
<td>/oče/</td>
<td>[oče]</td>
<td>'apple'</td>
</tr>
<tr>
<td>/dz/</td>
<td>/dzala/</td>
<td>[dzala]</td>
<td>'to be straight'</td>
</tr>
<tr>
<td>/i/</td>
<td>/ia/</td>
<td>[ia]</td>
<td>'to be light in complexion'</td>
</tr>
<tr>
<td>/v/</td>
<td>/va/</td>
<td>[va]</td>
<td>'to butcher'</td>
</tr>
<tr>
<td>/f/</td>
<td>/ifa/</td>
<td>[ifa]</td>
<td>'wing'</td>
</tr>
<tr>
<td>/th/</td>
<td>/θa/</td>
<td>[θa]</td>
<td>'to soak (cloth)'</td>
</tr>
<tr>
<td>/s/</td>
<td>/sa/</td>
<td>[sa]</td>
<td>'to soak (wood)'</td>
</tr>
<tr>
<td>/sisie/</td>
<td>/šeše/</td>
<td>[šeše]</td>
<td>'to be small'</td>
</tr>
<tr>
<td>/x/</td>
<td>/xa/</td>
<td>[xa]</td>
<td>'to be warmed by fire'</td>
</tr>
<tr>
<td>/y/</td>
<td>/ya/</td>
<td>[ya]</td>
<td>'chain'</td>
</tr>
<tr>
<td>/l/</td>
<td>/ula/</td>
<td>[ula]</td>
<td>'fat (from meat)'</td>
</tr>
<tr>
<td>/r/</td>
<td>/ra ço/</td>
<td>[ra ço]</td>
<td>'to paint'</td>
</tr>
<tr>
<td>/m/</td>
<td>/ma/</td>
<td>[ma]</td>
<td>'to build, mold'</td>
</tr>
<tr>
<td>/mh/</td>
<td>/mhala/</td>
<td>[mhala]</td>
<td>'to measure'</td>
</tr>
<tr>
<td>/n/</td>
<td>/na/</td>
<td>[na]</td>
<td>'to run'</td>
</tr>
<tr>
<td>/anio/</td>
<td>/ane/</td>
<td>[ane]</td>
<td>'wine'</td>
</tr>
<tr>
<td>/y/</td>
<td>/ya/</td>
<td>[ya]</td>
<td>'to be'</td>
</tr>
<tr>
<td>/w/</td>
<td>/wa/</td>
<td>[wa]</td>
<td>'to pain from hot pepper'</td>
</tr>
</tbody>
</table>

All of these phonemic and phonetic segments occur in all sub-dialects of Ekpheli (e.g., Azukhala).

With the exception of /p/, /ts/, /dz/, and /θ/, all of the phonemes occur in all dialects of Etsako.

/p/ is completely absent from the U. dialect, and is extremely rare in occurrence in Au., Avie., SU., and SI.. A cross dialectical comparison (cf. Appendix) shows that /p/ is replaced by /t/ in some dialects (e.g., /ope/ in E., /ote/ in U., 'rat').

/ts/ and /dz/ do not occur in Avie. and SU.. /ts/ is replaced by /s/ (e.g., /otsa/ in E., /osa/ in Avie. and SU., 'soap'); /dz/ is replaced by /z/ (e.g., /edzo/ in E., /ezo/ in Avie., and SU., 'case (in court)'.

5
/θ/ is replaced by /ɣ/, a voiceless alveolar fricative in some dialects (e.g., /aθu/ in E., /aγu/ in Av., U., SI., Au., Avie., 'cap, hat').

2.0. Phonetic correlates

The symbol 'h' is used in the orthography of Etsakọ to indicate the phonemic contrast between the consonants of (3).

(3) orthography
/kp/ kp /kph/ kph
/gb/ gb /gbh/ gbh
/k/ k /x/ kh
/g/ g /γ/ gh
/v/ v /u/ vh
/t/ t /θ/ th
/m/ m /mh/ mh

These consonants have already received considerable attention in the previous studies cited in other related languages. Laver (1967, 1969), in his study of the Aviele dialect, employs the features [tense]/[lax] to characterize the differences between /k/ and /kh/, /g/ and /gh/, /v/ and /vh/, and /m/ and /mh/. The lax consonants are the 'h' consonants of the pairs. Laver suggests that the distinction is one of greater or less muscular tension during the articulation. Elugbe (1973) makes a similar analysis using the feature [fortis] for [tense] and [lenis] for [lax].

Wellmers (1973) employs the binary feature [+ suction] to characterize the four labio-velar stop consonants with /kp/ and /gb/ being specified as [+ suction] and /kph/ and /gbh/ as [- suction].

Elugbe and Hombert (1975) in their study of nasals in Ghotuo (a language related to Etsakọ) use the binary feature [+ long] to distinguish the two bilabial nasals /m/ ([+ long]) and /mh/ ([− long]). Their decision was based on a perception experiment in which only the duration of the bilabial nasals was varied, showing that subjects used the length difference as a major cue to differentiate between the two.

There is no question that the consonants in question differ phonemically and phonetically. There has been some attempt to distinguish all the 'h' consonants from their 'non-h' pairs by one feature, e.g., [+ fortis], [+ suction] or [+ long]. It is not at all clear why one should wish to do this. There are no phonological rules that require the class of 'h' consonants as opposed to the class of 'non-h'. It is therefore possible that the search for the one 'correct' feature will obscure the real phonetic differences between the pairs.

If one wishes a viable phonetic description, an instrumental analysis can help to specify the distinguishing phonetic features. An alternative method would be to conduct perceptual experiments aimed at finding
which acoustic cues are necessary and sufficient to distinguish between the consonants of a pair or between classes of sounds.

As a first attempt, I recorded a number of utterances containing these sounds, made spectrograms, and analyzed the spectrograms. The spectrograms are presented in Figures 1-5.

Figure 1(a,b) gives the spectrograms of four contrastive labio-velar stop consonants in words. It can be observed that the stop closures of [kp] and [gb] are almost twice the length of their counterparts [kph] and [gbh]. It is not possible, however, to tell from spectrographic analysis alone whether the length contrast is the major difference or even the major perceptual cue hearers use to distinguish the pairs. For lack of further physiological data, we can distinguish these phonologically and phonetically by the feature [± long]. As cover symbols, however, in keeping with the orthography, we will use the 'h' for the shorter consonants.

Figure 2(a,b) shows spectrograms of the four contrastive velar consonants /k/ and /g/, and /x/ and /q/ (the latter two orthographically 'kh' and 'gh'). It may be observed that /k/ and /g/ contain no friction while the /x/ and /q/ are clearly fricatives. However, in addition to the friction distinction the stops are also twice as long as the fricatives. For phonetic specificity, one would want to use both [± continuant] and [± long] values in the phonetic matrices. One cannot determine, other things being equal, what the correct distinctive feature is for the phonemic matrices.

Figure 3 presents the spectrograms of two contrastive bilabial nasal consonants as occurring in words. Once more it may be observed that the utterance which orthographically would be represented as 'm' is twice the length of that which would be represented as 'mh'. It is again impossible to tell from acoustic analysis what other properties may distinguish between these.

The spectrograms of /t/ and /θ/ (orthographically 't' and 'θh') of Figure 4 again reveals a length distinction with /t/ being longer in duration than /θ/. Like the distinctions between the velar consonants /θ/ ('th') is characterized as having friction, while /t/ is not. [θ] is a dental fricative and [t] is an alveolar stop. The phonetic specification should then provide values for both [± continuant] and [± long].

Spectrograms of utterances in which /v/ and /w/ ('wh') occur in the words are given in Figure 5. In the articulation of these sounds [v] is a bilabial approximant, and [v] a labio-dental fricative. Note also, however, that [v] is somewhat longer in duration than [v].

Spectrographic analysis has thus revealed some interesting phonetic differences that exist between the two sets of consonants, those orthographically symbolized with 'h' and those without. The use of 'h' does seem to have some phonetic reality in that all the 'non-h' sounds are longer than their 'h' counterparts.

In the case of the four labio-velar stops and the two bilabial nasals the only differentiating factor between the pairs as shown by spectrographic analysis is that of length. This is not to say that the feature [± suction] as proposed by Welmers to distinguish the four labio-velar stops is incorrect. One would need to conduct further experimental
Figure 1a. Comparison of Ḟ and ḹph: Spectrograms of the words ḟḵpọ 'clothes' (on left) and ḟḵphọ 'erosion' (on right).
Figure 1b. Comparison of ṡ and ṡh: Spectrograms of the words ṡgbe ṡe 'masquerade' (on left) and ṡghe ṡe 'house' (on right).
Figure 2a. Comparison of k and x: Spectrograms of the words ūkə 'week' (on left) and ɔxə 'hyena' (on right).
Figure 2b. Comparison of g and y: Spectrograms of the words ãgã 'net' (on left) and ãyã 'chain' (on right).
Figure 3. Comparison of m and mh: Spectrograms of the words 'mè 'farm' (on left) and 'mhè 'panic' (on right).
Figure 4. Comparison of $t$ and $\theta$: Spectrograms of the words $\dot{t}u$ 'age group' (on left) and $\ddot{u}$ 'cap' (on right).
Figure 5. Comparison of v and u: Spectrograms of the words ɗuʃmɛl̥ 'draw' (on left) and ɗuʃmɛl̥ 'request' (on right).
studies to determine whether there are indeed pressure and air flow differences.

It was further observed that 'k' and 'kh', 'g' and 'gh', and 't' and 'th' differ phonetically both in duration and in frication. Future perceptual studies may resolve the problem of which acoustic cues are most salient for listeners in distinguishing these pairs of consonants. Similarly, the phonetic difference between the labio-dental 'v' and the bilabial approximant 'vh' shows a length contrast as well as a consonantal contrast.

There is no way to solve the problem of what features should be used phonologically to distinguish between these pairs. The cover features 'tense/lax' and fortis/lenis' are too vague and fail to reveal the phonetic differences. They certainly do not reveal the stop-continuant contrast, although 'by convention' they may reveal the length contrast since in the literature it is often assumed that 'tense' or 'fortis' sounds are longer than their 'lax' or 'lenis' counterparts.

On the phonetic level, I shall use the features [+ long], [+ continuant], and [+ consonantal]. As stated above, there are no compelling phonological reasons to group these consonants into two sets; there exists, for example, no consonant harmony, no consonant alternations, and very few minimal pairs distinguished by the two consonant types. I therefore propose the Distinctive Feature matrices for the phonemes of Ekpheli, as seen in Table 1.

3.0. Derived phonetic segments (allophonic variants)

The phonemes /ts/, /dz/, /s/, and /n/ obligatorily undergo a process of palatalization when immediately followed by a [- consonantal, + high, - back] segment, and are thus realized phonetically as [ɛ], [ɛ], [ɛ], and [n] respectively. This will be discussed below in the section on vowels and glide formation. Examples are seen in the list of morphemes given in (2).

4.0. The vowel system

On the systematic phonetic level, Ekpheli vowel system reveals seven short vowels, as seen in (4);

(4) [i] : [pɪ] 'to shoot'
[e] : [le] 'to eat'
[e] : [ne] 'to defecate'
[u] : [bu] 'to be plenty'
[o] : [do] 'to weave'
[a] : [ka] 'to plant'
[a] : [ma] 'to build (mold)'

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Table 1

SYSTEMATIC PHONEMES OF EKPELI
seven long vowels, as shown in (5);

(5)  

\[ \text{[ii]} : \quad \text{[kwii]} \quad \text{'(to) cut'} \]

\[ \text{[ee]} : \quad \text{[see]} \quad \text{'(to) climb'} \]

\[ \text{[ɛɛ]} : \quad \text{[sɛɛ]} \quad \text{'(to) praise'} \]

\[ \text{[uu]} : \quad \text{[uumhi]} \quad \text{'grass'} \]

\[ \text{[oo]} : \quad \text{[loo]} \quad \text{'(to) imitate'} \]

\[ \text{[ɔɔ]} : \quad \text{[vɔɔ]} \quad \text{'(to) store'} \]

a large number of diphthongs of the type illustrated in (6);

(6)  

\[ \text{[ai]} : \quad \text{[okpʰai]} \quad \text{'basket'} \]

\[ \text{[ae]} : \quad \text{[eːme]} \quad \text{'food'} \]

\[ \text{[aɛ]} : \quad \text{[uɡwaː]} \quad \text{'room'} \]

\[ \text{[au]} : \quad \text{[aumhi]} \quad \text{'spirits'} \]

\[ \text{[ao]} : \quad \text{[ɑokwɪ] \quad \text{'chameleon'}} \]

\[ \text{[aɔ]} : \quad \text{[ukaɔmhi]} \quad \text{'counting'} \]

\[ \text{[oi]} : \quad \text{[ɛkɔi]} \quad \text{'cassava'} \]

\[ \text{[ou]} : \quad \text{[ɔuṃhi]} \quad \text{'corpse'} \]

\[ \text{[ɔa]} : \quad \text{[upunɔa]} \quad \text{'(to) blow out'} \]

\[ \text{[ɛi]} : \quad \text{[ɛkɛi]} \quad \text{'egg'} \]

\[ \text{[ɛe]} : \quad \text{[uθɛe]} \quad \text{'snail'} \]

\[ \text{[ɛu]} : \quad \text{[ɛumhi]} \quad \text{'copper'} \]

\[ \text{[ɛa]} : \quad \text{[ufɛa]} \quad \text{'(to) wash (cloth)'} \]

\[ \text{[ɔi]} : \quad \text{[ɔɔci]} \quad \text{'war'} \]

\[ \text{[ɔɛ]} : \quad \text{[umhoɛmhi]} \quad \text{'having'} \]

\[ \text{[ɔɛ]} : \quad \text{[ɔɔki]} \quad \text{'not'} \]

\[ \text{[ei]} : \quad \text{[esɛi]} \quad \text{'fish'} \]

\[ \text{[eu]} : \quad \text{[ɛumhi]} \quad \text{'coppers'} \]

\[ \text{[ea]} : \quad \text{[uθyea]} \quad \text{'forgetting'} \]

and two other sets of diphthongs of the type observed in (7).
(7) [wi] : [alɔkwɔ] 'chameleon'
[we] : [ɛpwe] 'wealth'
[we] : [aɔwe] 'tomorrow'
[wo] : [udwoyye] 'a king's chest'
[wo] : [oɔdogɔ] 'duck'
[wa] : [oɔɔwɔ] 'harmattan'
[ye] : [ɔyɔye] 'king'
[yɛ] : [aʃyɛ] 'urine'
[yu] : [uduyɔ] 'every palm-tree'
[yɔ] : [uduyɔyɔ] 'king's palm-tree'
[yɔ] : [ufyɔ] 'light (lantern')
[ya] : [ɔfɔyɔ] 'shoe'

It will be demonstrated that the vowels of (4) are the only systematic vowel phonemes of the language, and that those in (5-7) are derived. Section 4.1. will discuss why the feature [mid] is selected over the feature [low] in characterizing the vowels of (4). It will also be argued in Section 4.2. that there are no underlying long vowels. In Section 4.3., it will be shown that there are no underlying diphthongs of the type in (6). In Section 4.4., the diphthongs of the type in (7) will be derived from an underlying sequence of vowel + vowel, whereby the first vowel of the sequence becomes a glide or non-syllabic if it has the feature specification [+ high]. In Section 4.5., further arguments against underlying long vowels and underlying diphthongs of the type in (6) and (7) will be presented.

4.1. Pluralization

Plurality is characterized by the alternation of vowel prefixes, as seen in (8).

(8) [akpa] 'cup' + [íkpa] 'cups'
[ukpo] 'cloth' + [íkpo] 'clothes'
[ini] 'elephant' + [íní] 'elephants'
[gkpe] 'tiger' + [èkpe] 'tigers'
[kppe] 'rat' + [löpe] 'rats'
[ʊxɔ] 'chicken' + [εxɔ] 'chickens'
[εyɛl] 'tortoise' + [εyì] 'tortoises'

In (8), it is observed that nouns which have initial [i], [u], and [a] in the singular show an initial [i] in the plural, whereas those with
initial [o], [ɛ], [ɔ], and [ɔ] in the singular have initial [e] in the plural. The phonetic form of the plural is therefore phonologically conditioned. One might, however, propose a morphological rule by representing the plural prefix as /i/ and stating the conditions under which the /i/ is lowered as in (9).

\[
(9) \quad i \rightarrow e / \begin{array}{c}
V \\
+ P1
\end{array} : \text{where} \begin{bmatrix}
\begin{array}{c}
\text{V} \\
\text{- high} \\
\text{- low} \\
\text{+ Sg}
\end{array}
\end{bmatrix}
\]

(I am ignoring, for now, what the correct feature specification of these vowels should be, which will be discussed below).

Alternatively, one might posit a strictly phonological rule or, rather, two rules, as given in (10a-b).

\[
(10) \quad a. \quad V \rightarrow i / \begin{array}{c}
\alpha \text{ high} \\
- \alpha \text{ low}
\end{array} \\
+ P1
b. \quad V \rightarrow e / \begin{array}{c}
\alpha \text{ high} \\
\alpha \text{ low}
\end{array} \\
+ P1
\]

To collapse rules (10a and b) would be very difficult given the feature specifications of the vowels using [± high] and [± low]. Furthermore, one must distinguish between [e] and [ɛ], and [ɔ] and [ɔ]. Using the SPE (1968) features we would thus distinguish between the vowels as given in (11).

\[
(11) \quad i \quad e \quad \epsilon \quad u \quad o \quad \sigma \quad a
\]

\[
\begin{array}{c}
\text{high} \\
\text{back} \\
\text{low} \\
\text{tense}
\end{array} \begin{array}{c}
+ \\
- \\
- \\
+ \\
- \\
+ \\
- \\
+ \\
- \\
+
\end{array}
\]

Using these features, rules (9) and (10) would be stated as in (12) and (13).

\[
(12) \quad V \rightarrow [\text{- high}] / \begin{array}{c}
\begin{array}{c}
V \\
\text{+ P1}
\end{array}
\end{array} : \text{where} \begin{bmatrix}
\begin{array}{c}
\text{V} \\
\text{- high} \\
\text{- low} \\
\text{+ Sg}
\end{array}
\end{bmatrix}
\]

\[
(13) \quad a. \quad \begin{array}{c}
V \\
\text{+ P1}
\end{array} \rightarrow [\text{+ high}] / \begin{array}{c}
\begin{array}{c}
\alpha \text{ high} \\
- \alpha \text{ low}
\end{array}
\end{array}
\]

\[
b. \quad \begin{array}{c}
V \\
\text{+ P1}
\end{array} \rightarrow [\text{- high}] / \begin{array}{c}
\begin{array}{c}
\alpha \text{ high} \\
\alpha \text{ low}
\end{array}
\end{array}
\]

\[
19
\]
If instead of using the feature [± low] we used the feature [± mid] the vowels would be specified as in (14).

\[
\begin{array}{cccccc}
  i & e & \varepsilon & u & o & a \\
\text{high} & + & + & - & + & - \\
\text{back} & - & - & + & + & + \\
\text{mid} & - & + & - & + & + \\
\end{array}
\]

Not only does the feature Mid permit a simpler description but it also permits less complex rules, revealing the generalization in a more intuitively satisfying way. The morphological rule would be stated as in (15), while the phonological alternative would be as in (15').

\[
(15) \quad \text{Pluralization} \quad V \rightarrow [+ \text{mid}] / \left[ \begin{array}{c}
  + P1 \\
  + Sg \\
\end{array} \right] : \text{where} \left[ \begin{array}{c}
  V \\
  + \text{mid} \\
\end{array} \right]
\]

\[
(15') \left[ \begin{array}{c}
  V \\
  + P1 \\
\end{array} \right] \rightarrow \left[ \begin{array}{c}
  + \text{high} \\
  - \text{back} \\
\end{array} \right] / \left[ \begin{array}{c}
  a \text{ mid} \\
\end{array} \right]
\]

Exceptions to these phonologically conditioned plurals are semantic noun class conditioned plurals, as seen in (16).

\[
(16) \quad \begin{array}{cccc}
  a. \ [\text{alo}] & \text{'face'} & \rightarrow & [\text{alo}] & \text{'face's'} \\
  b. \ [\text{ekoli}] & \text{'tooth'} & \rightarrow & [\text{ako}] & \text{'teeth'} \\
  c. \ [\text{obo}] & \text{'hand'} & \rightarrow & [\text{abo}] & \text{'hands'} \\
  d. \ [\text{owe}] & \text{'leg'} & \rightarrow & [\text{agwe}] & \text{'legs'} \\
  e. \ [\text{olumhi}] & \text{'corpse'} & \rightarrow & [\text{alumhi}] & \text{'corpses'} \\
  f. \ [\text{oyya}] & \text{'person'} & \rightarrow & [\text{oyya}] & \text{'people'} \\
  g. \ [\text{ojo}] & \text{'child'} & \rightarrow & [\text{iuya}] & \text{'children'} \\
  h. \ [\text{ozzawoli}] & \text{'man'} & \rightarrow & [\text{idzawoli}] & \text{'men'} \\
  i. \ [\text{okpotso}] & \text{'woman'} & \rightarrow & [\text{ikpotso}] & \text{'women'} \\
  j. \ [\text{obo}] & \text{'European'} & \rightarrow & [\text{ibo}] & \text{'Europeans'} \\
\end{array}
\]

Examples (16a-f) take an [a] prefix in the plural. Notice also that most of these examples of (a-f) are body parts. This suggests a possible historical explanation in the sense that the [a] plural form might be a remnant of the Proto-Niger-Congo gender /ku/-/-a/ (sg./pl.) which was used for 'hand', 'leg', and other body parts. Examples (e-f) indicate that the nouns 'corpse' (a dead body), and 'person' (a live body) may also have been considered as 'body parts'. (The irregularity
of (b) and (d) will be discussed under Section 4.5.) Examples (g-j) illustrate that a number of nouns with a possible feature characteristic [+ human] take a semantic noun class conditioned plural [i]. In example (g), the word for 'child' is seen to be irregular in the plural. Not all nouns with the semantic feature [+ body part], or [+ human] take the semantic noun class conditioned plurals [a], or [i]. A number of examples of such nouns are given in (17).

(17) a. [usomhi] 'head' + [lsomhi] 'heads'
b. [ukpho] 'heart' + [ikpho] 'hearts'
c. [ugwa] 'bone' + [igwa] 'bones'
d. [ayu] 'belly' + [iyu] 'bellies'
e. [egbe] 'body' + [egbe] 'bodies'
f. [esa] 'cheek' + [esa] 'cheeks'
g. [elo] 'ear' + [elo] 'ears'
h. [eto] 'hair' + [eto] 'hair'
i. [eθa] 'father' + [eθa] 'fathers'
j. [edo] 'husband' + [edo] 'husbands'

In (17), examples (a-j) take phonologically conditioned plurals regardless of the fact that they are characterized by the features [+ body part] (examples (a-h)), or [+ human] (examples (i-j)). The fact that a large number of nouns with the features [+ body part], or [+ human] take the phonologically conditioned plurals is evidence that example (16a-j) which takes the semantic noun class conditioned plurals is an exception to rule (15). Furthermore, the exceptions of example (16a-j) are the only ones found in the data collected for this research. They will simply have to be marked as exceptions to rule (15) in the lexicon. One might wish to provide two minor rules such as seen in (18).

(18) a. PL + a/ + exception
      + body part
      Sg

      b. PL + i/ + exception
         + human
         Sg

One last topic to be discussed on plurality is what happens to long vowels of the type in (5) and the diphthongs of the sort in (6) when taking the plural. Illustrations are given in (19).

21
(19) a. [aokwi] 'chameleon' $\rightarrow$ [iokwi] 'chameleons'
b. [aeye] 'buffalo' $\rightarrow$ [ieye] 'buffaloes'
c. [eamhi] 'meat, animal' $\rightarrow$ [eemhi] 'meats, animals'
d. [oemhi] 'tongue' $\rightarrow$ [eemhi] 'tongues'
e. [uumhi] 'grass' $\rightarrow$ [iumhi] 'grasses'

Examples of (19a-e) illustrate that only the first part (vowel) of diphthongs and long vowels is affected by the application of rule (15) (pluralization), and not the entire unit as might be the case (i.e.,
[aokwi] $\rightarrow$ *[iokwi], [eamhi] $\rightarrow$ *[eimhi], [oemhi] $\rightarrow$ *[eemhi], and
[uumhi] $\rightarrow$ *[iumhi] after the application of rule (15) since rule (15)
effects the prefix of nouns, as was observed in examples (16) and (17).
This seems to indicate that the diphthongs and long vowels of the
examples of (19a-e) are not functioning as a single diphthong or long
vowel segment, but rather as sequences of two separate vowel segments.
Furthermore, it appears that the diphthongs and the long vowels of (19)
belong to two separate morphemes (i.e., the first vowel of the diphthongs
and long vowels that alternates when undergoing the application of rule
(15) belongs to the prefix morpheme, while the second vowel belongs to
the stem.) Moreover, it will be illustrated in Sections 4.2., and 4.3.
that such surface diphthongs and long vowels as seen in (19) are derived
from the deletion of an intervocalic /l/. In conclusion, it seems that
the process of pluralization offers evidence that the diphthongs of the
type in (6) and the long vowels of the sort in (5) should be interpreted
as sequences of two contiguous vowels, rather than underlying diphthongs
and underlying long vowels.

4.2. Surface long vowels

On the systematic phonetic level, Ekpheli exhibits contrastive
vowel length, as seen in (20).

(20) a. b.
[i] : [pi] ' (to) shoot' [ii] : [kwi] ' (to) cut'
[e] : [de] ' (to) fall' [ee] : [see] ' (to) climb'
[e] : [de] ' (to) buy' [ee] : [see] ' (to) praise'
[o] : [lo] ' (to) enter' [oo] : [l00] ' (to) imitate'
[o] : [vo] ' (to) be filled' [oo] : [voo] ' (to) store'
[a] : [da] ' (to) drink' [aa] : [daa] ' (to) melt'

It will be argued that the vowels of (20b) are not phonological long
vowels, but rather they are sequences of two identical vowels of the
type in (20a). The examples of (21) illustrate one of the many ways in
which the vowels of (20b) are derived.
(21) Underlying Form | Surface Form  
---|---
a. /kwi:/ 'to cut' → [kwi:] or [kwil\_]
b. /sele/ 'to climb' → [see] or [sele]
c. /sεlε/ 'to praise' → [sεe] or [sεlε]
d. /dala/ 'to melt' → [daa] or [dala]
e. /lolo/ 'to imitate' → [lolo] or [lolo]
f. /volo/ 'to store' → [voo] or [volo]

In (21), long vowels are derived by deleting an intervocalic /l/ leaving behind two adjacent identical vowels. The long vowels of the surface form of (21) are found to contrast with verbs that have short vowels (compare for example [da] '(to) drink', [lo] '(to) enter', and [vo] '(to) be filled' with examples (21d-f)). It should be mentioned here that the surface forms of (21) may or may not contain an intervocalic /l/ (e.g., compare the two columns under Surface Form). Consequently, any rule deleting an intervocalic /l/ must be optional. Therefore, an optional intervocalic /l/ deletion rule is posited in (22) to account for the surface forms of (21).

(22) /l/ Deletion (optional):

\[
\begin{array}{c}
\text{[+ con]} \\
\text{[+ voc]} \rightarrow \emptyset / \text{[+ voc]} \\
\text{[+ cont]}
\end{array}
\]

Furthermore, the optionality of this rule explains why there are phonetic long vowels, as well as why all intervocalic /l/’s are not deleted. Not only is rule (22) applicable to verbs as seen in (21), but it is also applicable to nouns, as illustrated in (23).

(23) Underlying Form | Surface Form  
---|---
a. /ebili/ 'darkness' → [ebii] or [ebili]
b. /umhele/ 'salt' → [umhe] or [umhele]
c. /igbafεɛɛ/ 'rice' → [igbafeεɛ] or [igbafεɛɛ]
d. /ulumhi/ 'grass' → [ulumhi] or [ulumhi]
e. /ilolo/ 'song' → [iloo] or [ilolo]
f. /oθolo/ 'guinea fowl' → [oθolo] or [oθolo]
g. /agbala/ 'main road' → [agbao] or [agbala]

It must be mentioned that there are cases where rule (22) is non-applicable (i.e., rule (22) cannot optionally apply). This refers to morphemes like the example seen in (23e) whereby only one of the two intervocalic /l/’s is deleted, and to morphemes like /ulumhi/ 'entering' whereby the intervocalic /l/ is the only consonant of the stem (i.e., /u/....../mhi/
are affixes for forming the gerundive). Therefore, if both intervocalic /l/’s are deleted from example (23e) and the only intervocalic /l/ is deleted from /ulomhi/, the stems will be left without an important part of their identification. The examples (where intervocalic /l/ is not deleted when it is the main consonant of the stem) are far more common with verbs than nouns, particles, pronouns, articles, and other grammatical morphemes. Nevertheless, there still remains this general tendency in Ekpheli to retain intervocalic /l/ when its deletion would create a loss of identification of utterances, as observed in (24).

(24) \begin{tabular}{ll}
\text{Uncontracted Form} & \text{Contracted Form} \\
\hline
a. \(\text{o} \text{ l'\text{o}}\text{wa}\) & b. \(\text{\text{o}}\text{l'\text{o}}\text{wa}\) & c. \(\text{\text{o}}\text{owa}\) \\
he enter house & he entered house & he entered a house \\
\end{tabular}

The utterance of (24a) is possible, acceptable and understandable, but not usually spoken. That is, since it is totally unambiguous, it usually appears in spoken language (as opposed to written) for the purpose of clarity. The utterance of (24b) is what one almost always hears. As can be observed (but less discernible here since two like vowels are concerned), the vowel of the verb is deleted. The final vowel of verbs is always deleted whenever contracted with noun objects (see Section 4.5). Since this is the case with contractions, it usually results in utterances that are ambiguous as is the case of (24b) which has three or more possible meanings. For example, in addition to the meaning given in (24b), it can also mean "he ate a house" (from the verb /le/ 'to eat'), or it can mean "he knew a house" (from the verb /le/ 'to know'). In (24c), if both /l/ deletion and vowel deletion occurs, the entire verb is deleted leaving a pronoun and a noun; the complete identification of the verb is lost. This explains why all intervocalic /l/’s are not deleted. Consequently, we are left with a rule that is phonologically motivated or conditioned, but psychologically constrained (i.e., it can optionally apply to intervocalic /l/’s where the identification of morphemes or utterances is not lost.)

Thus, phonology is not autonomous; semantic factors may constrain phonological processes. Intervocalic /l/ deletion in Ekpheli provides interesting data regarding the necessity of semantic information within phonology. Current linguistic theory doesn't allow us a way to formalize such processes that are phonologically motivated and semantically constrained. It will be noticed in Section 4.3 that glide deletion encounters the same problems. One might suggest that in such cases we find an interaction of grammatical and pragmatic factors which are at present unaccountable for in any theoretical framework. The /l/ deletion rule therefore requires a condition blocking its application when the result would be unclarity or ambiguity.

Other cases where long vowels are derived are of the type in (25).
Again, the phonetic forms of (25) can surface with the presence of the intervocalic /i/, as seen in column (2). Consequently, rule (22) is also optional in this case. Notice that if rule (22) applies to the underlying form of column (1), the output of rule (22) would not give the surface forms of column (4), but rather [esel], [ekel], [oxi], and [ukphal] respectively. These forms can, however, also surface phonetically. Therefore, an intermediate stage whereby an optional assimilation rule would apply to [esel], [ekel], [oxi], and [ukphal] to give the surface forms of column (4) is needed. This optional assimilation rule will be as in (26).

(26) /i/ Assimilation (optional)

\[
\begin{array}{c}
\text{v} \\
+ \text{high} \\
- \text{back} \\
- \text{mid}
\end{array} \rightarrow \begin{array}{c}
\text{aF} \\
\text{V}
\end{array} / \begin{array}{c}
\text{aF} \\
\text{\#}
\end{array}
\]

This rule states that /i/, in word final position, will assimilate to the features of the preceding vowel. Since the forms *[esele], *[ewolo], *[ekeli], *[oxi], and *[ukphala] never surface phonetically, this suggests that rule (22) if applied to the underlying form of (25) must be ordered before rule (26) if rule (26) is to apply, or both rules could apply simultaneously. However, simultaneous rule application would not account for the fact that the following forms can occur, e.g., [esel], [esel], [esel]. That is, rule (26) can only apply if rule (22) has applied.

4.3. Diphthongs of the type in (6)

Ekhqeli exhibits a large number of diphthongs (a sequence of two contiguous non-identical vowels), as seen in (27).
These diphthongs of (27) are derived, as observed in (28).

(28) a. [aɪ] : /okhali/ → [okhæ] 'basket'
b. [æe] : /emæle/ → [emæ] 'food'
c. [æɛ] : /ugwaɛ/ → [ugwaɛ] 'room'
d. [au] : /alumahi/ → [aumhæ] 'spirits'
e. [æo] : /alokui/ → [aokwæ] 'chameleon'
f. [ao] : /ukømæhæ/ → [ukømæhæ] 'counting'
g. [oi] : /ekowi/ → [ekowi] 'cassava'
h. [ou] : /olumhi/ → [olumhi] 'corpse'
i. [oæ] : /upunoyæ/ → [upunovæ] 'to blow out'
j. [ɛi] : /ekæli/ → [ekæi] 'egg'
k. [ɛɛ] : /uðæle/ → [uðæ] 'snail'
l. [ɛa] : /ufæya/ → [ufæ] 'to wash (cloth)'
m. [ɛu] : /ɛlumhi/ → [ɛlumhi] 'copper'

It can be observed in (28a-h, j-k, m-o, q, and s) that a number of these diphthongs are derived by the deletion of an intervocalic /l/. Examples (28i, l, and r) illustrate that other such diphthongs are derived by the deletion of an intervocalic /y/. Examples (28p) is shown to be derived from the deletion of an intervocalic /w/. Since the forms left of the arrow are capable of surfacing phonetically with all consonants remaining intact, whatever deletion rules that are necessary to reduce the
forms left of the arrow to those that are right of the arrow must be optional. Rule (22) can account for the optional deletion of intervocalic /l/’s in example (28a–h, j–k, m–o, q, and s). On the other hand, the examples of 28(i, l, r, and p) suggest the positing of an optional glide deletion rule of the form in (29).

(29) Glide Deletion (optional)

\[
\begin{align*}
\text{[- con]} & \rightarrow \emptyset / [+ \text{ voc}] \ldots [+ \text{ voc}] \\
\text{[- voc]} & \\
(y,w)
\end{align*}
\]

Furthermore, rule (22) and rule (29), having the same environment, can be collapsed into the rule of (30).

(30) Lateral and Glide Deletion (optional)

\[
\begin{align*}
\text{[a con]} & \rightarrow \emptyset / [+ \text{ voc}] \ldots [+ \text{ voc}] \\
\text{[a voc]} & \\
\text{[+ cont]} & \\
(l,w,y)
\end{align*}
\]

Rule (30), like the intervocalic /l/ deletion rule (22), will apply to glides that will not result in a loss of identification of morphemes. /y/, for example, is found to delete when occurring in what might be called a suffix or splitting verbal units as seen in (31).

(31) /fe:ya/ 'to wash' \rightarrow [fe:a] \\
/ve:ya/ 'to break' \rightarrow [ve:a] \\
/ye:ya/ 'to forget' \rightarrow [ye:a] \\
/val:aya/ 'to separate' \rightarrow [val:aa] \\
/pun:oya/ 'to blow out' \rightarrow [pun:oa] \\
/kpo:luya/ 'to clean' \rightarrow [kpo:lu:a] \\
/gwɔ:ya/ 'to demolish' \rightarrow [gwɔ:ya:a]

The verbs of (31) all have an underlying meaning that involves "away or out"; /ya/ adds this particular meaning to verbs. It occurs only as a "suffix" added to verbs, i.e., never occurs as a verb. However, any object of the verbs of (31) occurs between the verb and /ya/ (e.g., o pun(o) e:šai ya "he blew out the fire").

The deletion of /w/ is most commonly associated with the negative construction and the word /ɔwə/'who'.

Thus far, it has been argued that there are no underlying diphthongs of the type in (6). Furthermore, it has been illustrated that any such surface diphthongs are not vowel sequences in their underlying representations, but have an intervening consonant. There remain, however, a few cases that must be treated as exceptions. Such exceptions, for
example, never surface as diphthongs. Nevertheless, they must be treated as vowel sequences in their underlying representation. Illustrations are given in (32).

(32)  
1.       2.       3.  
   a. /ášsə/ → ā̀səl āsl 'ant'  
   b. /ō̞bə/ → ā̀bə̀bə̀ ābə̀ 'European'

The underlying form is given in column (1). Note that the initial stem vowel of column (1a-b) is /i/. The vowel prefix of (a) is /a/, while (b) is /o/. In column (2) the stem vowel undergoes an obligatory rule of vowel assimilation whereby it assimilates to the vowel prefix. In column (3), one of the identical vowels is deleted. The motivation for positing an underlying vowel sequence that never surfaces phonetically is of several sources. First, there is evidence in other dialects that an intervening consonant of (32a) still surfaces phonetically (e.g., [ā̀səl] 'ant', see Appendix, word no. 12). In Ekpheli, it is obvious that the intervening consonant has been lost. This alone, of course, would not justify lexical representation which never surfaces if this were the only evidence. A second reason for positing the phonemic forms in column (1) is provided by the plural forms of these words. If the underlying representations were those of column (2) or column (3), the expected plurals (see Section 4.1) would be [iasi] / [isi] and [iibo] / [ibo] respectively. These are, instead [iisi] / [isi] and [iibo] / [ibo].

Given the underlying representations as suggested above one also can derive the falling tones and the long vowels from sequences of vowels as will be shown to be a regular process in Ekpheli (see Chapter III, and Section 2.1).

This /i/ assimilation rule is almost identical to rule (26) except in its obligatory nature. One might collapse these rules as shown in (33).

(33). /i/ Assimilation.  

\[ V \quad \begin{array}{c} + \text{high} \\ \text{- back} \\ \text{- mid} \end{array} \quad + [aF] / [aF] \]  

\( \begin{array}{c} \text{Condition} \\ \langle+\text{Stem}\rangle \end{array} \) = obligatory.

This rule states that /i/, whenever occurring as the initial vowel of a stem or a final vowel, will assimilate to the immediately preceding vowel. This rule would then be followed by a vowel contraction rule of the form in (34).

(34) Vowel Deletion (optional)  

\[ + \text{voc} \quad \begin{array}{c} \text{- con} \\ \text{[aF]} \end{array} \quad + \text{voc} \quad \begin{array}{c} \text{- con} \\ \text{[aF]} \end{array} \]
4.4. **Diphthongs of the type in (7)**

At the systematic phonetic level, Ekpheli displays a number of diphthongs of the sort in (35).

(35)  

(a) wi *wu  
    we wo we     
    wa     

(b) *yi yu  
    ye yo ye     
    ya     

We are concerned here with these glide + vowel diphthongs that occur after consonants (e.g., [twɛ] 'to cost', and [pyɛ] 'to clear bush'). The diphthongs *[wu]* and *[yi]* are starred in (35) to indicate the non-occurrences of such diphthongs, which will be discussed below. It will be illustrated in this section that none of the diphthongs of (35) occur at the systematic phonetic level, but are derived from underlying sequences of two contiguous vowels, as in (36).

(36)  

(a) /alokui/ 'chameleon' + [alokwi]  
(b) /epue/ 'wealth' + [epwe]  
(c) /axwe/ 'tomorrow' + [axwe]  
(d) /oθwa/ 'harmattan' + [oθwa]  
(e) /oθgua/ 'duck' + [oθgua]  
(f) /oθle/ 'king' + [oθle]  
(g) /afве/ 'urine' + [afwe]  
(h) /ofла/ 'shoe' + [ofла]  
(i) /ufio/ 'light (lantern)' + [ufio]  

The vowels that concern us here are underlined. Notice that each vowel sequence begins with a vowel of the feature specification [+ high]. And that, it is these vowels that undergo a feature change when immediately preceded by a segment of the specified feature [+ con], and immediately followed by a [+ voc] segment. This feature change of high vowels does not take place, however, if the specified environment is not met. That is, if a /u+V/ or /i+V/ sequence is not immediately preceded by a [+ con] segment, the process does not occur (e.g., when an intervocalic /l/, of the type in /llokui/ 'chameleons', is deleted leaving behind a vowel sequence /l+o/, it does not become *[yokwi]* since it is not immediately preceded by a [+ con] segment. The /l/ in this case is a plural prefix (see Section 4.1.). Furthermore, it must be specified that the immediately following vowel in such sequences as /u+V/ and /i+V/ (where /V/ stands for vowel) must not be of the identical feature specification of the preceding high vowel (i.e., the [+ high, + voc] segment will not undergo
a feature change to [-voc] if the immediately following vowel has identical feature specification (e.g., when an intervocalic /i/ is deleted in /ebili/ 'darkness', it does not become *[ebyi]*, but rather, it remains [ebili], or the final /i/ can be optionally deleted leaving behind [ebi]).

Due to the fact that most of the VV sequences (except for examples of the type /aisi/ 'ant' and /oubo/ 'European') in previous discussions were derived (e.g., from the deletion of intervocalic /i/, /y/, /w/), one can ask why are there only the occurrences of underlying VV sequences of the type is example (36), and why underlying glides are not posited instead. A possible historical reason is that the vowel sequences of the type in (36) have permanently lost their intervening consonants during the course of history. Synchronic evidence with intervening consonants of some of the VV sequences of the type in (36) is found in cross dialectical comparison. For example, the word for 'beans' is /ezili/ in Aviele, and /isili/ in South Unene, while it is /efi/ in Ekpheli, Auchi, AvIanwu, Uzairue, and South Ibie. Notice that in the former dialects, the word for 'beans' occurs with the intervocalic /i/, while in the latter it occurs without. Similarly, the infinitive 'to faint' is /unili/ in Ekpheli, Uzairue, and South Ibie, while it is /unili/ in Weppa-Wano, and Avianwu. The word for 'voice' is /wulii/ in Auchi, /urulii/ in Uzairue, and /wulii/ in Ekpheli. The word for 'bundle' is /ukuli/ in Auchi, /ukulii/ in Uzairue, /ukuli/ in Ekpheli, /uxuli/ in Weppa-Wano, and Avianwu, and /uxuli/ in South Ibie. See Appendix for more examples. Further support for positing underlying VV sequences to derive the glides of (36) will be presented in this section below and Section 4.5.

Support for deriving the diphthongs of (35) from sequences of underlying vowels is provided by the noun + noun associative construction as shown in (37).

(37) 1. a. /udu # oyile/  uduoyile  [udwoyye] 'chest of a king'
     b. /udi # oyile/  udioyile  [udcyye] 'palm-tree of a king'

We are concerned with the underlined vowels. In column (1) of (37) the two morphemes are given in their underlying forms. A sequence with two contiguous vowels is observed in column (2). In column (3), the [+voc, + high] segments have undergone a feature change to [-voc]. In the associative construction these [+voc, + high] segments fail to undergo a feature change if the immediately following vowel is of the identical feature specification, as illustrated in (38).

(38) 1. a. /idu # ukpeko/  iduukpeko  [idukpeko] 'lion of a village'
     b. /euyi # iko/  eyiloiko  [eyiko] 'tortoise of a messenger'

30
Again, the underlying forms are given in column (1). A sequence of two contiguous vowels is seen in column (2). The two identical vowels are contracted in column (3) (see Section 4.5 on vowel contraction).

We have observed in this section that [+ voc, + high] segments undergo a feature change to [- voc] when immediately following a [+ con] segment and immediately preceding a [+ voc] segment within morphemes and across morpheme boundaries. Furthermore, it was illustrated that if the immediately following vowel has identical features, then the [+ voc, + high] segment will not undergo the feature change to [- voc]. In order to capture the generalization of this glide formation process, a rule of the form in (39) is posited.

(39) Glide Formation.
\[ V_1 \rightarrow [- \text{ voc}] / C [\overline{+ \text{ voc}} ] V_2 \]

Condition: \( V_1 \neq V_2 \)

The [+ high, - back] glide ([y]) has a palatalizing effect on some immediately preceding consonants. That is, the consonants /ts/, /dz/, /s/, and /n/ obligatorily undergo a process of palatalization when occurring immediately before a glide of the feature specification [+ high, - back], and, therefore, surface phonetically as [치], [치], [치], [치] respectively. All of the above consonants, except for the /ts/, require the presence of the glide [y] in order to undergo the palatalization process. That is, while /ts/ can optionally undergo the process of palatalization when occurring immediately before the [+ high, - back] vowel [i] (e.g., /itsi/ 'pig' can surface phonetically as [치si] or [치si]), /dz/, /s/, and /n/ cannot (e.g., /odzi/ 'crab', /usi/ 'law', and /ini/ 'elephant' cannot surface phonetically as *[치o]i*, *[치u]i*, and *[치n]i* respectively). Thus, palatalization of /ts/ is more general than that of the other segments. The optional rule for palatalization in this case is stated in (40).

(40) Palatalization (optional).
\[ /ts/ \rightarrow [치] /__i \]

Since palatalization is conditioned by the glide formation, the palatalization rule of the form in (41) must be ordered after the glide formation rule of (39).

(41) Palatalization (obligatory).
\[
\begin{array}{c}
\text{ts} \\
\text{dz} \\
\text{s} \\
\text{n}
\end{array}
\rightarrow
\begin{array}{c}
치 \\
치 \\
치 \\
치
\end{array}
\rightarrow
\begin{array}{c}
\_y \\
\_y
\end{array}
\]

In various proposed feature sets there is no one feature which would distinguish [치s], [치], and [치] as a class from [치] and [치]. Yet,
the four segments constitute a class which appears to be intuitive. Research in experimental phonetics is required to determine whether these sounds, excluding the alveolar/dental stops, are phonetically similar. One may find that a feature apical vs. laminal is needed. At this point, all we can suggest is a rule of the form in (42).

(42) Palatalization.

\[
\begin{array}{c}
\begin{cases}
+ \text{cor} \\
+ \text{del rel}
\end{cases}
\end{array}
\begin{cases}
+ \text{retracted} \\
+ \text{high} \\
- \text{back}
\end{cases}
\rightarrow \quad /\_y\]

This rule is one way of expressing rule (41) in features. The glide [ŋ] can be optionally deleted by rule (43) after the palatalization rule has applied.

(43) Glide Deletion Rule (optional).

\[ [+ \text{Seg}] \rightarrow \emptyset \ / \ [+ \text{retracted}]\]

\[ y \]

This rule specifies that the glide [ŋ] can be optionally deleted only when occurring immediately after [č], [ğ], [ɔ], and [n].

A sample derivation of the operation of the rules (39), (41), and (43) are given in (44).

(44) Underlying Form  

<table>
<thead>
<tr>
<th>Rule (39)</th>
<th>Rule (41)</th>
<th>Rule (43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/itsic/ 'yours'</td>
<td>itsyɛ</td>
<td>išyɛ</td>
</tr>
<tr>
<td>/iridzia/ 'well (water)'</td>
<td>iridzya</td>
<td>iri'ya</td>
</tr>
<tr>
<td>/enesic/ 'few'</td>
<td>enesyɛ</td>
<td>enešyɛ</td>
</tr>
<tr>
<td>/aniow/ 'wine'</td>
<td>anyo</td>
<td>anyo</td>
</tr>
</tbody>
</table>

Not only does the process of palatalization operate within morphemes, but it also operates across morpheme boundaries, as seen in (45) (the associative construction).

(45)

1. /itsi # oye/ 'pig' 'king'  
2. itsloye itsoyoe  išoyye [išoyye] 'king's pig'  
3. /odzi # oye/ 'crab' 'king'  
4. odyoye odyoye išoyye [išoyye] 'king's crab'  
5. /usi # oye/ 'law' 'king'  
6. usiøyie usiyyee ušoyye [ušoyye] 'king's law'  
7. /ini # oye/ 'elephant' 'king'  
8. iniøyie iniyyee iniyy ee [iøyye] 'king's elephant'

The vowels, diphthongs, and consonants that concern us here are underlined. In column (1), the underlying forms are given. In column (2),

\[ \quad \]

32
the two vowels of column (1) are now contiguous. In column (3), rule (39) applies. Rule (41) applies to the output of rule (39) in column (4). In column (5), rule (43) applies.

The one remaining vowel that requires some discussion is /u/, which has a rounding or labializing effect on the consonant /m/ (e.g., /mu/ 'to catch' surfaces phonetically as [mew]). This suggests the rule in (46).

\[
\begin{align*}
\text{[+ nasal]} & \quad + \text{ round} \\
\text{[+ long]} & \quad \underline{+ \text{ high}} \\
\text{+ ant} & \quad \underline{+ \text{ round}} \\
\text{m} & \\
\end{align*}
\]

This rule states that /m/ takes on the feature [+ round] or becomes labialized before the vowel /u/.

4.5. Vowel contraction

The final vowel of verbs is always deleted when preceding a vowel prefix of an immediately following noun object, as seen in (47).

(47) 1.  
   a. /de # akpa/  \rightarrow [dakpa]  'buy' 'cup'  
      'make' 'cup'
   b. /sese # akpa/  \rightarrow [sesakpa]  'make' 'cup'

The underlying form (except for tone) is given in column (1). Observe in column (2) that vowel deletion applies to the final vowel of both monosyllabic verbs (as in (a)) and disyllabic verbs (as in (b)).

The process of vowel deletion fails to operate, however, if the final vowel of the verb is either /i/ or /u/, unless the immediately following vowel prefix is also either /i/ or /u/ respectively. /i/ and /u/ (see Section 4.4.) become [y] and [w] respectively. Examples are given in (48).

(48)  
a. /pi # ekpe/  \rightarrow [pyekpe]  'shoot a tiger'
   b. /du # akpa/  \rightarrow [dwakpa]  'carry a cup'
   c. /fomhi # owa/  \rightarrow [fomhyowa]  'sweep a house'
   d. /pi # ldu/  \rightarrow [pidu]  'shoot a lion'
   e. /du # ukpo/  \rightarrow [dukpo]  'carry a cloth'

In (48a-c), it is noted that when the vowel prefix of the noun object is not identical in feature specifications to the final vowel of the verb,
the final vowel of the verb (whether monosyllabic or disyllabic) undergoes a glide formation rule (39). Observe that such diphthongs of column (2a-c) are of the type seen in (7). To the contrary, examples (d-e) show that the glide formation fails if the final vowel of the verb and the vowel prefix of the noun have identical feature specifications. This process of vowel contraction in the above cases can be accounted for with a rule of the form in (49).

\[
\begin{array}{c}
V_1 \\
V_2
\end{array}
\xrightarrow{\text{Condition } V_1 = V_2}
\begin{array}{c}
\emptyset \\
\text{Verb}
\end{array}
\]

This rule states that the final vowel of a verb is deleted when contracted with a vowel prefix, and that the high vowels (/i/ and /u/) are deleted only if they are identical to the vowel prefix with which they are contracted. The condition of rule (49) can be abandoned if a rule ordering is imposed on rule (39) (glide formation) and rule (49) (regressive vowel deletion), whereby rule (39) must precede rule (49) in the ordering. Thus, rule (39) (ordered before rule (49)) will change all appropriate high vowels into glides. Then rule (49) will simply delete the remaining correct vowels.

The phonological processes of vowel deletion (rule (49)) as observed in the examples of (48) and intervocalic /l/ deletion (rule (22)) as seen in the examples of (21), (23), and (25) can create long vowels of the type in (5) and diphthongs of the type in (6). Illustrations are given in (50).

\[
\begin{array}{c|c|c}
1. & 2. & 3. \\
\hline
\text{/kαlɔ́ # ayia/} & \text{[kalayya]} & \text{[kaayya]} \\
\text{"count"people"} & \text{"count people"} & \\
\text{/kαlɔ́ # eselɛ/} & \text{[kaleseli]} & \text{[kaeseli]} \\
\text{"count"fish"} & \text{"count fish"} & \\
\text{/kαlɔ́ # eselɛ/} & \text{[kaleseli]} & \text{[kaeseli]} \\
\text{"dry"fish"} & \text{"dry fish"} & \\
\text{/sɛlé # akatsi/} & \text{[selakači]} & \text{[sekači]} \\
\text{"mount"horse"} & \text{"mount a horse"} & \\
\text{/sɛlé # eθa/} & \text{[seleθa]} & \text{[seeθa]} \\
\text{"climb"trees"} & \text{"climb trees"} & \\
\end{array}
\]

Note that the forms of column (2) and (3) can both surface phonetically.
The final vowel of the verb is deleted in column (2). In column (3), the intervocalic /l/ is deleted. Observe in column (3a,c,e) that long vowels of the type in (5) are created. It is further shown in column (3b-d) that diphthongs of the type in (6) are derived.

Furthermore, the final vowel of a noun stem is deleted when contracted
with an immediately following vowel prefix, as observed in (51).

(51) 1. /owa # oyie/ \rightarrow [owoyye] 'a king's house'
house''king

Again, vowel deletion fails to operate if the final vowel of the nouns is /i/ or /u/, unless the following vowel prefix happens to be /i/ or /u/ respectively. Examples are given in (52).

(52) 1. a. /udi # oyie/ \rightarrow [udyoyye] 'a king's palm-tree'
palm-tree 'king'
b. /idu # oyie/ \rightarrow [idwoyye] 'a king's lion'
lion''king
c. /udi # oko/ \rightarrow [udiko] 'a messenger's palm-tree'
palm-tree''messenger'
d. /idu # ukpeko/ \rightarrow [idukpeko] 'a village's lion'
lion''village'

Rule (49) can therefore also account for this process as shown in (53).

(53) Regressive Vowel Deletion.
\[ \begin{array}{c}
\rightarrow \emptyset \\
\downarrow \text{Regressive Vowel Deletion}
\end{array} \]
\[ \begin{array}{c}
V_1 \\
\langle + \text{high} \rangle \\
\text{Condition: } \langle v_1 = v_2 \rangle
\end{array} \]
\[ V_2 \text{Prefix} \]

Again, the condition of rule (53) is unnecessary if an ordering is imposed on rule (39) (glide formation) and rule (53) whereby rule (39) must precede rule (53) in the ordering.

While it is obvious in example (52a-b) that the diphthongs of the type [yo] and [wo] are derived from sequences of underlying vowels of /i + o/ and /u + o/ respectively, it is not so obvious in the examples of (54) that such diphthongs are derived from sequences of two underlying vowels.

(54) 1. a. /ayua # okpotso/ \rightarrow aywa okpotso \rightarrow [aywəkpotso] 'dog''woman'
b. /efia # okpotso/ \rightarrow efya okpotso \rightarrow [efyəkpotso] 'shoes''woman'

In column (1), the underlying form is given. The vowel sequences /u a/ and /i a/ underwent glide formation in column (2). In column (3), vowel deletion applies, giving the surface form. There is no real motivation for column (2) to occur before column (3) since it appears that vowel de-
letion can occur before glide formation, simultaneous with glide formation, or after glide formation, and the output will still be that of column (3). Therefore, it is not at all obvious as to which vowel (i.e., the /a/ or the /o/) conditions the glide formation, or whether these glides occur in the underlying matrices. The problem is further complicated, as seen in example (55).

\[(55)\]

\[
\begin{array}{cccc}
(1) & (2) & (3) & (4) \\
\hline \\
a. /ayua # ukpeko/ & aywa ukpeko & aywukpeko & [ay(u)ukpeko] \\
'dog' 'village' & 'a village's dog' \\
b. /efia # ikɔ/ & efya ikɔ & efyikɔ & [ef(1)ikɔ] \\
'shoes' 'messenger' & 'a messenger's shoes' \\
\end{array}
\]

Again, the underlying form is given in column (1). Glide formation takes place in column (2). Vowel deletion takes place in column (3). In column (4), the glides are changed back into vowels, and one of the two vowels of the sequence can be optionally deleted. Again, it is not obvious as to whether or not the glides exist in the underlying structure or whether they are derived from underlying vowel sequences. Furthermore, since they never surface phonetically, one can alternatively argue that vowel deletion applies before glide formation therefore rendering the glide formation rule inapplicable to the examples of (55). This would, nevertheless, create a paradox since in some cases vowel deletion would apply before glide formation, and in other cases after. Adopting the hypothesis that the glides are derived, the additional rules of (56) and (57) are needed to account for the data of (55).

\[(56)\] Vocalization

\[
\begin{array}{c}
C \\
\hline \\
- voc & + high & \alpha \text{ back} & \alpha \text{ round} \\
\end{array}
\quad \rightarrow \quad [+ \text{ voc}]
\quad / \quad \begin{array}{c}
+ \text{ voc} \\
+ \text{ high} \\
\alpha \text{ back} \\
\alpha \text{ round} \\
\end{array}
\]

This rule specifies that [y] and [w] become [i] and [u] respectively when preceded by a consonant and followed by [i] and [u] respectively.

\[(57)\] Long Vowel Shortening (optional)

\[
\begin{array}{c}
[+ \text{ voc}] \\
+ \text{ long} \\
\end{array}
\quad \rightarrow \quad [- \text{ long}]
\]

This rule states that [ii] and [uu] become [i] and [u] respectively. In order to obtain the correct output in (55), the rules given must be ordered as follows: rule (39) Glide Formation, rule (53) Vowel Deletion, rule (56) Vocalization, and rule (57) Long Vowel Shortening.

Since the final vowel of a noun deletes or undergoes glide formation when contracted to the following vowel prefix of any morpheme, rule (53) would account for all of the instances of vowel contraction found in the examples of (58).
(58) 1.  

Adverbial

a. /ukpo # enode/ 
   'cloth' 'yesterday'
   [ukpënôde] 
   'yesterday's cloth'

b. /aki # enode/ 
   'market' 'yesterday'
   [a kyënôde] 
   'yesterday's market'

c. /otu # enode/ 
   'age-group' 'yesterday'
   [otwënôde] 
   'yesterday's age-group'

Adjectival

d. /owa # o dziô/ 
   'house' 'old'
   [owôja] 
   'an old house'

e. /uki # o gbôômhì/ 
   'moon' 'new'
   [ukyôgbôômhì] 
   'a new moon'

f. /i du # o vene/ 
   'lion' 'another'
   [idwôene] 
   'another lion'

g. /umhele # o tsômhi/ 
   'salt' 'some'
   [umhelôtsômhi] 
   'some salt'

h. /akpa # o dzëva/ 
   'cup' 'second'
   [akpôdzëva] 
   'a second cup'

i. /owa # o da/ 
   'house' 'different'
   [owôda] 
   'a different house'

Interrogative (whose noun)

j. /owa # o wa/ 
   'house' 'whose'
   [owôwa] 
   'whose house?'

k. /i du # o wa/ 
   'lion' 'whose'
   [idwôwa] 
   'whose lion?'

l. /udi # o wa/ 
   'palm-tree' 'whose'
   [udyôwa] 
   'whose palm-tree?'

Interrogative (how many nouns)

m. /owa # eke/ 
   'houses' 'how many'
   [ewôke] 
   'how many houses?'

n. /i du # eke/ 
   'lions' 'how many'
   [idwôke] 
   'how many lions?'

o. /idl # eke/ 
   'palm-trees' 'how many'
   [idyôke] 
   'how many palm-trees?'

Noun Reduplication (compounding)

p. /owa # o wa/ 
   'house' 'house'
   [owôwa] 
   'every house'

q. /i du # i du/ 
   'lion' 'lion'
   [idwidû] 
   'every lion'

r. /udi # udi/ 
   'palm-tree' 'palm-tree'
   [udyûdi] 
   'every palm-tree'
Each grammatical category that is effected is given at the onset of their illustration. The underlying forms are given in column (1) of (58a-r). Observe in column (2) that the final vowel of the noun is deleted. Examples (b-c, e-f, k-l, n-o, and q-r) of column (2) illustrate that the high vowels /i/ and /u/ undergo rule (39) Glide Formation.

Rule (53) Vowel Deletion followed by rule (22) Intervocalic /l/ Deletion can, again, derive long vowels of the type in (5) and diphthongs of the type in (6), as illustrated in (59).

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /&lt;no line&gt;/ /otsomhi/ → [umhelotsomhi] → [umheotsomhi]</td>
<td>'salt' 'some'</td>
<td>'some salt'</td>
</tr>
<tr>
<td>b. /&lt;no line&gt;/ /oyle/ → [emaloyye] → [emaloyye]</td>
<td>'food' 'king'</td>
<td>'a king's food'</td>
</tr>
<tr>
<td>c. /&lt;no line&gt;/ /oyle/ → [ebaloyye] → [ebaloyye]</td>
<td>'guinea-fowl' 'king'</td>
<td>'a king's guinea-fowl'</td>
</tr>
<tr>
<td>d. /&lt;no line&gt;/ /obombhi/ → [ebalobombhi] → [epalobombhi]</td>
<td>'guinea-fowl' 'fresh'</td>
<td>'fresh guinea-fowl'</td>
</tr>
</tbody>
</table>

Observe that the underlined vowels of column (1) are deleted in column (2). In column (3), the intervocalic /l/ is deleted, leaving behind diphthongs in examples (a-c) and a long vowel in example (d).

The final vowel of the definite article (DA) deletes when contracted to a following vowel prefix, as seen in (60).

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /&lt;no line&gt;/ /ida/ → [eida] → 'the lion'</td>
<td>'DA' 'lion'</td>
<td>'the lion'</td>
</tr>
<tr>
<td>b. /&lt;no line&gt;/ /eseli/ → [eneseli] → 'the fish'</td>
<td>'DA' 'fish'</td>
<td>'the fish'</td>
</tr>
<tr>
<td>c. /&lt;no line&gt;/ /ekpa/ → [enekepa] → 'the bag'</td>
<td>'DA' 'bag'</td>
<td>'the bag'</td>
</tr>
<tr>
<td>d. /&lt;no line&gt;/ /udi/ → [enudi] → 'the palm-tree'</td>
<td>'DA' 'palm-tree'</td>
<td>'the palm-tree'</td>
</tr>
<tr>
<td>e. /&lt;no line&gt;/ /owa/ → [enowa] → 'the house'</td>
<td>'DA' 'house'</td>
<td>'the house'</td>
</tr>
<tr>
<td>f. /&lt;no line&gt;/ /wa/ → [enwa] → 'the child'</td>
<td>'DA' 'child'</td>
<td>'the child'</td>
</tr>
<tr>
<td>g. /&lt;no line&gt;/ /akpa/ → [enakpa] → 'the cup'</td>
<td>'DA' 'cup'</td>
<td>'the cup'</td>
</tr>
</tbody>
</table>

The underlying form is given in column (1). Observe in column (2) that the final vowel of the DA is deleted when contracted with the following vowel prefix. Again, with slight modifications to rule (53), the examples of (60) can be accounted for by a rule of the form in (61).
(61) Regressive Vowel Deletion

\[
V_1 \rightarrow \emptyset / \frac{DA}{\text{Prefix}} \rightarrow V_2
\]

This rule states that the final vowel of the DA deletes before a vowel prefix.

Rule 49, 53, and 61 can be collapsed into a rule of the form in 62.

(62) Regressive Vowel Deletion.

\[
\begin{array}{c}
V_1 \\
\leftrightarrow \text{high}
\end{array} \rightarrow \emptyset / \left\{ \begin{array}{c}
V \\
N \\
DA
\end{array} \right\} \rightarrow V_2 \text{ Prefix}
\]

Condition: \(<V_1 = V_2>\)

Exceptions to rule (62) can be found within the demonstrative construction, some adjectival constructions, and the relative clause construction. The final vowels of nouns are not deleted in these constructions, but instead, the vowel prefix of the demonstratives, adjectivals, and relatives is deleted, as seen in (63).

(63)

a. /óna # akpa # óna/ 'DA' 'cup' 'this' + [ónakpána] 'this cup'
b. /óna # eyí # óna/ 'DA' 'tortoise' 'this' + [óneyína] 'this tortoise'
c. /óna # aru # óli/ 'DA' 'louse' 'that' + [ónarull] 'that louse'
d. /akpa # óníkeθe/ 'cup' 'small' + [akpaníkeθe] 'a small cup'
e. /eyí # óníkeθe/ 'tortoise' 'small' + [eyíníkeθe] 'a small tortoise'
f. /aru # óníkeθe/ 'louse' 'small' + [aruníkeθe] 'a small louse'
g. /akpa # ónomíc/ 'cup' 'the one he saw' + [akpanómíc] 'a cup that he saw'
h. /eyí # ónomíc/ 'tortoise' 'the one he saw' + [eyínomíc] 'a tortoise that he saw'
i. /aru # ónomíc/ 'louse' 'the one he saw' + [arunómíc] 'a louse that he saw'

Again, the vowels that are deleted in examples (63 a–i) are underlined. Column (2) displays the underlined vowels that remain after contraction.
The DA /ɔna/ obligatorily comes with the demonstrative construction. Note in column (1) that the DA /ɔna/ and the demonstrative adjective /ɔna/ are identical morphemes or homonyms. The meaning of /ɔna/ in isolation is 'this one'. In column (2), it is observed that the final vowel of /ɔna/ is deleted by rule (62) when functioning as the DA. To the contrary, it is seen in column (2) that the vowel prefix of /ɔna/ is deleted when functioning as a demonstrative adjective. The demonstrative adjective /ɔli/ 'that' also loses its vowel prefix, as seen in example (63c). In examples (63 d-f), it is observed that the adjectival /ɔnikeθe/ 'small' loses its vowel prefix when contracted to the preceding noun. Examples (g-i) illustrate that relative clauses lose their vowel prefix when contracted to the preceding vowel of the head noun. Examples (a-i) suggest a rule of the type in (64).

(64) Progressive Vowel Deletion:

\[ \begin{array}{l}
V \rightarrow \emptyset / V \\
\text{N} \\
\text{Adj} \\
\text{Rel}
\end{array} \]

This rule specifies that the vowel prefix of demonstratives, adjectivals, and relatives is deleted when contracted to the final vowel of the preceding noun. Rule (64) Vowel Deletion must be ordered before rule (39) Glide Formation as illustrated in (63 b-c, e-f, and h-i) whereby rule (39) failed to apply. In other words, if rule (39) would have applied before rule (64), the output for (b-c, e-f, and h-i) would have been *[ɔneyɔna], *[ɔnaɾwɔli], *[eγγονικɛθe], *[aɾɔnikeθe], *[eγγονɔmyɛ], and *[aɾwɔnomyc] respectively.

(65) lists the rules discussed, in the order of their application:

(65) Progressive Vowel Deletion (rule 64)
Glide Formation (rule 39)
Regressive Vowel Deletion (rule 62)
Vocalization (rule 56)
Long Vowel Shortening (rule 57)

5.0 Summary

What appeared to be a large inventory of vowel segments has been reduced at the systematic phonemic level to seven short vowels, as given in (66).

(66) /i/, /e/, /ɛ/, /u/, /o/, /ɔ/, /a/.

In Section 4.1, it was shown that the distinctive features needed to characterize the seven short vowels are [high], [back], and [mid]. Evidence was also given in Section 4.1 to suggest that long vowels and diphthongs should be interpreted as sequences of two contiguous vowels. We observed in Section 4.2 that phonetic long vowels are derived from the deletion of intervocalic /l/. It became apparent in Section 4.2 that
there are no long vowels at the systematic phonemic level. In the discussion of diphthongs in Section 4.3, it was illustrated that they are derived from the deletion of intervocalic /I/, /y/, and /w/. In Section 4.4, it was shown that the diphthongs of the type /ui/, and /yu/ are derived from a sequence of two underlying contiguous vowels. Furthermore, the diphthongs of the type /yu/ have a palatalizing effect on /ts/, /dz/, /s/, and /n/ causing them to surface phonetically as [č], [j], [š], and [ŋ] respectively. In Section 4.5, more evidence was given to show the lack of underlying long vowels, and diphthongs.

CHAPTER III

The Tonal System

0.0. Previous works

One of the most interesting aspects of Etsako phonology, but that which has been least studied or documented in the literature, is its tonal system. Laver (1967, 1969) devotes a small portion of his study to tone.

Based on data from the Aviele dialect, Laver suggests that in non-compound words spoken in isolation, Etsako has two basic (phonemic) tones, high and low. These contrast as shown in (1).

(1) /èvá/  low-high  [__]  'two'
    /jgbá/  high-low  [___]  'fences/thorns'
    /jgbá/  low-low  [___]  'chins'

Laver further suggests that there is a possibility of a third contrastive tone (high-fall) because of the items in (2).

(2) /jgbá/  low-high/fall  [__ ___]  'locust beans/gathering(s)'
    /jújú/  high-high/fall  [___]  'to do'

He does not clarify why the high-fall is not to be considered a 'basic' tone.

Laver also suggests that in isolated non-compound words containing all identical tones, only low tones will occur as shown in (3).

(3) /àjèjè/  low-low-low  [___ ___]  'butterfly'

According to Laver, Etsako has both downdrift and downstep. All of the above examples are taken directly from Laver's discussion.

As will be shown below, Laver's analysis cannot account for much of the data in Etsako.
One of the latest treatments of Etsako tone is Elugbe (1973). His work is based on the dialects Avianu and Auchi. Basically, he makes some of the same claims as Laver, as given above. But, Elugbe's claims differ from Laver's regarding downstep/downdrift. Elugbe claims that there is no downstep (automatic or non-automatic) in Av. or Auchi. What he proposes, instead, is the feature upstep, which he claims is limited to particular constructions (e.g., the negative construction). To support his claim, he further proposes that underlying high tone is realized as a surface phonetic mid tone (equivalent to the mid tone of Yoruba). When there is upstepping, the upstep takes place from the tontonic mid to high, as illustrated in (4).

(4) /‘ùà dè/ 'I did not buy' [− _ _] → [− _ _]

He presents little evidence in support of this claim. The process of upstep as proposed by him is not phonologically conditioned nor phonetically motivated. The only examples given are cases where he claims that the subject pronoun of the negative construction upstepped from tontonic mid to high. All examples given illustrate only one case of upstep to each phrase or sentence. Furthermore, the data presented can be accounted for by the process of downdrift rather than upstep. Since downdrift and downstep widely attested in African languages have a phonetic explanation, and can account for the same data, there is no reason to posit an ad-hoc 'upstep'. In my discussion of 'downdrift/downstep', evidence will be presented to support the existence of these two phenomena in Etsako.

As mentioned in Chapter I, Etsako is characterized by a complex set of morphophonemic alternations. The purpose of this chapter is to present and discuss the general tone properties that underlie this complex set of morphophonemic alternations. Although some evidence will be taken from other dialects, the main sources will come from Ekpheli.

1.0. Surface tones

At the systematic phonetic level, Ekpheli exhibits five tones (high [\dot{V}], low [\breve{V}], falling [\ddot{V}], rising [\check{V}], and downstep [\breve{V}]). Three of these five tones (high, low, and falling) occur in simple or compound words cited in isolation. All five tones (high, low, falling, rising, and downstep) occur in isolated compound words. Illustrations are given in (5).

(5) a. [èvè] 'two' f. [èwà] 'house'
b. [àkpà] 'cup' g. [àtásà] 'plate'
c. [ûtè] 'axe' h. [úpèpè] 'bed'
d. [âsì] 'ant' i. [âkpàmè] 'cup (water)'
e. [èkè] 'ram' j. [èwòwà] 'every house'
or [èwòwà]

Examples (a-h) are words which contain two morphemes, the singular prefix
(see Section 4.1 of Chapter II) and the stem. Examples (i-j) are compounds which contain four morphemes (i.e., example (i) contains /ɔ+ṅpə/ 'cup' and /ɔ+ṅɔ/ 'water', while example (j) contains /ɔ+ǎwə/ 'house' and /ɔ+ǎwɔ/ 'house'. Thus each compound contains two prefixes and two stems). The contrasting tones and their domain that concern us here are underlined. Notice that a phonetic contrast between high, low and falling exist on the final syllable in examples (a-c), on the initial syllable in examples (b-d), and on the medial syllable in examples (g-i). Moreover, all five tones (high, low, falling, rising and downstep) are observed to contrast on the medial syllable in examples (g-j). The rising tone and the downstep tone are much more constrained in their occurrences in isolated compound words than the high, low, and falling.

2.0. Systematic phonemic tones

In Section 1.0., it was observed that Ekpheli has five phonetic tones (high, low, falling, rising and downstep). It will be argued in this section that only two tones (high and low) occur at the systematic phonemic level, and that the other three tones (falling, rising, and downstep) are derived from these.

2.1. The falling tone

The processes of vowel deletion, vowel coalescence, loss of syllabicity, etc. result in the creation of falling tones, as can be seen in (6).

(6) 1. 2. 3. 4.

a. /ɔdzəwɔl/ → ɔdzəwɔl → ɔdzəwɔ o → ɔdzəwɔ \[ \text{man} \]

b. /əsɔl/ → → əsɔl → əsɔl \[ \text{ant} \]

Example (6a-b) illustrates how an underlying tone sequence of high followed by low on two separate vowel segments can be realized as NL (falling). Note that this process of contour formation takes place within a single word. Since the two separate vowel segments involved are different in their underlying form (i.e., while (a) contains an intervocalic /l/ between its two separate vowel segments, (b) does not.), examples (a) and (b) will be discussed separately.

In column (1) of (6a), the underlying form is given. Notice that, at this stage, the two separate vowel segments (which have the high and low tone that concern us) are separated by an intervocalic /l/. In column (2) of (6a), the intervocalic /l/ is deleted by the application of rule (22) (given in Chapter II) leaving behind two contiguous vowels with two contiguous tones. Observe in column (3) of (6a) that by the application of rule (33) (/i/ assimilation, given in Chapter II), the high vowel /i/ is assimilated to the preceding vowel. In column (4) of (6a), the high tone and the low tone occur on a vowel segment with a resultant falling tone. The listener definitely hears a short falling contour pitch on a short vowel. In other words, what is claimed here is that there is a phonetic length distinction between columns (3) and (4),
the form in column (4) being shorter in duration than that in column (3). In fact, the forms in both columns (3) and (4) can surface phonetically, showing that contraction does occur. This motivates the intermediate stage of /i/ assimilation, rather than simply having /i/ delete from the very beginning, and having its tone retained.

We observed in (6a) that the tone sequence of high followed by low and their tone bearing vowels were separated by an intervocalic /l/ at the systematic phonemic level, whereas in column (1) of (6b), the tone sequence of high followed by low and their tone bearing vowels are not. See Chapter II, example (32) for a discussion of nouns of the type in (6b). Example (6b) illustrates further that when two morphemes come together to form a tone sequence of high followed by low, the results are falling contour tones. In column (1) of (6b), the underlying form is given. Notice that the prefix vowel has a high tone, while the initial vowel of the stem (which is underlined) has a low tone. The initial vowel of the stem obligatorily assimilates to the prefix vowel by the application of rule (33), in column (3) of (6b). Again, in column (4) of (6b), the high tone and the low tone occur on a single vowel segment with a resultant falling tone. Given these underlying forms in (6a-b), an explanation is provided for the falling tone on the final and initial syllable of some words in Ekpheli.

Thus far, the evidence in support of the claim that falling tones are derived from underlying tone sequences of high followed by low has been seen to occur within words in citation form. Further evidence comes from isolated compounds and short sentences, as seen in (7).

(7) 1. 2. 3.
    a. /âkpà/ '//'âmè/ + âkpââmè + [âkpâmè] 'cup (water)'
    b. /ɔ + dè/ /âkpà/ + ðdèâkpà + [ðdâkpà] 'he buys a cup'

Example (7a-b) is an illustration of how falling tones are derived when a tone sequence of high followed by low is created as a result of vowel contraction between two words. In column (1) of (7a-b), the underlying form is given. Note that (a) is a compound word consisting of the morphemes 'cup', and 'water', and the associative marker (AM) (see Chapter IV for a discussion of the associative construction), which is an underlying high floating tone. (b) is a sentence consisting of the morphemes 'he', 'buy', and 'cup', and it is in the habitual tense. Observe in column (2) of (7a) that the high 'floating' tone of the AM has a tone, raising effect on all immediately preceding low tones (i.e., âkpà + AM + âmè + âkpà + AM + âmè). What is of concern here are the two vowel sequences with the tone sequences of high followed by low, as seen in column (2) of (7a-b). In column (3) the vowel is deleted and the result is the falling tone. The falling tone in example (5i) is accounted for in this way.

More evidence supporting the claim that falling tones are derived from underlying tone sequences of high followed by low is given in (8).
Examples (8 a-b) illustrate how a falling tone is derived as a result of the loss of syllabic tone of a high tone vowel of a tone sequence of high followed by low. In column (1) of (8 a-b), the underlying form is given. Notice that there is a tone sequence of high followed by low on the last two vowels of each word. In column (2), the two high vowels (/u/ and /i/) have been changed to [w] and [y] respectively by the application of rule (39) Glide Formation. In (3), the high tones on the glides are realized as falling tones on the vowels. Similar processes apply to compound words and sentential phrases as shown in (9).

The next bit of evidence in support of deriving falling tones is of a different sort from previous evidence already examined. For example, the sequence of two contiguous vowels with a sequence of high followed by low is not involved here. Consequently, there is no vowel contraction. But the falling tone is still derived from a tone sequence of high followed by low. Illustrations are given in (10).

The underlying form is given in column (1) of (10 a-f). Note that all nouns end in a high tone. Observe in column (2) of (10 a-f) that a high tone in syllable final position in words cited in isolation, or in pre-pause position is realized as a falling tone. This process is extremely general in Ekpheli. Except for the numbers ([òkpá] 'one', [èvá] 'two', and [ìgbé] 'ten') and a few compounds of the types ([akpákpá] 'every cup',...
and [fkp tweaking] 'all cups'), there are no occurrences of a high tone in syllable final position in words cited in isolation or in pre-pause position. In other words, the final syllable of all words in pre-pause position will bear either a falling tone or a low tone. Therefore, all underlying high tones on final syllables of words in isolation or in pre-pause position will be converted to falling tones. This can be accounted for by a rule such as is given in (11).

(11) Low Tone Insertion/Pre-pause Tone Rule

\[ \emptyset \rightarrow [- \text{HIGH}] / [+ \text{HIGH}] \_\_\_\_\_\_\_Z \] (where \( Z \) = pause)

One may alternatively suggest a phonetic intonation rule to account for this pre-pausal fall, but as will be seen in Section 3.0 this would fail to account for the observed data.

Rule (11) explains the occurrence of examples (5 c, e, and h), as well as the non-occurrence of some expected phonetic tone patterns in certain contexts (e.g., *[HH], *[LH] etc.). This rule is obligatory in Ekphell, optional in some dialects, and non-existent in others. (See wordlist of Appendix).

Furthermore, it is observed in (12) that when the morphemes of (10) appear in context that is not in pre-pause position, the high tone does not become a falling tone, unless it is contracted with a following low tone.

(12)  

1. a. /údzé # èk³pá/ 'axe' 'one'  
   b. /èkó # èk³pá/ 'ram' 'one'
2. a. /údzé # èl³là/ 'axes' 'three'
   b. /èkó # èl³là/ 'rams' 'three'

In column (1) of (12), the underlying form of both the noun and the numeral is given. Note that the nouns are in the plural in examples (c-d). In column (2) (a-b), the high tone of the noun stem and the low tone of the prefix of the numeral contract into a falling tone. It is further observed in column (3) that the falling tone can optionally simplify to a high, and the low tone portion of the fall effects a downstep on the following high. In column (2) of (c-d), it is observed that the high tone of the noun stem and the high tone of the prefix of the numeral contract into a high tone. In both cases of vowel contraction in (12), it is the stem vowel of the noun that is deleted.

The occurrence of all falling tones can therefore be accounted for by deriving them from sequences of HIGH + LOW.
2.2. The rising tone

We have already noted above that the occurrences of rising tones in words cited in isolation are extremely rare. Except for examples of the type seen in (5j), there are none. In fact, it will be observed in subsequent sections that most rising tones are simplified to either a high tone, low tone or a downstep tone, thus, in one sense accounting for the rarity of rising tones in the language. Nevertheless, the same processes (vowel deletion, and loss of syllabicicy, etc.) that govern the creation of falling tones are also involved in deriving phonetic rising tones. One of the processes for creating rising tones occurs when two morphemes are joined, as shown in (13).

(13) 1. /ówà # ówà/ → 2. ówò ówà → 3. [ówòwà] 'every house'
      'house' 'house'

(13) is an example of noun reduplication to form compounds (see Chapter IV). The underlying form is given in (1). Column (2) gives the form after the vowel is deleted, with the tone remaining. Column (3) gives the phonetic form with a rising tone.

(14) demonstrates that rising tones are also created by the application of the glide rule.

(14) a. /ídù # ídù/ → íwídù → [ídùídù] 'every lion'
      'lion' 'lion'

b. /ídl # ídl/ → íyíl → [ídylí] 'every palm-tree'
      'palm-tree' 'palm-tree'

(14) further illustrates noun compounding as a result of noun reduplication.

2.3. The downstep

It was observed in previous sections that falling tones are derived from underlying sequences of high followed by low, and that rising tones are derived from underlying sequences of low followed by high. Also, it was demonstrated that these contour tones result from the application of segmental phonological rules. It will be illustrated in this section that downsteps are also derived from underlying sequences of low followed by high. In some cases, rising tones are first derived directly from underlying sequences of low followed by high, and downsteps are subsequently derived from rising tones by a process of simplification.

It was noted in (5j) that at the systematic phonetic level, Ekpheli shows a downstep. (5j) is repeated in the form of (15).

(15) 1. [ówòwà] → 2. [ówòwà] 'every house'

In column (1) of (15), the derivation begins at a stage where the rising
tone has already been derived. In column (2), the rising tone is simplified to a downstep. This process is conditioned by the preceding high tone. Also, under certain conditions, the tone simplification rule is optional, i.e., either (1) or (2) of (15) can surface phonetically.

2.4. Tone features

Only one tone feature is needed to contrast the two level tones on the lexical level, as seen in (16).

(16) high tone = [+ HIGH] (+ H)
    low tone = [- HIGH] (- H)

The Downstep tone can be designated with the additional feature [+ Downstep] (+ D). The falling and rising tones can be designated as representing a complex set of features, e.g., sequence, at the time they are mapped onto the segmental matrices. (See below).

3.0. Downdrift/downstep

An interesting aspect of tone languages is the phenomenon of downdrift (automatic)/downstep (non-automatic) (e.g., Welmers, 1959, 1970, 1973; Stewart, 1965; Schachter and Fromkin, 1968; Fromkin, 1972; Williamson, 1970; Peters, 1973; Hombert, 1974; Hyman, 1975; La Velle, 1975; and others). The phenomenon of downdrift is noted to occur in many tone languages of Africa, particularly the Niger Congo Group. This process involves the overall lowering of pitch throughout a phrase. More specifically, it involves the progressive lowering of a high tone after a low tone. Thus, a sequence of /HLHLH/ is realized phonetically as (17a) rather than (17b).

(17) a. /HLHLH/ → [−−−−]
    b. /HLHLH/ → [−−−−]

In (17a), note that the pitch of the second and third high tones is realized as progressively lower than the preceding high, because of the intervening low tones. In other studies (Schachter and Fromkin, 1968; Hombert, 1974; Hyman, 1975), it has also been pointed out that in some languages, the low tones which intervene between the high tones, in examples such as (17), are also subject to downshift. The intervals created by the degrees of lowering of low tones were reported to have been found to vary from language to language. This could imply that the downshifting of low tones might go unnoticed in some languages.

Related to 'downdrift' is the phenomenon of 'downstep'. Downstep refers to the lowering of high tones where the conditioning intervening low tones are lost (deleted or assimilated) or where a high tone can be followed by a high (same), a lower high, or a low, but a low tone can only be followed by a low (same) or non-low. In cases where the lost low tones intervening between high tones are recoverable (i.e., the segment of such a low tone appears in the synchronic grammar before deletion or
assimilation, etc.) there has been no need to posit a phonemic downstep (Fromkin, 1968) since such downsteps can be derived from high tones. But since all downstep tones in a synchronic grammar cannot be derived from a deleted LOW (although this might have been the case historically) some linguists have posited the need for a phonemic downstep (Fromkin, 1972). That is, it is suggested that establishing a LOW which would always be deleted and which serves only to account for DOWNSTEP is an ad-hoc device and is not warranted.

The setting up of a 'non-existent' deleted LOW to account for DOWNSTEP should not, however, be confused with the possible need of including 'floating' tones in a language, where such tones are shown by their effect on surrounding tones and/or represent separate morphemes. Obviously, the justification for such tones must be compelling. Such 'floating' tones in Etsako will be discussed in Chapter IV.

Ekpheli is characterized by the same phenomenon of downdrift as outlined above for many tone languages of Africa. An illustration is given in (18).

(18) a. [θéyweg nhê] $\rightarrow$ [− − −]
'give me a goat'
b. [ɔ′θéyweg nhê] $\rightarrow$ [− − −]
'he is giving me a goat'
c. [ɔ′θéyweg goxog évhgyo nhê] $\rightarrow$ [− − −]
'a chicken, and a rabbit'

In (18a–c), the realization of the pitch patterns of these sentences is given in the phonetic brackets, right of the arrow. Notice that all high tones with intervening low tones are realized on different phonetic pitch levels. It should also be observed that low tones with intervening high tones also 'downdrift'. The sort of downdrift illustrated here places Ekpheli in the group of languages called 'terraced level' (Velmers, 1959).

Moreover, Ekpheli also displays downstep tones, as shown in (19).

(19) [šôwôwâ] $\rightarrow$ [− − −]

To account for the downstep phenomena a rule as given in (20) can be posited.

(20) Downstep Rule

$$ [+ H ] \rightarrow [+ D ] / [- H ]$$

Downsteps are not usually found in isolated non-compound words in Ekpheli. There are, however, a number of interrogatives that have downsteps, as seen in (21).
(21) a. [émè] 'what?'  
b. [éle] 'when?'  
c. [ésè] 'where?'  
d. [swa] 'who?'  
e. [ékè] 'how many?'  

Downsteps in these examples may be related to a rising tone at the end of these interrogatives that signal a question. This is speculative since one cannot elicit these interrogatives without a downstep; one can however elicit other nouns that are being questioned. In such cases, a rising tone occurs on the final syllable of these nouns. However, these rising tones are not simplified to a downstep, as illustrated in (22).

(22) a. [ówà] → [ówá] 'a house?'  
b. [ákpa] → [ákpa] 'a cup?'  
c. [údzé] → [údzé] 'an axe?'  

In (22), it is observed that all nouns when in question end in a rising tone. This method of questioning nouns in isolation does not apply to larger constituents (e.g., sentences). This method of questioning nouns in isolation suggests a rule of the kind in (23).

(23) High Tone Insertion  
\[ \emptyset \rightarrow [+ \text{HIGH}]/[- \text{HIGH}]_{\text{N}}^{\text{#?}} \]

Notice that this rule (23) must be ordered after rule (11) Low Tone Insertion. This can be observed in (22c), where the high tone marking the interrogative is 'attached' to a high-low-fall, producing a fall-rise. Earlier, the pre-pause low tone addition was discussed. If this were merely a pre-pausal fall, one would not expect the fall to occur in this case. Thus, it appears that the falling tones occurring on final syllables (derived from final high tone) are derived by the rule given in (11) rather than by an 'intonation' rule. The question words of (21) can therefore be accounted for as shown in the derivation of (24).

(24) Sample derivations:

1. a. /éme/ → [éme] → [éme] 'what?'  
b. /élè/ → [élè] → [élè] 'when?'  
c. /ésè/ → [ésè] → [ésè] 'where?'  
d. /swa/ → [swa] → [swa] 'who?'  
e. /ékè/ → [ékè] → [ékè] 'how many?'  

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The underlying form is given in column (1) of (24). In column (2), a final high tone is inserted (rule (23)) for questioning single words in isolation. The output of rule (23) is a rising tone. Again, the rising tone whenever immediately following a high tone is susceptible to tone simplification, as in column (3). The rule is discussed below. The final vowel of column (3) can be optionally lengthened depending on the speaker's mood.

4.0. Representation of tone

It has been observed throughout this chapter that whenever a two vowel sequence loses one of its vowels, either through vowel deletion or loss of syllabic identity, the tone structure of the word is preserved. If, for example, the tones of the two vowels of the syllable are identical, the two tones will be contracted into a single tone, after the deletion or loss of syllabic identity of one of the vowels, as seen in (25).

(25) 1. 2.
a. /ɔyˈwɔ/ → [ɔywɔ] 'dog'
b. /ɔyɛʃ/ → [ɔyɛʃ] 'king'
c. /ɔmɛʃmɔ/ → [ɔmyɛʃmɔ] 'to see'
d. /ɔɡwɛʃmɔ/ → [ɔgwɛʃmɔ] 'to say'

As already discussed above, if a two vowel sequence consists of a tone sequence of opposite feature specifications, and one of the two vowels of the sequence deletes or loses its syllabic identity, the following results are obtained, as illustrated below.

(26) 1. 2.
a. /tʌˈɔ/ → [tɔwɔ] 'underneath'
b. /luˈɔ/ → [luɔ] 'mat'
c. /udʒdʒ/ → [udʒdʒ] 'every palm-tree'
d. /dʒdʒ/ → [dʒdʒ] 'every lion'

(27) a. /ɔwɔˈɔ/ → [ɔwɔwɔ] 'every house'
b. /akpɑˈakpɑ/ → [akpɑakpɑ] 'every cup'

(28) a. /ɔnɑkpɑˈɔnɔ/ → [ɔnɑkɔnɔ] 'this cup'

If you compare (27) and (28), it will be seen that the second vowel of the two vowel sequence is deleted in (28), while the first vowel of the two vowel sequence is affected in (27).

The examples in (26), (27), and (28) illustrate the cases discussed in Chapter II where either the first or the second vowel is deleted. Note, however, that in either case the underlying tones remain, i.e., are not deleted with vowel segmental features.
This leads us to question whether tones would not better be represented in suprasegmental matrices, separate from the segmental matrices, with mapping rules provided in the grammar.

It has already been proposed by Leben (1971b, 1973a,b) that tone is a suprasegmental phenomenon in some languages. Using evidence from Mende (a Mande language of Sierra Leone) he argues that morphemes of this language can have the tonal contour LHL (e.g., mbภาวะ 'companion', nyά 'woman', and nkή 'groundnut') but may not have HLH (e.g., mbภาวะ, nyά, and nkή). This restriction applies to morphemes (words) of any number of syllables. In the event of this restriction, any suggestion that tone is a feature of the vowel (segmental) in this language would appear to be 'ad-hoc'. Consequently, he suggests that tone be represented as in a tonal matrix of the morpheme.

Leben further argues for suprasegmental matrices with evidence showing that tone is distinguished from features on segments in its ability to undergo rules of tone erasure. He suggests that tone erasure occurs in compound constructions such as Noun-Noun or Noun-Adjective, where one morpheme is taken as the head of a polymorphemic tonal unit; the tonal shape of the head determines the tonal shape of the whole unit, irrespective of the underlying tonal properties of the other members of the units. Evidence was drawn from Hausa, Maninka, Bambara, and Mende.

Leben further suggests that by adopting suprasegmental matrices, contour tones which fall on single vowels can be analyzed as sequences of level tones (which occur suprasegmentally), thereby excluding the need for contour features.

Furthermore, Leben shows that if tone is represented as features of the morpheme, there is no difficulty with representation of floating tone morphemes. Floating tone morphemes often have a phonetic realization; they obtain this by forming a tonal melody with neighboring suprasegmental tones, all of which ultimately are mapped onto segments. He illustrates this point with the 'floating low tone' definite article of Maninka.

Further evidence in support of suprasegmental matrices is found in Ekpheli. In Ekpheli, it appears that tone operates independently of segments. That is, the tonal contour (or melody) of a word remains even if vowels (segments) delete or lose their syllabicity, as seen in the examples given below.

\[(29)\]
\[
a. /\text{ówà} \# \text{ówà}/ \rightarrow \text{ówò} \text{ówà} \rightarrow [\text{ówòwà}] \quad \text{'every house'}
\]
\[
\quad \text{'house'}
\]
\[
b. /\text{idù} \# \text{idù}/ \rightarrow \text{idìdù} \rightarrow [\text{idìdù}] \quad \text{'every lion'}
\]
\[
\quad \text{'lion'}
\]

The examples of (29) are discussed in greater detail in Chapter IV. Note that a vowel is deleted in (29a), while a vowel loses its syllabicity in (29b). In either case the underlying tones remain intact (i.e., they are not deleted with the vowel segmental features). Given a theory where tone is represented as a feature on the segment, one would expect the tone feature to delete along with the vowel segmental features. The problems that are raised when treating a segment as the domain for tone

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are not encountered when tone is represented as a feature of the morpheme, as seen in Chapters III, IV, and V.

Evidence of floating tone morphemes found in Ekpheli further reveals a need for suprasegmental matrices. As seen in Chapter IV, there appears to be no difficulty with the representation of floating tone morphemes, if tone is represented as features on the morpheme. To the contrary, all kinds of complications are encountered if the segment is treated as the domain of tone in this language.

Given that the hypothesis of two matrices (segmental and suprasegmental) is adopted for this language, the tones of the suprasegmental matrix must be mapped onto the segmental matrix since at the systematic phonetic level tones and segmental features are realized simultaneously. The mapping rules which Leben suggests for Mende will not work in Ekpheli. If the ones he suggests are the correct rules for Mende, then it appears that mapping rules are language dependent rather than universal. It is possible (and probable) that there are universal constraints on such mapping rules, but one needs descriptions of many more tone languages in which suprasegmental matrices are found necessary before we can formulate such universal constraints. The following mapping rules appear to be those needed for Ekpheli.

(30) Mapping Rule:
Map tones onto segments within innermost brackets; map first tone onto first vowel, second tone onto second vowel, etc. If there is no vowel, let tone 'float'. Remove innermost brackets whether or not rule can apply. Map tone onto segments only where segments have not yet been specified by tone features.

(31) Mapping Rule:
Map 'floating' tones onto closest immediate vowel (not separated by a consonant).

Rule (30) is therefore confined to mapping tone features onto segments unspecified for tone. Rule (31) specifies the assignment of 'floating' tones to segments already specified for some tone features.

When all tones are mapped onto segments, then all brackets are removed.

Rule (30) and Rule (31) are necessary in order to prevent incorrect mapping of tones. For example, suppose the mapping rule were simply stated as in (32).

(32) Map first tone onto first vowel, second tone onto second vowel, etc.

Then each tone would be mapped onto each vowel with the 'floating tones' all occurring at the end of the phrase or sentences as shown in (33).

(33) TM: \[ H \ L \ H \ L \] SG: owa owa

\[ \emptyset \hspace{1cm} V \hspace{1cm} \text{deletion} \]

Mapping rule (32) \[ H \ L \ H \ L \]

\[ \text{ow} \hspace{0.5cm} \text{ow} \]

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If the mapping first occurs within syntactic categories then there is no problem, as shown in (34).

(34) Sample Derivation

\[
\begin{align*}
\text{TM} & \quad [ [H \ L] [H \ L] ] \\
& \quad [ [H \ L] [D \ L] ] \quad \text{Downstep Rule (20)} \\
\text{SM} & \quad [ [\text{o}w\alpha] [\text{o}w\alpha] ] \\
& \quad [ [\text{o}w\emptyset] [\text{o}w\alpha] ] \quad \text{Vowel Deletion Rule (62)} \\
\text{TM} & \quad [ [H \ L] [D \ L] ] \quad \text{Mapping Rule (30)} \\
\text{SM} & \quad [ [\text{o}w] [\text{o}w\alpha] ] \\
& \quad [ \text{H} \ L \ D \ L ] \quad \text{Remove Brackets} \\
& \quad [ \text{o}w \quad \text{o}w\alpha ] \\
& \quad [ \text{H} \ L \ D \ L ] \quad \text{Mapping Rule (31)} \\
& \quad [ \text{o}w\emptyset \text{o}w\alpha ] \quad \text{'every house'}
\end{align*}
\]

This provides a further example from suprasegmental phenomena of the interrelation between phonology and syntax, i.e., the need for syntactic brackets in phonology. As we will see below, this is also further evidence for the need for the cyclic application of phonological (i.e., tone) rules in phonology.

The simplification of the rising tone (LOW HIGH) to a downstep has not yet been accounted for. The simplification must occur after the tones have been mapped onto segments since the LOW before a HIGH is only deleted when both tones occur on one vowel. This rule may be stated as in (35).

(35) Tone Simplification

\[
[ - \text{HIGH} ] \rightarrow \emptyset / \left[ \begin{array}{c}
\text{+ Vocalic} \\
\text{+ HIGH}
\end{array} \right]
\]

There are other general tone rules (e.g., Tone Absorption and a further tone simplification rule) which will be discussed in Chapter IV. The following derivation illustrates the rules so far posited.
(36) Sample Derivation

\[ \text{TM} \quad \text{[ [H L] [H L] ]} \]
\[ \text{SM} \quad \text{[ [owa] [owa] ]} \]
\[ \text{[ [owa] [owa] ]} \quad \text{Vowel Deletion Rule (62)} \]
\[ \text{TM} \quad \text{[ [H L] [D L] ]} \quad \text{Mapping Rule (30)} \]
\[ \text{[ [owa] [owa] ]} \]
\[ \text{[ H L \quad D L ]} \]
\[ \text{[ [owa] [owa] ]} \quad \text{Remove Brackets} \]
\[ \text{[ H L \quad D L ]} \quad \text{Mapping Rule (31)} \]
\[ \quad \text{[ [owa] [owa] ]} \]
\[ \text{H (L) \quad D L} \]
\[ \text{[ [owa] [owa] ]} \quad \text{Tone Simplification Rule (35) (optional)} \]
\[ \text{[ówɔwɔ] \quad 'every house'} \]

CHAPTER IV
Tonal Alternations in Nouns and Noun Phrases

0.0. Introduction

The grammar of Ekpheli is characterized by a complexity of morphophonemic alternations. A large number of such morphophonemic alternations effect nouns and noun phrases in many different grammatical constructions. These are illustrated in (1). Since low tones are most often effected by such tonal alternations, a noun with all low tone in isolation is given in all possible forms. (The systematic phonetic tones are given).

(1) \[ [ákpá] \quad 'cup' \text{ (in isolation)} \]
\[ a. \quad ákpáme \quad 'water cup' \quad \text{Associative} \]
\[ b. \quad ákpámdé \quad 'a child's cup' \quad \text{Associative (genitive)} \]
\[ c. \quad ákpá mǹé \quad 'my cup' \quad \text{Possessive} \]
\[ d. \quad ákpáwá \quad 'whose cup?' \quad \text{Interrogative} \]
\[ e. \quad ákpéndé \quad 'yesterday's cup' \quad \text{Adverbial Time Phrase} \]
\[ f. \quad őnáák$páNTà \quad 'this cup' \quad \text{Demonstrative} \]
g. ɔnàkò̂l̂ 'that cup' Demonstrative
h. ákò̂nò̂wlsî 'a black cup' Adjectival
i. ákò̂nò̂dè 'a cup that he bought' Relative
j. ákò̂wúł 'a cup at market' Locative
k. ɔkò̂ xò̂nà 'this is a cup' Identification
l. ɔkò̂ xò̂nà 'this is a cup' Identification
m. ɔkò̂ xò̂nlí 'that is a cup' Identification
n. łŷkò̂kè 'how many cups?' Interrogative
o. ɔnàkò̂ 'the cup' Definite
p. ɔnàkò̂ xò̂nà 'this is the cup' Identification
q. ɔkò̂ mhè xò̂nà 'this is my cup' Identification
r. ɔkò̂nò̂wlsî xò̂nà 'this is a black cup' Identification

Given the examples of (1), the phonological representation of the tones of the noun is not obvious. The same alternating tonal patterns of this noun are obtained for all such nouns. One possible solution would be to lexically represent each noun with its different allomorphs for various grammatical constructions (e.g., /àkò̂/ 'cup' in isolation; /àkò̂/ in the grammatical constructions of examples (a-j), etc.). Such an analysis would imply that there are no generalizations to be drawn. We will see below however that there are indeed generalizations.

1.0. Associative construction

The examples given in (2) illustrate the tonal changes which occur in possessive constructions in which N1 is the possessed noun and N2 the possessor. Column (1) gives the nouns as they occur in isolation with an associative morpheme occurring between the two tones. This associative morpheme is represented solely by a Tonal Matrix as [+ HIGH]. It will be shown that the presence of this morpheme permits us to account for the tonal alternations in a way in which they cannot be accounted for otherwise. Column (2) gives the nouns before vowel deletion or glide formation occurs, and column (3) gives the phonetic representation of these 'associative constructions'.

(2)  1.  2.  3.
  a. /àmè/ /'a'/ /èθà/  +  ámèθà +  [ámèθà] 'water' A 'father' 'father's water'
  b. /àmè/ /'a'/ /òkè/  +  ámèòkè +  [ámòkè] 'water' A 'ram' 'a ram's water'
  c. /àmè/ /'a'/ /òmò/  +  ámòmò +  [ámòmò] 'water' A 'child' 'a child's water'
  d. /àmè/ /'a'/ /òdzí/  +  ámèòdzí +  [ámòdzí] 'water' A 'crab' 'a crab's water'
1. /\u0160\u0160/ /'e\u0160/ → \u0160\u0160\u0160/ → [\u0160\u0160\u0160]  
'mouth' A 'father' → 'father's mouth'

2. /\u0160\u0160/ /'e\u0160k/ → \u0160\u0160k/ → [\u0160\u0160k]  
'mouth' A 'ram' → 'a ram's mouth'

3. /\u0160\u0160/ /'o\u0111m/ → \u0160\u0160m/ → [\u0160\u0160m]  
'mouth' A 'child' → 'a child's mouth'

4. /\u0160\u0160/ /'u\u0160dz/ → \u0160\u0160u\u0160dz/ → [\u0160\u0160dz]  
'mouth' A 'crab' → 'a crab's mouth'

5. /\u0160\u0160/ /'e\u0160e\u0160/ → \u0160\u0160\u0160\u0160/ → [\u0160\u0160\u0160\u0160]  
'crab' A 'father' → 'father's crab'

6. /\u0160\u0160/ /'e\u0160k/ → \u0160\u0160k/ → [\u0160\u0160k]  
'crab' A 'ram' → 'a ram's crab'

7. /\u0160\u0160/ /'o\u0111m/ → \u0160\u0160u\u0160m/ → [\u0160\u0160m]  
'crab' A 'child' → 'a child's crab'

8. /\u0160\u0160/ /'u\u0160dz/ → \u0160\u0160u\u0160dz/ → [\u0160\u0160dz]  
'crab' A 'crab' → 'a crab's crab'

9. /\u0160\u0160/ /'e\u0160e\u0160/ → \u0160\u0160\u0160\u0160/ → [\u0160\u0160\u0160\u0160]  
'cricket' A 'father' → 'father's cricket'

10. /\u0160\u0160/ /'e\u0160k/ → \u0160\u0160k/ → [\u0160\u0160k]  
'cricket' A 'ram' → 'a ram's cricket'

11. /\u0160\u0160/ /'o\u0111m/ → \u0160\u0160o\u0111m/ → [\u0160\u0160m]  
'cricket' A 'child' → 'a child's cricket'

12. /\u0160\u0160/ /'u\u0160dz/ → \u0160\u0160u\u0160dz/ → [\u0160\u0160dz]  
'cricket' A 'crab' → 'a crab's cricket'

The N1's in examples (a-l) occur in isolation with either LOW LOW, HIGH LOW or HIGH HIGH (HIGH FALLING) phonetically due to pre-pausal Low Tone Insertion Rule (II), (see Chapter III). In these constructions, however, both tones on N1 occur as HIGH. Given only such examples one might suggest that the tonal 'associative' rule simply changes all the low tones on the N1 to HIGH. Note, however, that examples (m-p) show that when a LOW HIGH noun occurs as N1 the first tone remains LOW. The final HIGH therefore seems to block the change of the initial LOW.

The reason for this seemingly idiosyncratic rule can be found in historical changes which have occurred in the Niger Congo languages. A number of linguists have posited a high tone Associative marker for different languages in this family (Voorhoeve, Meeussen and de Blois, 1969; Welmers, 1970; and Hyman, 1974). At one time this Associative morpheme was realized both segmentally and tonally, and in some languages this is still the case. A tonal assimilation rule seems to have occurred in Etsako, such that all the low tones immediately preceding the HIGH tone associative morpheme assimilated. The assimilation did not extend to LOWs before HIGHs in the noun. It is possible that these tonal changes on the first noun signalled the syntactic relationship such that the segmental occurrence of the Associative marker became redundant and
was subsequently deleted, leaving only its tonal reflex.

It is interesting to note that a recent innovation in Etsako has reintroduced a segmental form of the associative or genitive marker, /tsì/ 'of'. This morpheme occurs rarely, only to prevent an ambiguity. The phrase /sòmò + 'ògyè/ → [sòmògyè] can mean either 'a loyal child' or 'a king's child'. The inclusion of /tsì/, however, resolves this ambiguity. /sòmò + tsì + 'ògyè/ → [sòmò tsògyè] can mean only 'a king's child'. Even when /tsì/ is used, however, the associative tonal assimilation takes place as can be seen in the example given.

For the more common associative constuctions, one may conclude that the Associative morpheme is still present as posited above.

The Associative 'tone-spreading' rule will apply only to the tone matrix of the surface structure and can be written as (3a) or as a TRANSFORMATIONAL RULE as in (3b). We will assume that the rule has the form of (3b).

(3) Low Tone Raising

a. [- HIGH]₁ → [+ HIGH] / [ + HIGH]_assoc

b. [- HIGH]₁ / [+ HIGH]_assoc → + H₁ Ø

(the subscript ₁ is used to mean one or more [- HIGH]'s will become [+ HIGH] when immediately preceding the associative morpheme).

In cases where the Low Tone Raising rule is inapplicable (i.e., where N₁ ends in a high tone as in example (2i-p)), a rule must be posited as given in (4) in order to derive the occurring phonetic tones. Alternatively, and probably better, is to express this 'absorption' by a convention such that two identical tones assigned to one segment are realized as one tone. Clearly, from a physical standpoint it could not be otherwise. We can therefore do away with the tone absorption rule (4), but will include it to show what is going on.

(4) Identical Tone Simplification/Tone Absorption Rule

[α HIGH]₁ → Ø / [ + Vocalic]

(the subscript ₁ is used to mean one or more HIGH's)

The rules effecting the segments will not effect the tones. This is illustrated in the derivations given in (5). The downstep rule is omitted here since it is not crucial to the examples.
(5) a. Sample Derivation: 'father's water'

<table>
<thead>
<tr>
<th>SEGMENTAL MATRIX</th>
<th>TONE MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>[âmè] [eθa]</td>
<td>[L L] [H] [L L]</td>
</tr>
<tr>
<td>NP    N Assoc N</td>
<td>NP    N Assoc N</td>
</tr>
</tbody>
</table>

-------------

| [âmè] | [eθa] | [H H] | [L L] | Low Tone Raising Rule (3) |

-------------

b. Sample Derivation: 'a ram's cricket'

<table>
<thead>
<tr>
<th>SEGMENTAL MATRIX</th>
<th>TONE MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ɔtè] [oke]</td>
<td>[L H] [H] [L H]</td>
</tr>
<tr>
<td>NP    N Assoc N</td>
<td>NP    N Assoc N</td>
</tr>
</tbody>
</table>

-------------

INAPPLICABLE

-------------

[ɔtè] [oke] [L H] [H] [L H] | Pre-pausal Rule (11) |

-------------

Vowel Deletion Rule (62)

c. Sample Derivation: 'a child's crab'

<table>
<thead>
<tr>
<th>SEGMENTAL MATRIX</th>
<th>TONE MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ɔdži] [ɔmɔ]</td>
<td>[H H] [H] [H L]</td>
</tr>
<tr>
<td>NP    N Assoc N</td>
<td>NP    N Assoc N</td>
</tr>
</tbody>
</table>

-------------

INAPPLICABLE

-------------

[ɔdžy] [ɔmɔ] | Glide Formation Rule (39) |

-------------

[ɔjy] [ɔmɔ] | Palatalization Rule (41) |

-------------

[ɔjø] [ɔmɔ] | Glide Deletion Rule (43) |

The rules mapping tones onto segments will then apply as illustrated in (6).

(6) a. TM [H H] [L L] | Mapping Rule (30)

SM [âmè] [eθa] |

-------------

[H H] [L L] | Remove Brackets |

-------------

[âmè] [eθa] | Mapping Rule (31)

[âmèθà] 'father's water'
b. TM [ [L H] [H ] [L H L ] ]
   SM [ [ot ] [ ] [oke ] ]
   [ L H H L H L ]
   [ ot oke ]
   [ L H H L H L ]
   [ ot oke ]
   [ ot oke ]
   [ot oke]
   [ot oke]
   Mapping Rule (30)
   Remove Brackets
   Mapping Rule (31)
   Tone Absorption Rule (4)
   'a ram's cricket'

c. TM [ [H H] [H ] [H L ] ]
   SM [ [oj ] [ ] [om ] ]
   [ H H H L ]
   [ oj om ]
   [ H H H L ]
   [ oj om ]
   [ oj om ]
   [oj om ]
   [oj om ]
   Mapping Rule (30)
   Remove Brackets
   Mapping Rule (31)
   Tone Absorption Rule (4)
   'a child's crab'

1.1. Possessive pronoun construction

The noun + possessive pronoun construction is characterized by the same tonal alternations as those of the noun + noun associative construction (in section 1.0.), as illustrated in (7).

(7)

1.  2.
   a. '/ôwâ/ /'/ /mhê/ → [ôwâ mhê] 'my house'
      'house' A 'my'
   b. '/àkpâ/ /'/ /mhê/ → [àkpâ mhê] 'my cup'
      'cup' A 'my'
   c. '/âyôyô/ /'/ /mhê/ → [âyôyô mhê] 'my skull'
      'skull' A 'my'
   d. '/ôkê/ /'/ /mhê/ → [ôkê mhê] 'my ram'
      'ram' A 'my'

Observe in column (1) of (7a-c) that the low tones of the nouns preceding the possessive pronoun are raised to the level of high in column (2) in a similar fashion to that of the noun + noun associative construction in Section 1.0. The low tone of N\textsubscript{1} in column (1) of (7d), on the other hand, remains unaffected in column (2). Such tonal alternations
were observed in the noun + noun associative construction to be effected by a high floating tone of association (A). If the same high tone associative morpheme occurs in the surface structure of noun + possessive pronoun constructions, the alternations are accounted for. Sample derivations are given in (8-10).

(8) Sample Derivation: 'my house'

\[
\begin{align*}
\text{TM} & \quad [ [H L] [ H ] [ L ] ] \\
\text{NP} & \quad \text{Assoc} \quad \text{PN} \\
\text{SM} & \quad [ [H H] [ L ] ] \\
\end{align*}
\]

\[
\begin{align*}
\hspace{1cm} \text{Low Tone Raising Rule (3)} \\
\end{align*}
\]

\[
\begin{align*}
\text{Vowel Deletion Rule (62)} \\
\text{(inapplicable)} \\
\text{Mapping Rule (30)} \\
\end{align*}
\]

\[
\begin{align*}
\text{'my house'}
\end{align*}
\]

(9) Sample Derivation: 'my skull'

\[
\begin{align*}
\text{TM} & \quad [ [L L L] [ H ] [ L ] ] \\
\text{NP} & \quad \text{Assoc} \quad \text{PN} \\
\text{SM} & \quad [ [a\gamma\gamma\gamma] [ ] [m\eta\epsilon] ] \\
\end{align*}
\]

\[
\begin{align*}
\hspace{1cm} \text{Low Tone Raising Rule (3)} \\
\end{align*}
\]

\[
\begin{align*}
\text{Vowel Deletion Rule (62)} \\
\text{(inapplicable)} \\
\text{Mapping Rule (30)} \\
\end{align*}
\]

\[
\begin{align*}
\text{'my skull'}
\end{align*}
\]
(10) Sample Derivation: 'my ram'

\[
\begin{array}{c}
\text{TM} & \left[ [ \text{L H} ] \left[ \text{H} \right] \left[ \text{L} \right] \right] \\
\text{NP} & \text{N} \text{ Assoc} \text{ PN} \\
\hline
\text{SM} & \left[ [ \text{oke} ] \left[ \right] \left[ \text{mhec} \right] \right] \\
\hline
\text{TM} & \left[ [ \text{L H} ] \left[ \text{H} \right] \left[ \text{L} \right] \right] \\
\text{SM} & \left[ [ \text{oke} ] \left[ \right] \left[ \text{mhec} \right] \right] \\
& \left[ \text{L H} \text{ H} \text{ L} \right] \\
& \left[ \text{oke} \text{ mhec} \right] \\
& \left[ \text{L H} \text{ H} \text{ L} \right] \\
& \left[ \text{oke} \text{ mhec} \right] \\
& \left[ \text{L H} \text{ L} \right] \\
& \left[ \text{oke} \text{ mhec} \right] \\
\hline
\end{array}
\]

\begin{itemize}
\item \text{Low Tone Raising Rule (3)} (inapplicable)
\item \text{Vowel Deletion Rule (62)} (inapplicable)
\item \text{Mapping Rule (30)}
\item \text{Remove Brackets}
\item \text{Mapping Rule (31)}
\item \text{Tone Absorption Rule (4)}
\end{itemize}

'my ram'

1.2. Possessive interrogative pronoun construction

The tones of nouns that immediately precede the interrogative pronoun 'whose' undergo tonal alternations that are identical to the noun + noun associative construction, as illustrated in (11).

(11) a. /\text{ákpà}/ /'/ /\text{jwà}/ \rightarrow [\text{ákpáwà}] 'whose cup?'
    'cup' A 'whose'

b. /\text{úkpò}/ /'/ /\text{jwà}/ \rightarrow [\text{úkpówà}] 'whose cloth?'
    'cloth' A 'whose'

c. /\text{údzè}/ /'/ /\text{jwà}/ \rightarrow [\text{údzówà}] 'whose axe?'
    'axe' A 'whose'

d. /\text{òkè}/ /'/ /\text{jwà}/ \rightarrow [\text{òkówà}] 'whose ram?'
    'ram' A 'whose'

It is not surprising that the tonal alternations of this construction are identical to the noun + noun associative construction, since the meaning of the possessive interrogative pronoun construction implies a genitive relationship. In fact /\text{ts}f/ can occur between the noun and the possessive interrogative pronoun (e.g., ákpà t:jwà 'whose cup?'), just as in the noun + noun associative construction (genitive). By recognizing the occurrence of the high tone associative morpheme (A) in the surface structure, examples of (11) can be accounted for in a unitary fashion, as seen in the sample derivations of (12-13).
(12) Sample Derivation: 'whose cup'

```
TM [ [L L] [ H ] [H L] ]
NP N Assoc PN
[ [H H] [H L]]
[ [H H] [H L H] ]
[ [H H] [H L D] ]
SM [ [akpa] [œwa] ]
[ [akpØ] [œwa] ]
TM [ [H H] [H L D] ]
SM [ [akp] [œwa] ]
[ H H [H L D] ]
[ akp œwa ]
[ H H [H L D] ]
[ akp œwa ]
[ akp œwa ]
[ akp œwa ]
[ akp œwa ]
[ akp œwa ]
[akpœwa]

Low Tone Raising Rule (3)
High Tone Insertion Rule (23)
Downstep Rule (20)
Vowel Deletion Rule (62)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)
Tone Simplification Rule (35)

(13) Sample Derivation: 'whose axe?'

```

```
TM [ [H H] [H L] ]
NP N Assoc PN
------------------------------
[ [H H] [H] [H L H] ]
[ [H H] [H] [H L D] ]
SM [ [udze] [ ] [œwa] ]
[ [udzØ] [ ] [œwa] ]
TM [ [H H] [H] [H L D] ]
SM [ [udz] [œwa] ]
[ H H [H L D] ]
[ udz œwa ]
[ H H [H L D] ]
[ udz œwa ]
[ udz œwa ]
[ udz œwa ]
[ udz œwa ]
[udzœwa]

Low Tone Raising Rule (3)
(inapplicable)
High Tone Insertion Rule (23)
Downstep Rule (20)
Vowel Deletion Rule (62)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)
Tone Simplification Rule (35)

'whose cup?'
1.3. Adverbial time phrase construction

It was noticed in previous sections that whenever a noun preceded another noun in some sort of association, the tones of the noun that preceded underwent tonal alternations. Similarly, it will be seen in this section that whenever a noun precedes another noun that indicates time (e.g., today, yesterday, etc.) the tones of the noun that precedes will undergo tonal alternations. Examples are given in (14).

(14) a. /ákù/ '/ /áxwè/ → [ákýáxwè] 'tomorrow's market'
    'market' A 'tomorrow'
b. /ákù/ '/ /éle/ → [ákýéle] 'today's market'
    'market' A 'today'
c. /ákù/ '/ /énòdè/ → [ákýénòdè] 'yesterday's market'
    'market' A 'yesterday'
d. /úkpò/ '/ /énòdè/ → [úkpénòdè] 'yesterday's cloth'
    'cloth' A 'yesterday'
e. /údzè/ '/ /énòdè/ → [údzénòdè] 'yesterday's axe'
    'axe' A 'yesterday'
f. /ákù/ '/ /énòdè/ → [ákénòdè] 'yesterday's ram'
    'ram' A 'yesterday'

It should be noted that the tonal alternations of this construction are identical to those of the noun + noun associative construction. In fact, the meaning of this construction (when in isolation) is always translatable to a parallel meaning of the associative construction, as observed in (14). If this construction is, on the other hand, placed within a context, the meaning can remain that of an obvious associative construction (e.g., 'he went to yesterday's market', or 'he bought yesterday's ram'), or it can have a less obvious meaning of association (e.g., 'he went to market yesterday', or 'he bought a ram yesterday'). Furthermore, if a speaker wishes to distinguish these two meanings, he will insert /ts/ between the first noun and the noun that indicates time (e.g., áktśénòdè) just as in the case of the noun + noun associative construction. In this instance, the meaning can only be that of "yesterday's noun" or "noun of yesterday". In any case, the evidence supports the occurrence of the high tone associative morpheme. The sample derivations of (15-17) illustrate this.
(15) Sample Derivation: 'yesterday's market'

\[
\begin{array}{c|c}
\text{TM} & \text{[H L L] [H L L]} \\
\hline
\text{NP N} & \text{Assoc N} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{SM} & \text{[aki] [enode]} \\
\hline
\text{[aky]} & \text{[enode]} \\
\hline
\text{TM} & \text{[H H]} [H L L] \\
\hline
\text{SM} & \text{[aky] [enode]} \\
\hline
\text{[aky]} & \text{[enode]} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{[aky]} & \text{[enode]} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{[aky]} & \text{[enode]} \\
\hline
\text{[aky]} & \text{[enode]} \\
\hline
\end{array}
\]

Low Tone Raising Rule (3)
Glide Formation Rule (39)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)

\[\text{[akyenodê]}\]

'yesterday's market'

(16) Sample Derivation: 'yesterday's cloth'

\[
\begin{array}{c|c}
\text{TM} & \text{[H L L] [H L L]} \\
\hline
\text{NP N} & \text{Assoc N} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{SM} & \text{[ukpo] [enode]} \\
\hline
\text{[ukpø]} & \text{[enode]} \\
\hline
\text{TM} & \text{[H H]} [H L L] \\
\hline
\text{SM} & \text{[ukp] [enode]} \\
\hline
\text{[ukp]} & \text{[enode]} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{[ukp]} & \text{[enode]} \\
\hline
\text{[H H]} & \text{[H L L]} \\
\hline
\text{[ukp]} & \text{[enode]} \\
\hline
\text{[ukp]} & \text{[enode]} \\
\hline
\end{array}
\]

Low Tone Raising Rule (3)
Vowel Deletion Rule (62)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)

\[\text{[ukpênodê]}\]

'yesterday's cloth'
Sample Derivation: 'yesterday's axe'

\[
\begin{array}{c}
\text{TM} \\
\text{NP N Assoc N} \\
\hline
\text{SM} \\
\text{[udze][ } ] [\varepsilon\text{node}] \\
\text{[udzë][ } ] [\varepsilon\text{node}] \\
\text{TM} \\
\text{[HH][H][H L L]} \\
\text{SM} \\
\text{[udz][ ] } [\varepsilon\text{node}] \\
\text{[H H H H L L]} \\
\text{udz } [\varepsilon\text{node}] \\
\text{[H H H H L L]} \\
\text{udz } [\varepsilon\text{node}] \\
\hline
\text{[udzênôdë]} \\
'yesterday's axe'
\end{array}
\]

Low Tone Raising Rule (3) (inapplicable)
Vowel Deletion Rule (62)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)

1.4. **Definite article construction**

The same tonal alternations that characterize the noun + noun associative construction also characterize the definite article construction, as illustrated in (18).

\[(18) \ a. \ /\text{ñâ}/ /' /\text{ákpà}/ \rightarrow [\text{ñâ}k\text{pà}] \text{ or } [\text{ñâ}k\text{pà}] \quad \text{'the cup'}
\]
\[(b. \ /\text{ñâ}/ /' /\text{ágbòp}/ \rightarrow [\text{ñâ}gb\text{p}]) \text{ or } [\text{ñâ}gb\text{p}] \quad \text{'the orange'}
\]
\[(c. \ /\text{ñâ}/ /' /\text{óyêdë}/ \rightarrow [\text{ñô}y\text{êdë}] \text{ or } [\text{ñô}y\text{êdë}] \quad \text{'the banana'}
\]
\[d. \ /\text{ñâ}/ /' /\text{ówà}/ \rightarrow [\text{ñô}wà] \quad \text{'the house'}
\]

It will be seen in the sample derivations of (20-21) that by adopting the rules given thus far, the surface forms of columns (2) are accountable for. Column (3), nevertheless, requires the addition of an optional tone simplification rule, as given in (19).

\[(19) \text{ Tone Simplification Rule}
\]
\[
\begin{array}{c}
[+ \text{HIGH}] \rightarrow \emptyset / [+ \text{HIGH}] \\
\hline
[+ \text{Vocalic}]
\end{array}
\]

66
Sample Derivation: 'the orange'

(20)

\[
\begin{align*}
\text{TM} & : \quad [ [L \ L] [H] [L \ L \ L] ] \\
\text{NP DA Assoc N} & : \quad [ [H \ H] [ ] [L \ L \ L] ] \\
\text{SM} & : \quad [ \text{on} ] \quad [\text{agbopi}] \\
\text{Low Tone Raising Rule (3)} & \\
\text{Vowel Deletion Rule (62)} & \\
\text{Mapping Rule (30)} & \\
\text{Remove Brackets} & \\
\text{Mapping Rule (31)} & \\
\text{Tone Simplification Rule (19)} & \\
\text{(optional)} & \\
\text{optional} & \\
\end{align*}
\]

or

\[
\begin{align*}
[\text{on} \text{agbopi}] \\
\text{'}the orange' & \\
\end{align*}
\]

Sample Derivation: 'the house'

(21)

\[
\begin{align*}
\text{TM} & : \quad [ [L \ L] [H] [H \ L] ] \\
\text{NP DA Assoc N} & : \quad [ [H \ H] [H \ L] ] \\
\text{SM} & : \quad [ \text{on} ] \quad [\text{owa}] \\
\text{Low Tone Raising Rule (3)} & \\
\text{Vowel Deletion Rule (62)} & \\
\text{Mapping Rule (30)} & \\
\text{Remove Brackets} & \\
\text{Mapping Rule (31)} & \\
\text{Tone Absorption Rule (4)} & \\
\end{align*}
\]

The tones in demonstrative construction undergo alternations of the same sort as discussed above. Nouns entering into this construction must

1.5. Demonstrative construction
already be in a state of definiteness (i.e., they must be accompanied by the definite article, as outlined in Section 1.4.). Illustrations of the demonstrative construction are given in (22).

(22)  
a. /ёнòwa/ '/'' /ёнà/ → [ёнòwànà] 'this house'  
b. /ёнàkpa/ '/'' /ёнà/ → [ёнàkpanà] 'this cup'  
c. /ёнàtáoà/ '/'' /ёнà/ → [ёнàtásonà] 'this plate'  
d. /ёнòyèdé/ '/'' /ёнà/ → [ёнòyèdènà] 'this banana'  
e. /ёнòwa/ '/'' /ёнà/ → [ёнòwà] 'that house'  
f. /ёнàkpa/ '/'' /ёнà/ → [ёнàkpanà] 'that cup'  
g. /ёнàtáoà/ '/'' /ёнà/ → [ёнàtásonà] 'that plate'  
h. /ёнòyèdé/ '/'' /ёнà/ → [ёнòyèdè] 'that banana'

The demonstrative pronouns are /ёнà/ 'this' in examples (a-d), and /ёнà/ 'that' in examples (c-h). The intervocalic /ён/ can be deleted in the forms given in (c-h) (e.g., ёнòwà → ёнò 'that house', etc.). For further discussion, see Chapter II.

In the previous discussions on the structure of the noun in Etsako, it was pointed out that a noun consists of a noun prefix and a stem. The correct bracketing then for a noun would be [[ ] [ ]].

N Pref Stem

In the derivations given above, this bracketing was omitted because the output of the rules would have been the same with or without such a bracketing. In the derivation of certain constructions, it has been pointed out that the noun prefix is deleted rather than the preceding V of N. In these cases we can once more see the importance of syntactic brackets for the correct application of phonological rules. If the prefix is not bracketed, the mapping rules would assign the prefix tone to the first vowel of the stem rather than to the preceding vowel. Furthermore, given that the correct bracketing for nouns is as above, the tone mapping rules discussed previously will be shown to be some what more complex than originally suggested in that they must be applied cyclically. The use of cyclic application of tone mapping rules was omitted in the sample derivations given previously because the output of the rules would have been the same with or without the cyclic application. In any such events to come, the same method will be adopted. Only in the events when the need for clarity is involved will cyclic application of tone mapping rules be given.

Michael Brame (1974) has offered further evidence for the cycle to
account for stress phenomena in Palestinian, Maltese, and Spanish. There has been much discussion as to whether cyclic application of phonological rules is justified. The problem of accounting for the complex tonal phenomena in Ekpheli appears to support the need for the cycle. The correct bracketing and application of the rules is given in the sample derivations of (23-24).

(23) Sample Derivation: 'this cup'

\[
\begin{array}{l}
\text{TM} [ [ [ H ] [ L L ] ] [ H ] [ [ L ] [ L ] ] ] \\
\text{NP NP PREF STEM ASSOC DPN PREF STEM} \\
[ [ [ H ] [ H H ] ] [ [ L ] [ L ] ] ] \text{Low Tone Raising Rule (3)} \\
\text{SM} [ [ [ o ] [ nakpa ] ] [ [ o ] [ na ] ] ] \\
[ [ [ o ] [ nakpa ] ] [ [ o ] [ na ] ] ] \text{Vowel Deletion Rule (64)} \\
\text{First Cycle} \\
\text{TM} [ [ [ H ] [ H H ] ] [ [ L ] [ L ] ] ] \text{Mapping Rule (30)} \\
\text{SM} [ [ [ o ] [ nakpa ] ] [ [ ] [ na ] ] ] \\
[ [ [ o ] [ nakpa ] ] [ [ ] [ na ] ] ] \text{Remove Brackets} \\
\end{array}
\]

\[
\begin{array}{l}
\text{Mapping Rule (31)} \\
\text{(inapplicable)} \\
\text{Second Cycle} \\
\text{Mapping Rule (30)} \\
\text{(inapplicable)} \\
\text{Remove Brackets} \\
\text{Mapping Rule (31)} \\
\text{'this cup'}
\end{array}
\]
(24) Sample Derivation: 'that plate'

```
(TM) [ [[ H ] [L H L ] ] [ ] [ [ H ] [ H ] ] ]
NP NP PREF STEM ASSOC DPN PREF STEM

[ [ [ H ] [L H H ] ] [ [ H ] [ H ] ] ]
Low Tone Raising Rule (3)

[ [ [ H ] [L H H ] ] [ [ H ] [ H L ] ] ]
Pre-pausal Rule (11)

(SM) [ [ ɔ ] [natasa] ] [ [ ɔ ] [I ] ]
Vowel Deletion Rule (64)

First Cycle

[ [ ɔ ] [natasa] ] [ [ ɔ ] [ I ] ]
Mapping Rule (30)

Second Cycle

[ [ H ] [L H H ] ] [ [ H ] [ H L ] ]
Remove Brackets

[ [ ɔ ] [natasa] ] [ [ I ] ]
Mapping Rule (31)

[ [ H ] [L H H ] ] [ [ H ] [ H L ] ]

[ [ ɔ ] [natasa] ] [ [ I ] ]
Tone Absorption Rule (4)

\[ \text{natasa}\]

\[ \text{that plate}\]
```

1.6. Adjectival construction

The tonal behavior in a noun + adjectival noun phrase also reveals the presence of the high tone associative morpheme. Illustrations are given in (25).

(25) a. /əmò/ '\text{child}' A 'black'
    \[ [əmònwɔls]\] \text{'a black child'}

b. /akpà/ '\text{cup}' A 'other'
    \[ [akpànìkèl]\] \text{'other cup'}

c. /òwè/ '\text{house}' A 'old'
    \[ [òwòjɔ]\] \text{'an old house'}

d. /akpà/ '\text{cup}' A 'new'
    \[ [akpàgbɔmhl]\] \text{'a new cup'}
e. /átásâ/ // /šuĕvê/ → [átásšuĕvê] 'another plate'
f. /úmhèlè/ // /štsômhl/ → [úmhélötsômhl] 'some salt'
g. /ágyôô/ // /šdzèvá/ → [ágyôôdzèvá] 'second skull'
h. /sêdède/ // /šnlkbë/ → [sêdèdènlkèbè] 'a small banana'
i. /élâmhl/ // /énebû/ → [élâmhlnebû] 'much meat'
j. /ôkè/ // /šnkûâ/ → [ôkènkèwà] 'a big ram'
k. /ôwà/ // /šdà/ → [ôwâdà] 'a different house'
l. /âmè/ // /kpô → [âmèkpô] 'all water'

Sample derivations are given in (26-29).

(26) Sample Derivation: 'a new cup'

\[
\begin{align*}
\text{TM} & \quad [\text{L L} \quad \text{[H]} \quad \text{[L L L]}] \\
\text{NP N} & \quad \text{Assoc ADJ}
\end{align*}
\]

\[
\begin{align*}
[ & \quad [\text{H H}] \quad \text{[L L L]}] \\
\text{SM} & \quad [\text{akpa}] \quad [\text{šgbômhi}] \\
\text{TM} & \quad [\text{H H}] \quad [\text{L L L}] \\
\text{SM} & \quad [\text{akp}] \quad [\text{šgbômhi}] \\
\text{TM} & \quad [\text{H H}] \quad [\text{L L L}] \\
\text{SM} & \quad [\text{akp}] \quad [\text{šgbômhi}] \\
\quad & \quad [\text{akpšgbômhi}] \\
\end{align*}
\]

Low Tone Raising Rule (3)
Vowel Deletion Rule (62)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)

'a new cup'
(27) Sample Derivation: 'a new ram'

Low Tone Raising Rule (3)
(inapplicable)

Vowel Deletion Rule (62)
Mapping Rule (30)

Remove Brackets

Mapping Rule (31)

Tone Absorption Rule (4)

'a new ram'

(28) Sample Derivation: 'a black cup'

Low Tone Raising Rule (3)

Vowel Deletion Rule (64)

First Cycle

Mapping Rule (30)

Remove Brackets

Mapping Rule (31)
(inapplicable)

Second Cycle

Mapping Rule (30)
(inapplicable)

Remove Brackets

Mapping Rule (31)

Tone Absorption Rule (4)

'a black cup'
(29) Sample Derivation: 'a black ram'

```
TM  [ [ [ L ] [ H ] ] [ H ] [ H ] [ L ] [ L ] ] ]
NP N PREF STEM ASSOC ADJ PREF STEM

-----------------------------------------------
SM  [ [ [ o ] [ ke ] ] [ ] [ [ o ] [ nówisi ] ] ]
    [ [ [ o ] [ ke ] ] [ ] [ [ φ ] [ nówisi ] ] ]
Vowel Deletion Rule (64)
First Cycle

TM  [ [ [ L ] [ H ] ] [ H ] [ H ] [ L ] [ L ] ] ]
SM  [ [ [ o ] [ ke ] ] [ ] [ [ ] [ nówisi ] ] ]
    [ [ L ] [ H ] ] [ H ] [ H ] [ L ] [ L ] ]
Remove Brackets

-----------------------------------------------

[ [ L ] [ H ] [ H ] [ H ] [ L ] [ L ] ]
[ o ke ] [ nówisi ]
Remove Brackets

[ [ L ] [ H ] [ H ] [ H ] [ L ] [ L ] ]
[ o ke ] [ nówisi ]
Mapping Rule (31)
Tone Absorption Rule (4)

[ [ o konówisi ]]
'a black ram'

1.7. Relative clause construction

The head noun of a relative clause undergoes the identical tonal alternations that characterize the noun + noun associative construction. Examples are given in (30).

(30)
1. a. /àkpà/ '/ /'/sm + i + dè/ → [àkpànìdè]
   'cup' A 'this one''I''buy' 'a cup that I am buying'
   b. /wà/ '/ /'/sm + i + dè/ → [łwànìdè]
   'house' A 'this one''I''buy' 'a house that I am buying'
   c. /àkè/ '/ /'/sm + i + dè/ → [òkènìdè]
   'ram' A 'this one''I''buy' 'a ram that I am buying'

In column (1) of (30), the underlying form is given. Note that the
relative clause is simply a verbal noun, consisting of /əna/ 'this one'; /i/ 'I'; and /de/ 'buy'. If the pronoun is changed to the third person /o/ (e.g., ákpanôde 'a buyable cup' or 'a cup that he is buying'), the relative clause can be defined as an adjectival. If the tones are changed within the relative clause, then the tense will change (e.g., ákpanôde 'a cup that I bought). Sample derivations are given in (31–32).

(31). Sample Derivation: 'a cup that I am buying'

| TM | [ [ [ L ] [ L ] ] [ H ] [ [ H ] [ L L ] ] ] |
| NP | [ [ [ H ] [ H ] ] [ [ H ] [ L L ] ] ] |
| PRE | [ [ a ] [ kpa ] ] [ [ o ] [ nide ] ] |
| STEM | [ [ a ] [ kpa ] ] [ [ o ] [ nide ] ] |
| ASSOC | [ [ a ] [ kpa ] ] [ [ o ] [ nide ] ] |
| REL | [ [ a ] [ kpa ] ] [ [ o ] [ nide ] ] |
| PRE | [ Low Tone Raising Rule (3) ] |
| STEM | [ Vowel Deletion Rule (64) ] |
| First Cycle | [ Mapping Rule (30) ] |
| | [ Remove Brackets ] |
| | [ Mapping Rule (31) ] |
| | (inapplicable) |
| Second Cycle | [ Mapping Rule (30) ] |
| | (inapplicable) |
| | [ Remove Brackets ] |
| | [ Mapping Rule (31) ] |
| | [ Tone Absorption Rule (4) ] |

[a cup that I am buying']
(32) Sample Derivation: 'a ram that I am buying'

\[
\begin{align*}
\text{TM} & \quad \text{NP N PREF STEM ASSOC REL PREF STEM} \\
\text{SM} & \quad \text{[ o ] [ke] [ ] [o] [nide] [ ]} \\
\text{TM} & \quad \text{[ L ] [H ] [H ] [H ] [ L L ] [ ]} \\
\text{SM} & \quad \text{[ o ] [ke] [ ] [ ] [nide] [ ]} \\
& \quad \text{[ L ] [H ] [H ] [H ] [ L L ] [ ]} \\
& \quad \text{[ o ] ke [ ] [nide] [ ]} \\
\end{align*}
\]

Low Tone Raising Rule (3) (inapplicable)

Vowel Deletion Rule (64)

First Cycle

Mapping Rule (30)

Remove Brackets

Mapping Rule (31) (inapplicable)

Second Cycle

Mapping Rule (30) (inapplicable)

Remove Brackets

Mapping Rule (31)

Tone Absorption Rule (4)

'a ram that I am buying'

1.8. Locative construction

Historically, the locative construction probably had a high tone locative marker that came between the noun and the place noun (locative). At some later point in history, the segment of the high tone locative marker was lost, leaving behind a high floating tone that had already begun to effect a tonal alternation on the tones of the preceding noun. Synchronically, the locative construction is characterized by the same set of tonal alternations that characterize the noun + noun associative construction. Even though the high floating tone of these two constructions are from two different historical sources (e.g., high tone associative marker, and high tone locative marker), it is, synchronically, a single high floating tone associative morpheme that occurs between two nouns in association in the surface structure. Illustrations are given in (33).
(33) a. /àkpà/ /'a/ /àkì/ → [ákpààkì] 'cup' A 'market'
b. /úkpò/ /'a/ /àkì/ → [úkpòàkì] 'cloth at market'
c. /údzé/ /'a/ /àkì/ → [údzéàkì] 'axe at market'
d. /òkì/ /'a/ /àkì/ → [òkèàkì] 'ram at market'
e. /àkpà/ /'a/ /òwà/ → [àkpàòwà] 'cup at home'
f. /úkpò/ /'a/ /òwà/ → [úkpòòwà] 'cloth at home'
g. /údzé/ /'a/ /òwà/ → [údzéòwà] 'axe at home'
h. /òkè/ /'a/ /òwà/ → [òkèòwà] 'ram at home'

Sample derivations are given in (34–37).

(34) Sample Derivation: 'cup at market'

\[
\begin{array}{l}
\text{TM} \quad [\begin{array}{lll}L & L & H \end{array}] \quad [L & L & ] \\
\text{NF} \quad N \quad \text{Assoc} \quad N/LOC \\
\quad [\begin{array}{lll}H & H & L \end{array}] \quad [L & L & ] \\
\text{SM} \quad [\text{akpa}] \quad [\text{aki}] \\
\end{array}
\]

***************

\[
\begin{array}{l}
\text{TM} \quad [\begin{array}{lll}H & H & \end{array}] \quad [L & L & ] \\
\text{SM} \quad [\text{akpa}] \quad [\text{aki}] \\
\end{array}
\]

Vowel Deletion Rule (inapplicable)

Mapping Rule (30)

\[
\begin{array}{l}
\text{Low Tone Raising Rule (3)}
\end{array}
\]

'cup at market'
(35) Sample Derivation: 'ram at market'

```
TM [ [L H] [ H ] [L L] ]
NP N  Assoc N/LOC

SM [ [oke][     ][aki] ]

----------------------

TM [ [L H] [ H ] [L L] ]
SM [ [oke][     ][aki] ]

[ L H  H  L L ]
[    oke  aki ]
[ L H  H  L L ]
[    oke  aki ]
[    L   L ]
[    oke  aki ]
[okeâaki]

'okeâaki'

Low Tone Raising Rule (3) (inapplicable)
Vowel Deletion Rule (inapplicable)
Mapping Rule (30)
Remove Brackets
Mapping Rule (31)
Tone Absorption Rule (4)

(36) Sample Derivation: 'cup at home'

```

```
TM [ [L L][ H ][H L] ]
NP N  Assoc N/LOC

SM [ [akpa][     ][owa] ]

----------------------

TM [ [H H ][ H L] ]
SM [ [akpa][     ][owa] ]

[âkpaowà]

'âkpaowà'

Low Tone Raising Rule (3)
Vowel Deletion Rule (inapplicable)
Mapping Rule (30)

'cup at home'

'cup at home'
2.0. Identification construction

The next construction to be considered is that of identification (term from Wealters). Nouns and noun phrases of this construction usually undergo a tonal alternation, as seen in (38).

(38) a. /òwà ʃ xōná/ → [òwà xōná] 'this is a house'

b. /òwà ʃ xōí/ → [òwà xōí] 'that is a house'

c. /àkpà ʃ xōná/ → [àkpà xōná] 'this is a cup'

d. /àkpà ʃ xōí/ → [àkpà xōí] 'that is a cup'

e. /àwòòò ʃ xōná/ → [àwòòò xōná] 'this is a hoe'

f. /àtáśá ʃ xōná/ → [àtáśá xōná] 'this is a plate'

g. /údžé ʃ xōná/ → [údžé xōná] 'this is an axe'

h. /òkè ʃ xōná/ → [òkè xōná] 'this is a ram'
The first nouns in (38 a-f) all end in a LOW tone in isolation. In this identification construction, however, the final tone on the NOUN is either a rising tone (LOW HIGH) or a (DOWNSTEP). The forms with the rising tone will first be discussed. In examples (g-h), the NOUNs which end in a HIGH in isolation show a fall (HIGH LOW) in these constructions. Furthermore the initial tones on the VERB PHRASE in examples (a-f) which are HIGH in isolation occur as a DOWNSTEP showing that LOW tone must occur in the surface structure. From these examples, one can assume that the Identification morpheme is represented in the lexicon as a tonal matrix of [HIGH LOW].

In order to derive the occurring phonetic tones, the mapping rules must occur after the Downstep Rule (20). The Tone Absorption Rule (4) must apply. The Tone Simplification Rule (35) can optionally apply. And in addition, a rule must be posited as given in (39), which reflects the fact that these tones can not occur on one segment.

(39) Tone Simplification Rule

\[
\text{TONE} \rightarrow \emptyset / \begin{array}{l}
\text{TONE TONE} \\
\text{Vocalic}
\end{array}
\]

(Tone is a cover symbol for [± HIGH].)

The sequence of tone rules and tone mapping rules that are necessary to derive the Identification Construction are as in (40). Note that there are other rules which do not apply and are ordered in relation to the rule given.

(40) 1. Downstep Rule (20) \[[\pm H] \rightarrow [+ D] / [- H]\]

2. Mapping Rule (30) Map tones onto segments within innermost brackets; map first tone onto first vowel, second tone onto second vowel, etc. If there is no vowel, let tone 'float'. Remove innermost brackets whether or not rule can apply. Map tone onto segments only where segments have not yet been specified by tone features.

3. Mapping Rule (31) Map 'floating' tones onto closest immediate vowel (not separated by a consonant).

4. Tone Absorption Rule (4) \([\alpha \text{ HIGH}]_1 \rightarrow \emptyset / \begin{array}{l}
\alpha \text{ HIGH} \\
\text{Vocalic}
\end{array}\]

5. Tone Simplification Rule (39)

6. Tone Simplification Rule (35) \([- \text{HIGH}] \rightarrow \emptyset / \begin{array}{l}
+ \text{HIGH} \\
\text{Vocalic}
\end{array}\]

Given these rules, (41) illustrates how the phonetic tones can be derived.
(41) a. Sample Derivation:  'this is a house'

\[
\begin{array}{c}
\text{TM} \begin{array}{c}
[H \ H] [H \ L] [H \ H] \\
S \ N \quad ID \quad VP
\end{array} \\
[ [H \ L] [D \ L] [D \ H] ]
\end{array}
\]

\[
\begin{array}{c}
\text{SM} \begin{array}{c}
[\text{owa}] [ ] [\text{xona}] \\
\text{TM} \begin{array}{c}
[H \ L] [D \ L] [D \ H] \\
\text{SM} \begin{array}{c}
[\text{owa}] [ ] [\text{xona}] \\
[ ] [H \ L] [D \ L] [D \ H] \\
[ ] [\text{owa}] [ ] [\text{xona}] \\
\text{-------------}
\end{array}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\text{[\text{owa} \ \text{xona}]}
\end{array}
\]

b. Sample Derivation:  'this is an axe'

\[
\begin{array}{c}
\text{TM} \begin{array}{c}
[H \ H] [H \ L] [H \ H] \\
S \ N \quad ID \quad VP
\end{array} \\
[ [H \ H] [H \ L] [D \ H] ]
\end{array}
\]

\[
\begin{array}{c}
\text{SM} \begin{array}{c}
[\text{udze}] [ ] [\text{xona}] \\
\text{TM} \begin{array}{c}
[H \ H] [H \ L] [D \ H] \\
\text{SM} \begin{array}{c}
[\text{udze}] [ ] [\text{xona}] \\
[ ] [H \ H] [H \ L] [D \ H] \\
[ ] [\text{udze}] [ ] [\text{xona}] \\
\text{-------------}
\end{array}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\text{[\text{udze} \ \text{xona}]}
\end{array}
\]

The alternative forms in (38a-f) can be accounted for by the Tone Simplification Rule (35) as given originally in Chapter III, and repeated in (40). The Tone Simplification Rule (35) is clearly a case of tone deletion which can optionally apply after the Tone Simplification
Rule (39). Consequently, the input to Rule (35) are the final forms as given in (41). Sample derivations are given in (42).

(42) a. $\text{H L D D H} \quad \text{H (L) D D H} \quad \text{H (L) D D H}$
    $\text{owə} \quad \text{owə} \quad \text{owə'} \quad \text{'this is a house'}$

    $\text{L (L) D D H} \quad \text{L (L) D D H} \quad \text{L (L) D D H}$
    $\text{akpa} \quad \text{akpa} \quad \text{akpa'} \quad \text{'this is a cup'}$

    $\text{L L L D D H} \quad \text{L L (L) D D H} \quad \text{L L (L) D D H}$
    $\text{awəəo} \quad \text{awəəo} \quad \text{awəəo} \quad \text{'this is a hoe'}$

Both the HIGH tone Associative morpheme and the HIGH-LOW Identification morpheme can occur in the surface structure as is shown in the examples under (43).

(43) a. \[\text{'cup' A 'my' ID 'is this'} \quad \begin{array}{c}
\text{/'akpa'/} \\
\text{/'mhe'/} \\
\text{/'xənə'/}
\end{array} \]  
\[\text{'this is my cup'} \quad \begin{array}{c}
\{\text{/'akpa' mhe' xənə'}/
\text{/'akpa' mhe' xənə'}/
\end{array} \]

\[\text{/'akpa'/} \\
\text{/'ənwəls'/} \\
\text{/'xənə'/} \quad \begin{array}{c}
\{\text{/'akpa'ənwəls' xənə'}/
\text{/'akpa'ənwəls' xənə'}/
\end{array} \]
\[\text{'this is a black cup'} \quad \begin{array}{c}
\{\text{/'ənwəls' xənə'/}
\text{/'ənwəls' xənə'/}
\end{array} \]

\[\text{/'ənə'/} \\
\text{/'əkpa'/} \\
\text{/'xənə'/} \quad \begin{array}{c}
\{\text{/'ənəkpa' xənə'}/
\text{/'ənəkpa' xənə'}/
\end{array} \]
\[\text{DA A 'cup' ID 'is this'} \quad \begin{array}{c}
\{\text{/'ənəkpa' xənə'}/
\text{/'ənəkpa' xənə'}/
\end{array} \]
\[\text{'this is the cup'} \quad \begin{array}{c}
\{\text{/'ənəkpa' xənə'}/
\text{/'ənəkpa' xənə'}/
\end{array} \]

A sample derivation is given in (44).
(44) Sample Derivation: 'this is a black cup'

\[
\begin{align*}
\text{TM} & \quad \text{SNP N PREF STEM ASSOC ADJ PREF STEM ID VP}
\end{align*}
\]

\[
\begin{align*}
\text{Low Tone Raising Rule (3)} & \\
\text{Downstep Rule (20)} & \\
\text{Vowel Deletion Rule (64)} & \\
\text{First Cycle} & \\
\text{Mapping Rule (30)} & \\
\text{Remove Brackets} & \\
\text{Mapping Rule (31)} & (\text{inapplicable})
\end{align*}
\]

\[
\begin{align*}
\text{Second Cycle} & \\
\text{Mapping Rule (30)} & (\text{inapplicable}) & \\
\text{Remove Brackets} & \\
\text{Mapping Rule (31)} & \\
\text{Tone Absorption Rule (4)} & \\
\text{Tone Simplification Rule (39)} &
\end{align*}
\]

\[
\begin{align*}
\text{'this is a black cup'}
\end{align*}
\]

The alternative forms in (44) can, furthermore, be accounted for by the application of the Tone Simplification Rule (35) to the output of the final forms of (44), as seen in (45).
As illustrated in (46), tonal alternations also occur in interroga-
tives involving 'how many'.

(46) a. /éwà # ékè/ → [éwèkè] 'how many houses'
      /íkpà # ékè/  → [íkpèkè] 'how many cups'
      /íwòòò # ékè/  → [íwòòèkè] 'how many hoes'
      /ításà # ékè/  → [ításèkè] 'how many plates'
      /ídzè # ékè/  → [ídzèkè] 'how many axes'
      /èkè # ékè/  → [èkèkè] 'how many rams'

As noted above in Section 3.0. of Chapter III, in interroga-
tives a HIGH tone morpheme occurs finally in the surface structure. In final position the rising tone simplification rule is obligatory. The derivations of
these forms are illustrated in (47-48).
(47) Sample Derivation: 'how many houses'

\[
\text{TM} \quad [ [ [H \quad L] [H \quad L] ] ]
\]
\[
\text{Q NP N N}
\]
\[
[ [ [H \quad L] [H \quad L \quad H] ] ]
\]
\[
[ [ [H \quad L] [D \quad L \quad D] ] ]
\]
\[
\text{SM} \quad [ [ \text{ew} \quad \text{a} [\text{eke} \quad ] ] ]
\]
\[
[ [ \text{ew} \quad \text{Ø} [\text{eke} \quad ] ] ]
\]
\[
\text{TM} \quad [ [ [H \quad L] [D \quad L \quad D] ] ]
\]
\[
\text{SM} \quad [ [ \text{ew} \quad [\text{eke} \quad ] ] ]
\]
\[
[ [ \quad H \quad L \quad D \quad L \quad D \quad ] ]
\]
\[
[ [ \quad \text{ew} \quad [\text{eke} \quad ] ] ]
\]
\[
[ [ \quad H \quad L \quad D \quad L \quad D \quad ] ]
\]
\[
[ [ \quad \text{ew} \quad [\text{eke} \quad ] ] ]
\]

\[\text{How Tone Insertion Rule (23)}\]
\[\text{Downstep Rule (20)}\]
\[\text{Vowel Deletion Rule (62)}\]
\[\text{Mapping Rule (30)}\]
\[\text{Remove Brackets}\]
\[\text{Mapping Rule (31)}\]
\[\text{Tone Absorption Rule (4)}\]
\[\text{Tone Simplification Rule (35)}\]

\[\text{[éwéke'] or [éwéke']}\]

(48) Sample Derivation: 'how many rams'

\[
\text{TM} \quad [ [ [L \quad H] [H \quad L] ] ]
\]
\[
\text{Q NP N N}
\]
\[
[ [ [L \quad H] [H \quad L \quad H] ] ]
\]
\[
[ [ [L \quad D] [H \quad L \quad D] ] ]
\]
\[
\text{SM} \quad [ [ \text{ek} \quad [\text{eke} \quad ] ] ]
\]
\[
[ [ \text{ek} \quad [\text{eke} \quad ] ] ]
\]
\[
\text{TM} \quad [ [ [L \quad D] [H \quad L \quad D] ] ]
\]
\[
[ [ [L \quad D] [H \quad L \quad D] ] ]
\]
\[
[ [ \text{ek} \quad [\text{eke} \quad ] ] ]
\]
\[
[ [ \text{ek} \quad [\text{eke} \quad ] ] ]
\]
\[
[ [ \text{ek} \quad [\text{eke} \quad ] ] ]
\]
\[
\text{L \quad H \quad L \quad D}
\]
\[
\text{ek \quad eke}
\]
\[
[\text{èkeke}']
\]

\[\text{How Tone Insertion Rule (23)}\]
\[\text{Downstep Rule (20)}\]
\[\text{Vowel Deletion Rule (62)}\]
\[\text{Mapping Rule (30)}\]
\[\text{Remove Brackets}\]
\[\text{Mapping Rule (31)}\]
\[\text{Tone Absorption Rule (4)}\]
\[\text{Tone Simplification Rule (35)}\]

\[\text{'how many rams'}\]
4.0. Noun reduplication

In the Ekpheli equivalent of the English NP with 'every' modifying a noun (e.g., 'every house'), the noun in Ekpheli is reduplicated. Noun reduplication is characterized by a full repetition of the segments of the noun, with tone alternations which are very regular. The examples in (49) are derived by the rules already given.

(49) a. /òwà # òwà/ → [òwòwà] [òwòwà] 'every house'
    b. /útsàdè # útsàdè/ → [útsàdútsàdè] [útsàdútsàdè] 'every pot'
    c. /àyòxò # àyòxò/ → [àyòxàyòxò] [àyòxàyòxò] 'every coco-yam'
    d. /ídù # ídù/ → [ídùídù] [ídùídù] 'every lion'
    e. /údù # údù/ → [údyùdù] [údyùdù] 'every palm-tree'
    f. /ôlùmòhè # ôlùmòhè/ → [ôlùmòhyôlùmòhè] [ôlùmòhyôlùmòhè] 'every corpse'

(49a-f) are straightforward. Vowel deletion, glide formation, mapping, and tone simplification rules apply as shown in (50-51).

(50) Sample Derivation: 'every house'

| TM  | [ [H L] [H L] ] |
| N N |                     |
| N N |                     | Downstep Rule (20)
| N N |                     |
| SM  | [ owa ] [ owa ] |
| [ owa ] [ owa ] | Vowel Deletion Rule (62)
| TM  | [ [H L] [D L] ] |
| SM  | [ owa ] [ owa ] |
| [ owa ] [ owa ] | Mapping Rule (30)
| [ owa ] [ owa ] | Remove Brackets
| [ H L ] [ D L ] |
| [ owa ] [ owa ] |
| [ H L ] [ D L ] |
| [ owa ] [ owa ] |
| [ H L ] [ D L ] |
| [ owa ] [ owa ] |

-----------

[òwòwà] or [òwòwà] 'every house'

85
(51) Sample Derivation: 'every lion'

\[
\begin{aligned}
\text{TM} & \quad [ [H \ L] [H \ L] ] \\
N \ N \ N & \quad [ [H \ L] [D \ L] ] \\
\text{SM} & \quad [ [ud] [ud] ] \\
& \quad [ [ud] ] \\
\text{TM} & \quad [ [H \ L] [D \ L] ] \\
\text{SM} & \quad [ [ud] [ud] ] \\
& \quad [ [ud] ] \\
\hline
& \quad [ H \ L \ D \ L ] \\
& \quad [ \underbrace{ud \ ud} ] \\
& \quad [ \underbrace{ud \ ud} ] \\
\hline
\text{H(L)} & \quad D \ L \\
\hline
& \quad [ \underbrace{ud\ ud} ] \\
& \quad [ \underbrace{ud\ ud} ] \\
\end{aligned}
\]

Downstep Rule (20)

Glide Formation Rule (39)

Mapping Rule (30)

Remove Brackets

Mapping Rule (31)

Tone Absorption Rule (4)

Tone Simplification Rule (35)

There are cases however where the Rise is simplified to a Low rather than to a High (DOWNSTEP), as illustrated in (52).

\[
(52) /\text{útsádè} \# \text{útsádè}/ \rightarrow \begin{cases} \text{útsádèútsádè} \\ \text{útsádèútsádè} \end{cases}
\]

\[
\begin{aligned}
\text{H} & \quad \text{H} \quad \text{L} & \quad \text{H} \quad \text{L} \\
\underbrace{ud} & \quad \underbrace{ud} \\
\hline
\underbrace{ud} & \quad \underbrace{ud} \\
\end{aligned}
\]

This LOW-HIGH \rightarrow LOW simplification is also evidenced when a reduplicated noun occurs in an associative construction as shown in (53).
(53) Sample Derivation: 'every house of yesterday'

| TM | [[ [H] [L] ] [ [H] [L] ] [ [H] [L] ] [ [H] [L] ] ] |
| NP | N N PREF STEM N PREF STEM ASSOC N PREF STEM |
| SM | [[ [o] [wa] ] [ [o] [wa] ] [ [e] [node] ] ] |

Low Tone Raising Rule (3)

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Downstep Rule (20)
Vowel Deletion Rule (62)

First Cycle

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Mapping Rule (30)

Remove Brackets

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Mapping Rule (31) (inapplicable)

Second Cycle

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Remove Brackets

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Mapping Rule (31)

Third Cycle

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Remove Brackets

| TM | [[ [H] [L] ] [ [D] [H] ] [ [H] [L] ] ] |
| SM | [[ [o] [w] ] [ [o] [w] ] [ [e] [node] ] ] |

Mapping Rule (31)

Tone Absorption Rule (4)

Tone Simplification Rule (56)

[ówówénode] or [ówówénode] 'every house of yesterday'

In the earlier examples showing a simplification of a rising tone to HIGH (DOWNSTEP) the following tone was either a LOW or DOWNSTEP. In these
examples the following tone is a non-downstepped HIGH. It appears then that in order to preserve the underlying presence of the LOW the simplification rules must be changed. Before we formulate the new rule, some examples of the type in (54) will show that a simplification of a falling tone (HIGH LOW) can also occur, with the deletion of the LOW part.

(54) /ɔyɛdɛ # ɔyɛdɛ/ → \{[ɔyɛdɔyɛdɛ] \} 'every banana'
     'banana' 'banana'
     \{[ɔyɛdɔyɛdɛ] \}

The final low tone results from a rule which adds a LOW to pre-pausal HIGH (by Rule 11). There appears to be a principle of 'polarity' at work to preserve the effect of the underlying tones. That is, a HIGH-LOW becomes HIGH before a following LOW, and LOW-HIGH becomes LOW before a following non-downstepped HIGH. We can therefore formulate the contour tone simplification rule as in (55).

(55) Tone Simplification Rule:

\[ \begin{array}{c|c}
\text{[-α HIGH]} & \text{[-α HIGH]} \\
\text{[+ Vocalic]} & \text{[- DOWNSTEP]} \\
1 & 2 \\
\end{array} \rightarrow \begin{array}{c}
\text{[-α HIGH]} \\
\text{[+ Vocalic]} \\
1 & 2 \\
\end{array} \]

Another case where the LOW portion of a falling tone is deleted is when it occurs before a DOWNSTEPED HIGH, as seen in (56).

(56) a. /ɔkɛ # ɔkɛ/ → \{[ɔkokɛ] \} 'every ram'
     'ram' 'ram'
     \{[ɔkokɛ] \}

b. /ɔtsɛdɛ # ɔtsɛdɛ/ → \{[ɔtsɛdɔtɛdɛ] \} 'every sunrise'
     'sunrise' 'sunrise'
     \{[ɔtsɛdɔtɛdɛ] \}

Such examples can be accounted for by a rule of the form in (57).

(57) Low Tone Deletion Rule:

\[ \text{[- HIGH]} \rightarrow \emptyset / \begin{array}{c|c}
\text{[+ HIGH]} \\
\text{[+ DOWNSTEP]} \\
\text{[+ Vocalic]} \\
\end{array} \]

Rule (57) must be ordered after the Downstep Rule (20).

5.0. Summary of tone rules

(1) Low Tone Insertion/Pre-pause Tone Rule (Rule 11 of Ch. III):
    \( \emptyset \rightarrow [- \text{HIGH}] / [+ \text{HIGH}] \) % (where % = pause)

(2) Downstep Rule (Rule 20 of Ch. III):
    \( [+ \text{H}] \rightarrow [+ \text{D}] / [- \text{H}] \)

(3) High Tone Insertion Rule (Rule 23 of Ch. III):
    \( \emptyset \rightarrow [+ \text{HIGH}] / [- \text{HIGH}] \) #?
(4) Tone Simplification Rule (Rule 35 of Ch. III):
\[
[-\text{HIGH}] \rightarrow \emptyset / \begin{array}{c}
\text{[HIGH]} \\
\text{+ Vocalic}
\end{array}
\]

(5) Low Tone Raising Rule (Rule 3 of Ch. IV):
(a) \[
\begin{array}{c}
[-\text{HIGH}]
\end{array} \rightarrow \begin{array}{c}
[+\text{HIGH}] / \begin{array}{c}
\text{[HIGH]}
\end{array}
\end{array} \quad \text{Assoc}
\]
(b) \[
\begin{array}{c}
[-\text{HIGH}]
\end{array} \rightarrow \begin{array}{c}
[+\text{HIGH}]
\end{array} \quad \text{Assoc}
\]

(6) Tone Absorption Rule (Rule 4 of Ch. IV):
\[
\begin{array}{c}
[-\text{HIGH}]
\end{array} \rightarrow \emptyset / \begin{array}{c}
\text{[HIC]} \\
\text{+ Vocalic}
\end{array}
\]

(7) Tone Simplification Rule (Rule 19 of Ch. IV):
\[
[+\text{HIGH}] \rightarrow \emptyset / \begin{array}{c}
[+\text{HIGH}] \\
\text{[HIC]} \\
\text{[HIC]}
\end{array} \quad \text{Assoc}
\]

(8) Tone Simplification Rule (Rule 39 of Ch. IV):
\[
\text{TONE} \rightarrow \emptyset / \begin{array}{c}
\text{TONE TONE}
\end{array} \\
\text{[HIC]}
\]

(9) Tone Simplification Rule (Rule 55 of Ch. IV):
\[
\begin{array}{c}
[\text{[HIC]}]
\end{array} \rightarrow \begin{array}{c}
[\text{[HIC]}] \\
\text{[HIC]} \\
\text{[HIC]}
\end{array} \rightarrow \begin{array}{c}
[\text{[HIC]}] \\
\text{[HIC]}
\end{array}
\]

(10) Low Tone Deletion (Rule 57 of Ch. IV):
\[
\begin{array}{c}
[-\text{HIGH}]
\end{array} \rightarrow \emptyset / \begin{array}{c}
[+\text{HIGH}] \\
\text{[HIC]}
\end{array} \quad \text{[HIC]}
\]

CHAPTER V

Tonal Alternations in Verbs and Verb Phrases

0.0. Introduction

This chapter is concerned with the complexity of morphophonemic alternations in the verb phrase of Ekpheli. Tone bears a great syntactic functional load, particularly in the verb phrase. In many cases, only tonal alternations of the pronominal prefix, the verb stem, and the noun object reveal the tense and aspect. In order to understand what is going on, it is necessary to briefly describe the structure of the verb phrase. This discussion will be limited to transitive verbs.

The derived surface structure of the sentence [Ṣdãkpà] 'he bought a cup' would be, roughly:
This bracketing is crucial when we attempt to map the tones of the TM onto the segments of the SM.

The reason why the pronoun is posited as a prefix on the verb is because in a sentence with a non-pronominal subject the prefix still occurs, as for example ['ìyóò ɔ̄ dêkpà] 'Iyogho bought a cup'.

Furthermore, the tense aspect tonal morphemes are realized by their tonal influence on this prefix which argues for the bracketing of the Pron-Prefix and the Tense/Aspect under one node.

I will discuss the non-negative verb phrase in its different tense/aspect forms, followed by a discussion of the negative. But before going into either of these discussions, a discussion of tonal alternations in noun objects will precede.

1.0. **Noun object**

Nouns when occurring as objects of a verb in some verb tenses undergo tone changes. Such tonal alternations originate from contraction between a verb and its noun object, where the vowel of the verb deletes but its tone remains as an influence on the noun object. Illustrations of nouns occurring as an object of a verb in the PAST TENSE, PRESENT PROGRESSIVE, FUTURE TENSE, PAST HABITUAL, and NEGATIVE are given in (1-5).

(1) **Past Tense:**

1.  a.  ɔ̄ + dê # àkpà

   he buy cup

   ➔ [ɔ̄dêkpà]

   'he bought a cup'

2.  b.  ɔ̄ + dê # ìyèdê

   he buy banana

   ➔ [ɔ̄dêyèdê]

   'he bought a banana'

3.  c.  ɔ̄ + dê # àtásà

   he buy plate

   ➔ [ɔ̄dêtašà]

   'he bought a plate'

4.  d.  ɔ̄ + dê # òtèkwè

   he buy chair

   ➔ [ɔ̄dêtkwè]

   'he bought a chair'

In column (1), verbs + noun objects are given in their citation forms. Note that the verb tone affects the initial tone of the noun object in example (1a–c).
(2) Present Progressive:

1. 
   a. /ɔ + dɛ # ɔ kpɔ/ → [ɔdɔkɔpɔ]
      he buy cup
      'he is buying a cup'
   b. /ɔ + dɛ # ɔ yɛdɛ/ → [ɔdɔyɛdɛ]
      he buy banana
      'he is buying a banana'
   c. /ɔ + dɛ # ɔtɔsɔ/ → [ɔdɔtɔsɔ]
      he buy plate
      'he is buying a plate'
   d. /ɔ + dɛ # ɔtɛkwɛ/ → [ɔdɔtɛkwɛ]
      he buy chair
      'he is buying a chair'
   e. /ɔ + dɛ # ɔkɔpɔ/ → [ɔdɔɛkpɔ]
      he buy cloth
      'he is buying cloth'

Note that not only is there a tonal alternation involving the initial
tone of a noun object but the final tone of a noun object is observed to a
alternate in example (a). Nouns of this sort require an explanation as
will be given below, following the examples of the NEGATIVE.

(3) Future Tense:

1. 
   a. /ɔ + ɔθɔ + dɛ # ɔ kpɔ/ → [ɔθɔ dɔkpɔ] or [ɔθɔ dɔkpɔ]
      he FUT buy cup
      'he will buy a cup'
   b. /ɔ + ɔθɔ + dɛ # ɔyɛdɛ/ → [ɔθɔ dɔyɛdɛ]
      he FUT buy banana
      'he will buy a banana'
   c. /ɔ + ɔθɔ + dɛ # ɔtɛkwɛ/ → [ɔθɔ dɔtɛkwɛ] or [ɔθɔ dɔtɛkwɛ]
      he FUT buy chair
      'he will buy a chair'
   d. /ɔ + ɔθɔ + dɛ # ɔkɔpɔ/ → [ɔθɔ dɔkɔpɔ]
      he FUT buy cloth
      'he will buy cloth'

The tonal alternations between the verb and its noun object of the
FUTURE TENSE are observed to be similar to those of the PRESENT PROGRESSIVE TENSE, except for the tonal influence of the low tone portion of the future tense morpheme onto the verb phrase.

(4) Past Habitual:

1. 
   a. /ɔ + ɔya + dɛ # ɔ kpɔ/ → [ɔ ɔya dɔkpɔ] or [ɔ ɔya dɔkpɔ]
      he PAST HAB buy cloth
      'he used to buy a cup'
   b. /ɔ + ɔya + dɛ # ɔyɛdɛ/ → [ɔ ɔya dɔyɛdɛ]
      he PAST HAB buy banana
      'he used to buy a banana'
   c. /ɔ + ɔya + dɛ # ɔtɛkwɛ/ → [ɔ ɔya dɔtɛkwɛ] or [ɔ ɔya dɔtɛkwɛ]
      he PAST HAB buy chair
      'he used to buy a chair'
   d. /ɔ + ɔya + dɛ # ɔkɔpɔ/ → [ɔ ɔya dɔkɔpɔ]
      he PAST HAB buy cloth
      'he used to buy cloth'
The tonal alternations of the PAST HABITUAL are identical to those of the FUTURE TENSE.

(5) Present Progressive Negative:

1.  
   a. /ɔ + ɗɛ # ñkpɔ/  
      NEG/he buy cup  
      [ɔ dɔkpɔ]  
      'he is not buying a cup'
   b. /ɔ + ɗɛ # ɗyɛɗɛ/  
      NEG/he buy banana  
      [ɔ dɔyɛɗɛ]  
      'he is not buying a banana'
   c. /ɔ + ɗɛ # ùtkɔl/  
      NEG/he buy chair  
      [ɔ dɔtkɔl]  
      'he is not buying a chair'
   d. /ɔ + ɗɛ # õkpɔ/  
      NEG/he buy cloth  
      [ɔ dúkpɔ]  
      'he is not buying cloth'

The tonal alternations of the NEGATIVE are identical to those of the PRESENT PROGRESSIVE TENSE (affirmative).

As observed in examples (1-5), most of the tonal alternations of the noun object are caused by the tone of the verb. There are, nevertheless, a class of nouns with all LOW tones that are affected by the Tense/Aspect in non-negative verb phrases. In negative verb phrases, nouns of this class undergo identical tonal alternations irrespective of Tense/Aspect. Such tonal alternations are triggered by the presence of NEG. When such low tone nouns occur as an object of a verb in some Tense/Aspect non-negative verb phrases, and all negative verb phrases, all low tones of the nouns are raised to high. After being raised to high, such raised low tones are subject to the influence of the tone of the verb in the same manner as any two high tones occurring after a verb (cf. (2a) and (2d)). Further illustrations are given in (6).

(6)  

1.  
   a. /ɔ + ɗɛ # ñkpɔ/ ððɛkpɔ ððɛkpɔ ððɛkpɔ [ððdkpɔ]  
      he buy cup  
      'he is buying a cup'
   b. /ɔ + ɗɛ # ɗgbɔpl/ ððɛgbɔpl ððɛgbɔpl ððɛgbɔpl ððɛgbɔpl [ððdbɔpl]  
      he buy orange  
      'he is buying an orange'

The underlying form is given in column (1). The low tones are raised to high in column (2). The high tone of the verb is lowered to low in column (3). In column (4), the vowel of the verb is deleted. The rising tone of column (4) is simplified to a low tone in column (5). The low tone raising suggests a rule of the form in (7).
(7) Low Tone Raising

\[
\begin{bmatrix}
[- \text{HIG} \text{H}]_1 \\
\end{bmatrix} \
\rightarrow
\begin{bmatrix}
[+ \text{HIG} \text{H}]_1 \\
\end{bmatrix}
\]

\[
\begin{array}{c}
\text{Future} \\
\text{Present Progressive} \\
\text{Past Habitual} \\
\text{NEGATIVE}
\end{array}
\]

This rule states that low tones of a noun are raised to high in FUTURE, PRESENT PROGRESSIVE, PAST HABITUAL, and in the presence of NEGATIVE.

2.0. Present progressive

Examples of mono-syllabic and bi-syllabic verbs, followed by noun objects in the present tense, are given in (8).

(8) 1. 2.

a. /ɔ + dɛ Ʇ útsádɛ/  \rightarrow  [ɔ dútśádɛ]  \\
   he buy pot  \\
   'he is buying a pot'

b. /ɔ + dɛ Ʇ ãkpà/  \rightarrow  [ɔ dàkpà]  \\
   he buy cup  \\
   'he is buying a cup'

c. /ɔ + dɛ Ʇ ɔyɛ́dɛ/  \rightarrow  [ɔ dɔyɛ́dɛ]  \\
   he buy banana  \\
   'he is buying a banana'

d. /ɔ + dɛ Ʇ àtásà/  \rightarrow  [ɔ dátásà]  \\
   he buy plate  \\
   'he is buying a plate'

e. /ɔ + dɛ Ʇ úkpò/  \rightarrow  [ɔ dúkpò]  \\
   he buy cloth  \\
   'he is buying cloth'

f. /ɔ + kɛlɛ Ʇ útsádɛ/  \rightarrow  [ɔ kɛlútsádɛ]  \\
   he look-for pot  \\
   'he is looking for a pot'

g. /ɔ + kɛlɛ Ʇ ãkpà/  \rightarrow  [ɔ kɛlàkpà]  \\
   he look-for cup  \\
   'he is looking for a cup'

h. /ɔ + kɛlɛ Ʇ ɔyɛ́dɛ/  \rightarrow  [ɔ kɛlɔyɛ́dɛ]  \\
   he look-for banana  \\
   'he is looking for a banana'

i. /ɔ + kɛlɛ Ʇ àtásà/  \rightarrow  [ɔ kɛlátásà]  \\
   he look-for plate  \\
   'he is looking for a plate'

j. /ɔ + kɛlɛ Ʇ úkpò/  \rightarrow  [ɔ kɛlúkpò]  \\
   he look-for cloth  \\
   'he is looking for cloth'

In column (1) of (8a-j), the underlying forms are given. The surface phonetic forms are given in column (2). Note that the forms given in column (2) show alternations from the tones of the forms given in column (1). That is, while mono-syllabic and bi-syllabic verbs are observed in column (1) to have lexical high tone, this isn't at all obvious in column (2). For example, in column (2a-b), the mono-
sylabic verb has low tone; but it has high tone in the forms of (c-e). In column (2f-g), the bi-syllabic verb has low tone, but in the forms of (h-j), it has a tone sequence of low followed by high. The same alternating tonal patterns of these verbs are obtained for all such verbs occurring in the Present Progressive, Future Tense, Past Habitual and Negative (all aspects), as will be illustrated throughout this chapter. Furthermore, it will be observed in this chapter, that the verb has a non-alternating high tone in the Past Tense, Past Perfect, and the Present Habitual. One possible solution would be to lexically represent each verb with its different allomorphs in various paradigms (e.g., /dê/ 'buy' in isolation; /dê/ or /dê/ (depending on the following noun object) in the Present Progressive, Future Tense, Past Habitual, and Negative. Such an analysis would make the claim that there is no generalization to be drawn. There are, however, regularities as to tonal alternations as will be seen below.

From the examples of (8a–j), one can assume that the tense/aspect of the present progressive tense is characterized by polarization of the verb tone in respect to the tones of the noun object. In order to maintain this polarization, the underlying tones of both verbs and nouns are affected. To derive the surface phonetic tones, three additional rules of the form given in (9-11) are posited.

(9) Tone Lowering of Mono-syllabic Verb:

\[
\left[+ \text{HIGH}\right] \rightarrow \left[- \text{HIGH}\right] / \left[\begin{array}{c}
\text{V} \\
\text{N}
\end{array}\right] \\
\text{VP}
\]

Present Progressive
Future
Past Habitual
NEGATIVE

(10) Tone Lowering of Bi-syllabic Verb:

\[
\left[+ \text{HIGH}\right]^1 \rightarrow \left[- \text{HIGH}\right] / \left[\begin{array}{c}
\text{V} \\
\text{N}
\end{array}\right] \\
\text{VP}
\]

Present Progressive
Future
Past Habitual
NEGATIVE

(11) Tone Dissimilation of Bi-syllabic Verb:

\[
\left[+ \text{HIGH}\right]^1 \rightarrow \left[- \text{HIGH}\right] / \left[\begin{array}{c}
\text{V} \\
\text{N}
\end{array}\right] \\
\text{VP}
\]

Present Progressive
Future
Past Habitual
NEGATIVE
Given these rules and rules from previous chapters, (12-21) illustrate how the phonetic tones can be derived.

(12) Sample Derivation: 'he is buying a pot'

\[
\text{TM} \left[ \begin{array}{c} [L] \mid [H] [H L] \end{array} \right] \\
\text{S AUX PN VP V N}
\]

\[
\begin{array}{cccc}
\end{array}
\]

Tone Lowering Rule (9)

\[
\begin{array}{cccc}
[ & [c] & [d\emptyset] & [utsadê] ]
\end{array}
\]

Vowel Deletion Rule (62)

\[
\begin{array}{cccc}
\end{array}
\]

Mapping Rule (30)

\[
\begin{array}{cc}
\end{array}
\]

Remove Brackets

\[
\begin{array}{cc}
\end{array}
\]

Mapping Rule (31)

\[
\begin{array}{cc}
\end{array}
\]

Tone Simplification Rule (55)

\[
\begin{array}{cc}
\begin{array}{c}
\text{L L H H} \\
\text{c d utsadê}
\end{array}
\end{array}
\]

\['\text{he is buying a pot}'\]

(13) Sample Derivation: 'he is buying a cup'

\[
\text{TM} \left[ \begin{array}{c} [L] \mid [H] [L L] \end{array} \right] \\
\text{S AUX PN VP V N}
\]

\[
\begin{array}{cccc}
\end{array}
\]

Tone Raising Rule (7)

\[
\begin{array}{cccc}
\end{array}
\]

Tone Lowering Rule (9)

\[
\begin{array}{cccc}
\end{array}
\]

Vowel Deletion Rule (62)

\[
\begin{array}{cccc}
[ & [c] & [d\emptyset] & [akpa] ]
\end{array}
\]

Mapping Rule (30)

\[
\begin{array}{cccc}
\end{array}
\]

Remove Brackets

\[
\begin{array}{cccc}
\end{array}
\]

Mapping Rule (31)

\[
\begin{array}{cccc}
\end{array}
\]

Tone Simplification Rule (55)

\[
\begin{array}{cc}
\begin{array}{c}
\text{L L H} \\
\text{c d akpa}
\end{array}
\end{array}
\]

\['\text{he is buying a cup}'\]
(14) Sample Derivation: 'he is buying a banana'

(15) Sample Derivation: 'he is buying a plate'
(16) Sample Derivation: 'he is buying cloth'

```
(16) Sample Derivation: 'he is buying cloth'

TM [[ L ][ H ][ H L ] ]
S AUX PN VP V N
SM [[ c ][ de ][ ukpo ] ]
    [[ c ][ d ][ ukpo ] ]
Vowel Deletion Rule (62)

TM [[ L ][ H ][ H L ] ]
SM [[ c ][ d ][ ukpo ] ]
    [[ L ][ H ][ H L ] ]
Remove Brackets
    [[ c ][ d ][ ukpo ] ]
Mapping Rule (30)

TM [[ L ][ H ][ H L ] ]
SM [[ c ][ d ][ ukpo ] ]
    [[ L ][ H ][ H L ] ]
Mapping Rule (31)
    [[ c ][ d ][ ukpo ] ]
Tone Absorption Rule (4)

[3 dukpo]

'he is buying cloth'
```

(17) Sample Derivation: 'he is looking for a pot'

```
(17) Sample Derivation: 'he is looking for a pot'

TM [[ L ][ H ][ H L ] ]
S AUX PN VP V N
SM [[ c ][ kele ][ utsadè ] ]
    [[ c ][ kele ][ utsadè ] ]
Tone Lowering Rule (10)
    [[ L ][ H ][ H L ] ]
Vowel Deletion Rule (62)
    [[ c ][ kele ][ utsadè ] ]
Mapping Rule (30)

TM [[ L ][ L ][ H L ] ]
SM [[ c ][ kele ][ utsadè ] ]
    [[ L ][ L ][ H L ] ]
Remove Brackets
    [[ c ][ kele ][ utsadè ] ]
Mapping Rule (31)

TM [[ L ][ L ][ H L ] ]
SM [[ c ][ kele ][ utsadè ] ]
    [[ c ][ kele ][ utsadè ] ]
Tone Simplification Rule (55)

[3 kelftsadè]

'he is looking for a pot'
```
(18) Sample Derivation: 'he is looking for a cup'

(19) Sample Derivation: 'he is looking for a banana'
(20) Sample Derivation: 'he is looking for a plate'

S AUX PN VP V N

[ [ L ] ][ [ H H ] [ L H L ] ]

[ [ L ] ][ [ L H ] [ L H L ] ]

[ [ L ] ][ [ L D ] [ L D L ] ]

[ [ ɔ ] ][ [ kele ] [ atasa ] ]

[ [ ɔ ] ][ [ ke10 ] [ atasa ] ]

Tone Dissimilation Rule (11)
Downstep Rule (20)

Vowel Deletion Rule (62)

Mapping Rule (30)

Remove Brackets

Mapping Rule (31)

Low Tone Deletion Rule (57)

'hhe is looking for a plate'

(21) Sample Derivation: 'he is looking for cloth'

S AUX PN VP V N

[ [ L ] ][ [ H H ] [ H L ] ]

[ [ L ] ][ [ L L ] [ H L ] ]

[ [ L ] ][ [ L L ] [ H L ] ]

[ [ ɔ ] ][ [ kele ] [ ukpo ] ]

[ [ ɔ ] ][ [ ke10 ] [ ukpo ] ]

Tone Lowering Rule (10)
Vowel Deletion Rule (62)
Mapping Rule (30)

Remove Brackets

Mapping Rule (31)

Tone Simplification Rule (35)

'he is looking for cloth'
3.0. **Future tense**

The **future tense** is characterized by the presence of /θá'/ 'future tense morpheme' and the same set of tonal alternations between the verb and its noun object that characterizes the present progressive tense. One further addition is the tonal effect on the verb that is influenced by the tones of the future tense morpheme. Illustrations of mono-syllabic and bi-syllabic verbs, followed by noun objects are presented in (22).

\[(22)\]

1. a. /ɔ + θá' + dɛ ‚ utsádɛ/ → \{[ɔ θá dutsádɛ]\}
   he FUT buy pot
   \{[ɔ θá dutsádɛ]\}
   'he will buy a pot'

   b. /ɔ + θá' + dɛ ‚ akpá/ → \{[ɔ θá dákpá]\}
   he FUT buy cup
   \{[ɔ θá dákpá]\}
   'he will buy a cup'

   c. /ɔ + θá' + dɛ ‚ ɔyɛdɛ/ → \{[ɔ θá ðyɛdɛ]\}
   he FUT buy banana
   'he will buy a banana'

   d. /ɔ + θá' + dɛ ‚ ɔtásá/ → \{[ɔ θá ðtásá]\}
   he FUT buy plate
   'he will buy a plate'

   e. /ɔ + θá' + dɛ ‚ úkpò/ → \{[ɔ θá dúkpò]\}
   he FUT buy cloth
   'he will buy cloth'

   f. /ɔ + θá' + kélɛ ‚ utsádɛ/ → \{[ɔ θá kělútutsádɛ]\}
   he FUT look-for pot
   'he will look for a pot'

   g. /ɔ + θá' + kélɛ ‚ akpá/ → \{[ɔ θá kělákpá]\}
   he FUT look-for cup
   'he will look for a cup'

   h. /ɔ + θá' + kélɛ ‚ ɔyɛdɛ/ → \{[ɔ θá kělɔyɛdɛ]\}
   he FUT look-for banana
   'he will look for a banana'

   i. /ɔ + θá' + kélɛ ‚ ɔtásá/ → \{[ɔ θá kělôtásá]\}
   he FUT look-for plate
   'he will look for a plate'

   j. /ɔ + θá' + kélɛ ‚ úkpò/ → \{[ɔ θá kělúkpò]\}
   he FUT look-for cloth
   'he will look for cloth'

Again, note that the forms given in column (2) show alternations from the tones of the forms given in column (1). While both mono-syllabic and bi-syllabic verbs have lexical high tone, this isn't at all obvious in column (2). The surface phonetic tones of the forms given in column (2) are accounted for by the rules already posited. Sample derivations are given in (23-28).
The alternative form in (22a) can be accounted for by the application of Tone Simplification Rule (55) in place of Tone Simplification Rule (35) and Low Tone Deletion Rule (57) as seen in (23b).

(23) a. Sample Derivation: 'he will buy a pot'

The alternative form in (22a) can be accounted for by the application of Tone Simplification Rule (55) in place of Tone Simplification Rule (35) and Low Tone Deletion Rule (57) as seen in (23b).

(23) b. Sample Derivation: 'he will buy a pot'
(24) a. Sample Derivation: 'he will buy a cup'

\[
\begin{align*}
\text{Tone Raising Rule (7)} & \quad \text{Tone Lowering Rule (9)} \\
\text{Downstep Rule (20)} & \\
\text{Vowel Deletion Rule (62)} & \\
\text{Mapping Rule (30)} & \\
\text{Remove Brackets} & \\
\text{Mapping Rule (31)} & \\
\text{Tone Simplification Rule (35)} & \\
\text{Low Tone Deletion Rule (57)} & \\
\end{align*}
\]

The alternative form in (22b) can be accounted for by the application of Tone Simplification Rule (55) in place of Tone Simplification Rule (35) and Low Tone Deletion Rule (57) as seen in (24b).

(24) b. Sample Derivation: 'he will buy a cup'

\[
\begin{align*}
\text{Tone Simplification Rule (55)} & \\
\text{Tone Simplification Rule (55)} & \\
\end{align*}
\]
(25) Sample Derivation: 'he will buy a banana'

\[
\text{T} \left[ \left[ \left[ L \right] \left[ H L \right] \right] \left[ \left[ H \right] \left[ L L H \right] \right] \right] \\
\text{S AUX PN FUT VP V N}
\]

\[
\left[ \left[ L \right] \left[ H L \right] \right] \left[ \left[ H \right] \left[ L L H \right] \right] \\
\left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\text{Pre-pausal Rule (11)}
\]

\[
\left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\text{Downstep Rule (20)}.
\]

\[
\text{SM} \left[ \left[ \partial \right] \left[ \theta a \right] \right] \left[ \left[ d\partial \right] \left[ \gamma \theta e \theta e \right] \right] \\
\text{Vowel Deletion Rule (62)}
\]

\[
\text{T} \left[ \left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \right] \\
\text{Mapping Rule (30)}
\]

\[
\text{SM} \left[ \left[ \gamma \right] \left[ \theta a \right] \right] \left[ \left[ d \right] \left[ \gamma \theta e \theta e \right] \right] \\
\text{Remove Brackets}
\]

\[
\left[ \left[ L \right] \left[ \theta a \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\text{Mapping Rule (31)}
\]

\[
\left[ \left[ \gamma \right] \left[ \theta a \right] \right] \left[ \left[ d \right] \left[ \gamma \theta e \theta e \right] \right] \\
\text{Tone Simplification Rule (55)}
\]

\[
\left[ \left[ \gamma \right] \left[ \theta a \right] \right] \left[ \left[ d \right] \left[ \gamma \theta e \theta e \right] \right] \\
\text{Low Tone Deletion Rule (57)}
\]

\[
\left[ \gamma \right] \left[ \theta a \right] \left[ \gamma \theta e \theta e \right] \\
\text{he will buy a banana'}
\]

(26) Sample Derivation: 'he will buy a plate'

\[
\text{T} \left[ \left[ \left[ L \right] \left[ H L \right] \right] \left[ \left[ H \right] \left[ L H L \right] \right] \right] \\
\text{S AUX PN FUT VP V N}
\]

\[
\left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\text{Downstep Rule (20)}
\]

\[
\text{SM} \left[ \left[ \partial \right] \left[ \theta a \right] \right] \left[ \left[ d\partial \right] \left[ \gamma \theta e a \right] \right] \\
\text{Vowel Deletion Rule (62)}
\]

\[
\text{T} \left[ \left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \right] \\
\text{Mapping Rule (30)}
\]

\[
\text{SM} \left[ \left[ \gamma \right] \left[ \theta a \right] \right] \left[ \left[ d \right] \left[ \gamma \theta e a \right] \right] \\
\text{Remove Brackets}
\]

\[
\left[ \left[ L \right] \left[ \theta a \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\left[ \left[ L \right] \left[ D L \right] \right] \left[ \left[ D \right] \left[ L L D L \right] \right] \\
\text{Mapping Rule (31)}
\]

\[
\left[ \left[ \gamma \right] \left[ \theta a \right] \right] \left[ \left[ d \right] \left[ \gamma \theta e a \right] \right] \\
\text{Low Tone Deletion Rule (57)}
\]

\[
\left[ \gamma \right] \left[ \theta a \right] \left[ \gamma \theta e a \right] \\
\text{he will buy a plate'}
\]
(27) Sample Derivation: 'he will buy cloth'

```plaintext
(27) Sample Derivation: 'he will buy cloth'

TM [ [ [L] [ H L] ][ [ H][H L] ] ]
S AUX PN FUT VP V N
[ [ [L] [ D L] ][ [ D][H L] ] ]
Downstep Rule (20)
SM [ [ [∅][θa ] ][ [de] [ukpo] ] ]
Vowel Deletion Rule (62)
Mapping Rule (30)
[ [ L D L][ D H L ] ]
Remove Brackets
[ [ L D L][ D H L ] ]
Mapping Rule (31)
[ [ ∅θa ][ d][ukpo] ]
Tone Absorption Rule (4)
L D L D [ukpo]
[ ∅θa d ukpo]
[ ∅θa dukpo]
''he will buy cloth''
```

(28) Sample Derivation: 'he will look for a pot'

```plaintext
(28) Sample Derivation: 'he will look for a pot'

TM [ [ [L] [ H L] ][ [ H][H L] ] ]
S AUX PN FUT VP V N
Tone Lowering Rule (10)
Vowel Deletion Rule (62)
Mapping Rule (30)
[ [ L H L][ L L H H L ] ]
Remove Brackets
[ [ L H L][ L L H H L ] ]
Mapping Rule (31)
[ [ ∅θa ][ kele][utsade] ]
Tone Simplification Rule (55)
L H L L L[utsade]
[ ∅θa keleutsade]
L H L L L[utsade]
[ ∅θa keleutsade]
''he will look for a pot''
```

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4.0. Past tense

The PAST tense is the only aspect that is represented on the surface by a rising tone on the pronominal prefix. That is, in all other tense/aspects, the pronominal prefix has low tone. The high tone portion of the rising tone in the PAST tense can be derived from the TM of the PAST tense morpheme which is represented as [+ HIGH]. The rising tone on the pronominal prefix and the preservation of the underlying tone of the verb and the noun object distinguishing the PAST tense from other tense/aspect can be derived in this way. Examples of mono-syllabic and bi-syllabic verbs with noun objects are given in (29).

(29) a. /ɔ + ' + òtśädè/ he PAST buy pot → [ɔ dūtsādè] 'he bought a pot
b. /ɔ ' òtś ' àkpa/ he PAST buy cup → [ɔ dākpa] 'he bought a cup'
c. /ɔ + ' + òtśasadè/ he PAST buy plate → [ɔ dāt̪̄sādè] 'he bought a plate'
d. /ɔ + ' + kēlé # òtśasadè/ he PAST look-for pot → [ɔ kēlūtsādè] 'he looked for a pot'
e. /ɔ + ' + kēlé # àkpa/ he PAST look-for cup → {[ɔ kēlākpa] [ɔ kēl̪̄kpa]} 'he looked for a cup'
f. /ɔ + ' + kēlé # àkpa/ he PAST look-for plate → {[ɔ kēl̪̄t̪̄sā] [ɔ kēl̪̄t̪̄sā]} 'he looked for a plate'

Observe that the high tone PAST tense morpheme is attached to the pronominal prefix effecting a rising tone. Note, also, that the underlying tones of the mono-syllabic verb, bi-syllabic verb, and noun objects are preserved. That is, it is somewhat obvious here that these verbs belong to a single class of high tone verbs. Slight modification of the tone of the bi-syllabic verb is, however, observed in (a-f). That is, the final high tone of a bi-syllabic verb is optionally deleted. Sample derivations of the PAST tense are given in (30-33).
(30) Sample Derivation: 'he bought a pot'

\[
\begin{array}{c}
\text{TM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{H} \underline{H} \underline{L}] ] \\
\text{S AUX PN PAST VP V N}
\end{array}
\]

SM \quad [ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{tsadɛ} ] ]

[ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{tsadɛ} ] ] \quad \text{Vowel Deletion Rule (62)}

\[
\begin{array}{c}
\text{TM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{H} \underline{H} \underline{L}] ] \\
\text{SM} \quad [ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{tsadɛ} ] ]
\end{array}
\]

[ \underline{L \underline{H}} ] [ \underline{H \underline{H} \underline{L}} ] \quad \text{Mapping Rule (30)}

[ \underline{ɔ} ] [ \underline{d} \underline{tsadɛ} ] \quad \text{Remove Brackets}

[ \underline{L \underline{H}} ] [ \underline{H \underline{H} \underline{L}} ] \quad \text{Mapping Rule (31)}

[ \underline{ɔ} ] [ \underline{d} \underline{tsadɛ} ] \quad \text{Tone Absorption Rule (4)}

[3 dûtsädɛ] \quad \text{'he bought a pot'}

(31) Sample Derivation: 'he bought a cup'

\[
\begin{array}{c}
\text{TM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{L} \underline{L}] ] \\
\text{S AUX PN PAST VP V N}
\end{array}
\]

SM \quad [ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{akpa} ] ]

[ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{akpa} ] ] \quad \text{Vowel Deletion Rule (62)}

\[
\begin{array}{c}
\text{TM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{L} \underline{L}] ] \\
\text{SM} \quad [ [ \underline{[ɔ]} [ \underline{[d]} ] ] [ \underline{akpa} ] ]
\end{array}
\]

[ \underline{L \underline{H}} ] [ \underline{H \underline{L} \underline{L}} ] \quad \text{Mapping Rule (30)}

[ \underline{ɔ} ] [ \underline{d} \underline{akpa} ] \quad \text{Remove Brackets}

[ \underline{L \underline{H}} ] [ \underline{H \underline{L} \underline{L}} ] \quad \text{Mapping Rule (31)}

[ \underline{ɔ} ] [ \underline{d} \underline{akpa} ] \quad \text{'he bought a cup'}

(32) Sample Derivation: 'he looked for a pot'

\[
\begin{array}{c}
\text{SM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{H} \underline{H} \underline{L}] ] \\
\text{S AUX PN PAST VP V V}
\end{array}
\]

SM \quad [ [ \underline{[ɔ]} [ \underline{[k]} ] ] [ \underline{tsadɛ} ] ]

[ [ \underline{[ɔ]} [ \underline{[k]} ] ] [ \underline{tsadɛ} ] ] \quad \text{Vowel Deletion Rule (62)}

\[
\begin{array}{c}
\text{TM} \quad [ [ \underline{[L]} \underline{[H]} ] ] \quad [ [ \underline{H}] [\underline{H} \underline{H} \underline{L}] ] \\
\text{SM} \quad [ [ \underline{[ɔ]} [ \underline{[k]} ] ] [ \underline{tsadɛ} ] ]
\end{array}
\]

[ \underline{L \underline{H}} ] [ \underline{H \underline{H} \underline{L}} ] \quad \text{Mapping Rule (30)}

[ \underline{ɔ} ] [ \underline{k} \underline{tsadɛ} ] \quad \text{Remove Brackets}

[ \underline{L \underline{H}} ] [ \underline{H \underline{H} \underline{L}} ] \quad \text{Mapping Rule (31)}

[ \underline{ɔ} ] [ \underline{k} \underline{tsadɛ} ] \quad \text{Tone Absorption Rule (4)}

[3 kélûtsädɛ] \quad \text{'he looked for a pot'}
(33) Sample Derivation: 'he looked for a cup'

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

Vowel Deletion Rule (62)

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

Mapping Rule (30)

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

Remove Brackets

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

Mapping Rule (31)

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

Tone Simplification Rule (19)

optional

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
& \text{S} & \text{AUX} & \text{PN} & \text{PAST} & \text{VP} & \text{v} & \text{N} \\
\hline
\end{array}
\]

\[\text{[ɔ kele akpa]} \text{ or [ɔ kele akpa]}\]

'he looked for a cup'

5.0. Past perfect

The PAST PERFECT is distinguished from the PAST tense only by the presence of the aspectual morpheme /xé/ which occurs between the pronominal prefix and the verb. Examples are given in (34).

(34) a. /ɔ + ' + xé' + de' # útsáde'/ \rightarrow \text{[ɔ xè útsáde']}
he PAST PER buy pot 'he has bought a pot'

b. /ɔ + ' + xé' + de' # ákpà'/ \rightarrow \text{[ɔ xè ákpà']}
he PAST PER buy cup 'he has bought a cup'

c. /ɔ + ' + xé' + de' # átasà'/ \rightarrow \text{[ɔ xè átasà']}
he PAST PER buy plate 'he has bought a plate'

d. /ɔ + ' + xé' + kele' # útsáde'/ \rightarrow \text{[ɔ xè kele útsáde']}
he PAST PER look-for pot 'he has looked for a pot'

e. /ɔ + ' + xé' + kele' # ákpà'/ \rightarrow \{[ɔ xè kele akpa'],
he PAST PER look-for cup \{[ɔ xè kele akpa']
'he has looked for a cup'

f. /ɔ + ' + xé' + kele' # átasà'/ \rightarrow \{[ɔ xè kele átasà'],
he PAST PER look-for plate \{[ɔ xè kele átasà']
'he has looked for a plate'

Note that the PAST PERFECT morpheme /xé/ undergoes a tonal alternation. That is, the falling tone is simplified to a low tone after the rising tone of the pronominal prefix. Evidence in support of positing an underlying sequence of high followed by low will be given under the discussion of the NEGATIVE. Since the tonal alternations of the PAST PERFECT are
identical to those of the PAST tense, only one sample derivation is
given in (35) to illustrate the PAST PERFECT morpheme.

(35) Sample Derivation: 'he has bought a pot'

\[
\begin{align*}
\text{TM} & \left[ \begin{array}{c}
\text{[L][H][H L]} & \text{[H][H L]} \\
\text{S AUX PN PAST PER VP V N}
\end{array} \right] \\
\text{SM} & \left[ \begin{array}{c}
\text{[ɔ][x][xe]} & \text{[de][utsadɛ]} \\
\text{[ɔ][x][xe]} & \text{[d][utsadɛ]} \\
\end{array} \right] \quad \text{Vowel Deletion Rule (62)} \\
\text{TM} & \left[ \begin{array}{c}
\text{[L][H][H L]} & \text{[H][H L]} \\
\end{array} \right] \quad \text{Mapping Rule (30)} \\
\text{SM} & \left[ \begin{array}{c}
\text{[ɔ][x][xe]} & \text{[d][utsadɛ]} \\
\end{array} \right] \\
\end{align*}
\]

\[
\begin{align*}
\text{[L][H H L]} & \text{[H H L]} \quad \text{Remove Brackets} \\
\text{[ɔ x][d][utsadɛ]} & \\
\text{[L][H H L]} & \text{[H H L]} \quad \text{Mapping Rule (31)} \\
\text{[ɔ x][d][utsadɛ]} & \\
\end{align*}
\]

\[
\begin{align*}
\text{L H H L} & \text{H H L} \\
\text{5 x][d][utsadɛ]}
\end{align*}
\]

\[
\begin{align*}
\text{L H H L} & \text{H H L} \\
\text{5 x}[d][utsadɛ] \\
\end{align*}
\]

\[
\begin{align*}
[ɔ x][dútsadɛ] \\
\end{align*}
\]

'he has bought a pot'

6.0. Habitual

On the surface, the HABITUAL (HAB) differs from the PAST tense only
in respect to the tone of the pronominal prefix. While the HABITUAL has
a low tone pronominal prefix, the PAST tense has a rising tone. Since
the surface tone of the verb in the HABITUAL is always high, the tonal
alternations between the verb and the noun object that characterize the
HABITUAL are identical to those of the PAST tense. Illustrations are
given in (36).

(36) a. /ɔ + dé # útsadɛ/ \rightarrow [ɔ dútšadɛ] \\
    he buy pot 'he buys a pot'

b. /ɔ + dé # âkpa/ \rightarrow [ɔ dákpa] \\
    he buy cup 'he buys a cup'

c. /ɔ + dé # átásə/ \rightarrow [ɔ dátšasə] \\
    he buy plate 'he buys a plate'

d. /ɔ + kélə # útsadɛ/ \rightarrow [ɔ kélútsadɛ] \\
    he look-for pot 'he looks for a pot'

e. /ɔ + kélə # âkpa/ \rightarrow \{[ɔ kélâkpa] \\
    he look-for cup 'he looks for a cup'

f. /ɔ + kélə # átásə/ \rightarrow \{[ɔ kélátšasə] \\
    he look-for plate 'he looks for a plate'
A sample derivation is given in (37).

(37) Sample Derivation: 'he buys a pot'

\[
\text{TM} \begin{bmatrix}
[ \text{[L]} ] & [ \text{[H]} [ \text{H} \text{H} \text{L} ] ]
\end{bmatrix}
\]

\[
\text{S AUX} \begin{bmatrix}
\text{PN} & \text{VP} & \text{VN}
\end{bmatrix}
\]

\[
\text{SM} \begin{bmatrix}
[ \text{[O]} ] & [ \text{[dE]} [ \text{utsadè} ] ]
\end{bmatrix}
\]

\[
\begin{bmatrix}
[ \text{[O]} ] & [ \text{[dØ]} [ \text{utsadè} ] ]
\end{bmatrix}
\]

\[
\text{Vowel Deletion Rule (62)}
\]

\[
\text{TM} \begin{bmatrix}
[ \text{[L]} ] & [ \text{[H]} [ \text{H} \text{H} \text{L} ] ]
\end{bmatrix}
\]

\[
\text{SM} \begin{bmatrix}
[ \text{[O]} ] & [ \text{[d]} [ \text{utsadè} ] ]
\end{bmatrix}
\]

\[
\begin{bmatrix}
L & H & H & L
\end{bmatrix}
\]

\[
\text{Mapping Rule (31)}
\]

\[
\begin{bmatrix}
[ \text{[O]} ] & [ \text{d} \text{utsadè} ]
\end{bmatrix}
\]

\[
\text{Remove Brackets}
\]

\[
\begin{bmatrix}
[ \text{[O]} ] & [ \text{d} \text{utsadè} ]
\end{bmatrix}
\]

\[
\text{Mapping Rule (31)}
\]

\[
\begin{bmatrix}
L & H & H & L
\end{bmatrix}
\]

\[
\text{Tone Absorption Rule (4)}
\]

\[
\begin{bmatrix}
\text{[O dutsadè]}
\end{bmatrix}
\]

\[
'\text{he buys a pot}'
\]

7.0. Past habitual (used to)

The PAST HABITUAL is characterized by the aspectual morpheme /yá'/. This construction is translated into English as 'used to'. Not like other PAST tense constructions, the PAST HABITUAL takes a low tone pronominal prefix. The tonal alternations of this construction are identical to those of the FUTURE tense. Examples are given in (38).

(38) a. /ɔ + yá' + dè # ûtsadè/ → \begin{bmatrix}
[\text{[O yá dutsadè]}]
[\text{[O yá dutsadè]}]
\end{bmatrix}

he PAST HAB buy pot

'he used to buy a pot'

b. /ɔ + yá' + dè # àkpa/ → \begin{bmatrix}
[\text{[O yá dákpa]}]
[\text{[O yá dákpa]}]
\end{bmatrix}

he PAST HAB buy cup

'he used to buy a cup'

c. /ɔ + yá' + dè # òyèdè/ → \begin{bmatrix}
[\text{[O yá òyèdè]}]
\end{bmatrix}

he PAST HAB buy banana

'he used to buy a banana'

d. /ɔ + yá' + dè # òkpo/ → \begin{bmatrix}
[\text{[O yá òkpo]}]
\end{bmatrix}

he PAST HAB buy cloth

'he used to buy cloth'

e. /ɔ + yá' + kélé # ûtsadè/ → \begin{bmatrix}
[\text{[O yá kellutsadè]}]
\end{bmatrix}

he PAST HAB look-for pot

'he used to look for a pot'

Since the PAST HABITUAL is identical to the FUTURE construction in terms of tonal alternations, only one sample derivation is given in (39).
(39) Sample Derivation: 'he used to buy cloth'

\[
\begin{align*}
\text{TM} &: \left[ [L][H \ L] \right]\left[ [H][H \ L] \right] \\
\text{S AUX PN PAST HAB} &: \text{VP V N} \\
\text{SM} &: \left[ [\circ][ya] \right]\left[ [de][ukpo] \right] \\
\text{Downstep Rule (20)} \\
\text{TM} &: \left[ [L][D \ L] \right]\left[ [D][H \ L] \right] \\
\text{SM} &: \left[ [\circ][ya] \right]\left[ [d][ukpo] \right] \\
\text{Vowel Deletion Rule (62)} \\
\text{TM} &: \left[ [L][D \ L] \right]\left[ [D][H \ L] \right] \\
\text{SM} &: \left[ [\circ][ya] \right]\left[ [d][ukpo] \right] \\
\text{Mapping Rule (30)} \\
\text{Remove Brackets} \\
\text{TM} &: \left[ [\circ][ya] \right]\left[ [d][ukpo] \right] \\
\text{Mapping Rule (31)} \\
\text{Tone Absorption Rule (4)} \\
\text{SM} &: \left[ [\circ][ya] \right]\left[ [d][ukpo] \right] \\
\text{Low Tone Deletion Rule (57)} \\
\text{[\circ\ y\ d\ ukpo]} & \quad \text{'he used to buy cloth'}
\end{align*}
\]

8.0. Negative

The NEGATIVE construction is generally characterized by a falling contour tone over the pronominal prefix, a complete tone reversal of any aspectual morphemes occurring between the pronominal prefix and the verb (e.g., [\circ \ d\ ukpo] 'he will not buy a cup'), and verb tone polarization in respect to the noun object (i.e., all tonal alternations between the verb and the noun object are identical to those of the PRESENT PROGRESSIVE (affirmative)).

Only in the PAST NEGATIVE do we find a segmental representation. /wa/ is added as a suffix immediately after the pronominal prefix (e.g., /\circ + wa/). The /w/ of /wa/ is optionally deleted when occurring between two vowels (e.g., /\circ wa + [a]a/). Furthermore, /wa/ takes the low tone portion of the falling contour tone of the pronominal prefix (e.g., \circ + wa + \circ wa). This can be handled very easily by the mapping of TM onto SM. Any aspecual morphemes will follow /wa/ and precede the verb (e.g., \circ w\ x\ d\ ukpo 'he hasn't bought a cup').

8.1. Present progressive negative and habitual negative

The Present Progressive Negative and the Habitual Negative are homophonous. Illustrations are given in (40).
(40) a. /tʰ + dɛ # útsádɛ/  
   NEG/he buy pot  
   $[\tilde{\text{t}} \text{dútsádɛ}]$  
   'he is not buying a pot'  
   'he doesn't buy a pot'

b. /tʰ + dɛ # àkjɔpɔ/  
   NEG/he buy cup  
   $[\tilde{\text{t}} \text{dàkjɔpɔ}]$  
   'he is not buying a cup'  
   'he doesn't buy a cup'

c. /tʰ + dɛ # ñvédɛ/  
   NEG/he buy banana  
   $[\tilde{\text{t}} \text{dñvédɛ}]$  
   'he is not buying a banana'  
   'he doesn't buy a banana'

d. /tʰ + dɛ # ñkpɔ/  
   NEG/he buy cloth  
   $[\tilde{\text{t}} \text{dñkpɔ}]$  
   'he is not buying cloth'  
   'he doesn't buy cloth'

e. /tʰ + kɛlɛ # útsádɛ/  
   NEG/he look-for pot  
   $[\tilde{\text{t}} \text{kɛlútsádɛ}]$  
   'he is not looking for a pot'  
   'he doesn't look for a pot'

Note that the pronominal prefix has a falling tone when NEG is present. This is the only difference between the Present Progressive Negative, the Habitual Negative and the Present Progressive affirmative. Given that the tonal alternations of the verb phrase of the NEGATIVE are identical to the Present Progressive affirmative, the surface phonetic tones of the NEGATIVE are accounted for by the same tone rules and mapping rules already given. Since the tonal alternations of the NEGATIVE are identical to those of the Present Progressive affirmative, only one sample derivation is given in (41) to illustrate the mapping of the falling contour tone onto the pronominal prefix.

(41) Sample Derivation: 'he is not buying a pot'  
   'he doesn't buy a pot'

**TM** [ [ [H L ] ] [ [ H ][H H L ] ] ]  
  $S$ AUX DN/NEG VP V N  
  [ [ [H L ] ] [ [ L ][H H L ] ] ]  
  Tone Lowering Rule (9)

**SM** [ [ ɔ ] ] [ [dɛ] [utsadɛ] ]  
  [ [ ɔ ] ] [ [dɔ] [utsadɛ] ]  
  Vowel Deletion Rule (62)

**TM** [ [ [H L ] ] [ [ L ][H H L ] ] ]  
  [ [ ɔ ] ] [ [d ] [utsadɛ] ]  
  Mapping Rule (30)

**SM** [ [ ɔ ] ] [ [d ] [utsadɛ] ]  
  [ [ H L ] ] [ [ L ][H H L ] ]  
  Remove Brackets

**SM** [ [ ɔ ] ] [ [d ] [utsadɛ] ]  
  [ [ H L ] ] [ [ L ][H H L ] ]  
  Mapping Rule (31)

**SM** [ [ ɔ ] ] [ [d ] [utsadɛ] ]  
  [ [ H L ] ] [ [ L ][H H L ] ]  
  Tone Simplification Rule (55)

$'[\tilde{\text{t}} \text{dútsádɛ}]$  
   'he is not buying a pot'  
   'he doesn't buy a pot'
8.2. Future negative

The FUTURE maintains its aspectual morpheme /θa/ in the NEGATIVE, with some modification of the tone. But /θa/ serves to distinguish the FUTURE aspect from others. Examples are given in (42).

(42) a. /θ + θa + de # útsáðè/  →  [θ θa dútśáṭ]
    NEG/he  FUT buy pot  'he will not buy a pot'
b. /θ + θa + de # dákpa/  →  [θ θa dákpa]
    NEG/he  FUT buy cup  'he will not buy a cup'
c. /θ + θa + de # dąyéde/  →  [θ θa dąyéde]
    NEG/he  FUT buy banana  'he will not buy a banana'
d. /θ + θa + de # ñkpo/  →  [θ θa ñkpo]
    NEG/he  FUT buy cloth  'he will not buy cloth'
e. /θ + θa + kélè # útsáðè/  →  [θ θa kélūtsáðè]
    NEG/he  FUT look-for pot  'he will not look for a pot'

Since the tonal alternations in the verb phrase are identical to those of the PREsent PROgressive NEGative, only one sample derivation is given in (43).

(43) Sample Derivation: 'he will not buy a pot'

[ [ [H L ] [ L H ] ] [ [ H ] [ H H L ] ] ]
S AUX PN/NEG FUT VP V N

[ [ [H L ] [ L H ] ] [ [ L ] [ H H L ] ] ] Tone Lowering Rule (9)

[ [ [ H ] [ L ] ] [ [ H ] [ H L ] ] ]
SM [ [ [ H ] [ L ] ] [ [ H H L ] ] ]

[ [ [ H ] [ L ] ] [ [ H H L ] ] ]


[ [ [ H L ] [ L H ] ] [ [ L ] [ H H L ] ] ]
SM [ [ [ H L ] [ L H ] ] [ [ L ] [ H H L ] ] ] Remove Brackets

[ [ θa ] [ de ] [ útsáðè ] ]

[ [ H L ] [ L H ] ] [ [ L ] [ H H L ] ] Mapping Rule (31)

[ [ θa ] [ de ] [ útsáðè ] ]

[ [ H L ] [ L H ] ] [ [ L ] [ H H L ] ]

[ [ θa ] [ de ] [ útsáðè ] ] Tone simplification Rule (55)

[ [ θa ] [ de ] [ útsáðè ] ] 'he will not buy a pot'

8.3. Past habitual negative

The PAST HABITUAL NEGATIVE remains distinct from the other aspects of the NEGATIVE by retaining its aspectual morpheme /ya/. Examples are given in (44).
A sample derivation is given in (45).

(45) Sample Derivation: 'he didn't used to buy a pot'

The PAST NEGATIVE is distinguished from other forms of the NEGATIVE by the addition of /wa/. Illustrations are given in (46).
(46) a. /ɔwɔ + dê # ñtsɔdɛ/ \[ɔwɔ dûtsɔdɛ] 'he didn't buy a pot' 
   NEG/he/PAST buy pot 
   b. /ɔwɔ + dê # ɔkɔpɔ/ \[ɔwɔ dɔkɔpɔ] 'he didn't buy a cup' 
   NEG/he/PAST buy cup 
   c. /ɔwɔ + dê # ɔyɛdɛ/ \[ɔwɔ dɔyɛdɛ] 'he didn't buy a banana' 
   NEG/he/PAST buy banana 
   d. /ɔwɔ + dê # ɔkɔpɔ/ \[ɔwɔ dûkɔpɔ] 'he didn't buy cloth' 
   NEG/he/PAST buy cloth 
   d. /ɔwɔ + kɛlɛ # ñtsɔdɛ/ \[ɔwɔ kɛlûtsɔdɛ] 'he didn't look for a pot' 
   NEG/he/PAST look-for pot

A sample derivation is given in (47).

(47) Sample Derivation: 'he didn't buy a pot'

TM [ [ [ H L ] ] [ [ H ] [ H H L ] ] ]
S AUX PN/NEG/PAST VP V N
[ [ [ H L ] ] [ [ L ] [ H H L ] ] ]
   Tone Lowering Rule (9)
SM [ [ [ɔwɔ] ] [ [dɛ] [u(tsədɛ) ] ] ]
   Vowel Deletion Rule (62)
TM [ [ [ H L ] ] [ [ L ] [ H H L ] ] ]
SM [ [ [ɔwɔ] ] [ [d ] [u(tsədɛ) ] ] ]
TM [ [ [ H L ] ] [ [ L ] [ H H L ] ] ]
   Remove Brackets
SM [ [ [ɔwɔ] ] [ [ d ] u(tsədɛ) ] ]
   Mapping Rule (31)
SM [ [ [ɔwɔ] ] [ [ d ] u(tsədɛ) ] ]
   Tone Simplification Rule (55)

[ɔwɔ dûtsɔdɛ] 'he didn't buy a pot'

8.5. Past perfect negative

The PAST PERFECT NEGATIVE differs from the PAST NEGATIVE by the aspectual morpheme /xe/. Illustrations are given in (48).
(48) a. /swà + xe + dê + útsâdê/ → [swà xe dùtsâdê]  
NEG/he/PAST PER buy pot  'he hasn't bought a pot'
b. /swà + xe + dê + êkpâ/ → [swà xe dàkpâ]  
NEG/he/PAST PER buy cup  'he hasn't bought a cup'
c. /swà + xe + dê + ðyêdê/ → [swà xe dýyêdê]  
NEG/he/PAST PER buy banana  'he hasn't bought a banana'  
d. /swà + xe + dê + úkpô/ → [swà xe dúkpô]  
NEG/he/PAST PER buy cloth  'he hasn't bought cloth'
e. /swà + xe + kéê + útsâdê/ → [swà xe këùtsâdê]  
NEG/he/PAST PER look-for pot  'he hasn't looked for a pot'

Note that on the surface, /xe/ has a RISING tone in the NEGATIVE, whereas it has a LOW tone in the AFFIRMATIVE. Since only FALLING tone aspeclual morpheme of the AFFIRMATIVE (cf. /yâ/ and /ðâ/) are observed to reverse to a RISING tone in the NEGATIVE, this supports the positing of an underlying FALLING tone for /xe/ in the AFFIRMATIVE in Section 5.0. A sample derivation of the PAST PERFECT NEGATIVE is given in (49).

(49) Sample Derivation: 'he hasn't bought a pot'

TM [ [ [ [ H L ] [ L H ] ] [ [ H ] [ H H L ] ] ] ]  
S AUX PN/NEG PAST PER V P V N


Vowel Deletion Rule (62)

TM [ [ [ [ H L ] [ L H ] ] [ [ L ] [ H H L ] ] ] ]  
Mapping Rule (30)

Remove Brackets


Tone Simplification Rule (55)

[ swà xe dùtsâdê]  'he hasn't bought a pot'

9.0. Summary of all of the rules discussed in the text

1. Pluralization (Rule 15 of Ch. II):  

       [ V ]  
       + mid  
       + Sg
1'. Pluralization (Rule 15' of Ch. II):
\[
\begin{align*}
\left[ + \text{PL} \right] & \rightarrow \left[ + \text{high} \right] / \left[ \alpha \text{mid} \right] \\
\left[ \alpha \text{mid} \right] & \rightarrow \left[ + \text{body part} \right] / \left[ \alpha \text{mid} \right]
\end{align*}
\]

2. Pluralization (Rule 18 of Ch. II):
   a. PL \rightarrow a /
      \begin{align*}
      \left[ + \text{exception} \right] \\
      \left[ + \text{body part} \right] \\
      \left[ \text{Sg} \right]
      \end{align*}
   b. PL \rightarrow i /
      \begin{align*}
      \left[ + \text{exception} \right] \\
      \left[ + \text{human} \right] \\
      \left[ \text{Sg} \right]
      \end{align*}

3. /l/ Deletion (Rule 22 of Ch. II):
\[
\begin{align*}
\left[ + \text{con} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}] \\
\left[ + \text{cont} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}]
\end{align*}
\]

4. /l/ Assimilation (Rule 26 of Ch. II):
\[
\begin{align*}
\left[ + \text{high} \right] & \rightarrow [\alpha \text{F}] / [\alpha \text{F}] \\
\left[ - \text{mid} \right] & \rightarrow [\alpha \text{F}] \\
\end{align*}
\]

5. Glide Deletion (Rule 29 of Ch. II):
\[
\begin{align*}
\left[ - \text{con} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}] \\
\left[ - \text{voc} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}]
\end{align*}
\]

6. Lateral and Glide Deletion (Rule 30 of Ch. II):
\[
\begin{align*}
\left[ + \text{con} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}] \\
\left[ + \text{cont} \right] & \rightarrow \emptyset / [+ \text{voc}]_{\text{Sg}} [+ \text{voc}]
\end{align*}
\]

7. /l/ Assimilation (Rule 33 of Ch. II):
\[
\begin{align*}
\left[ + \text{high} \right] & \rightarrow [\alpha \text{F}] / [\alpha \text{F}] \\
\left[ - \text{mid} \right] & \rightarrow [\alpha \text{F}] \\
\end{align*}
\]
Condition: [+ Stem] = obligatory.

8. Vowel Deletion (Rule 34 of Ch. II):
\[
\begin{align*}
\left[ + \text{voc} \right] & \rightarrow \emptyset / [+ \text{voc}] \\
\left[ - \text{con} \right] & \rightarrow \emptyset / [+ \text{voc}] \\
\left[ \alpha \text{F} \right] & \rightarrow \emptyset / [+ \text{voc}]
\end{align*}
\]
9. Glide Formation (Rule 39 of Ch. II):
   \[ V_1 \rightarrow [-\text{voc}] / C \begin{bmatrix} + \text{voc} \\ + \text{high} \end{bmatrix} V_2 \]
   Condition: \( V_1 \neq V_2 \)

10. Palatalization (Rule 40 of Ch. II):
    /ts/ \rightarrow [\check{c}] / __i

11. Palatalization (Rule 41 of Ch. II):
    ts \check{c}
dz \rightarrow \frac{\check{c}}{\lambda} / __y
    n \n
12. Palatalization (Rule 42 of Ch. II):
    \begin{bmatrix} + \text{cor} \\ + \text{del rel} \end{bmatrix} \rightarrow \begin{bmatrix} + \text{retracted} \\ + \text{high} \\ - \text{back} \end{bmatrix} / __y

13. Glide Deletion (Rule 43 of Ch. II):
    [+seg] \rightarrow \emptyset / [+\text{retracted}]__

14. Labialization (Rule 46 of Ch. II):
    \begin{bmatrix} + \text{nasal} \\ + \text{long} \\ + \text{ant} \end{bmatrix} \rightarrow [+\text{round}] / __ [+\text{round}]

15. Regressive Vowel Deletion (Rule 49 of Ch. II):
    \begin{bmatrix} V_1 \end{bmatrix} \rightarrow \emptyset / \begin{bmatrix} V_2 \end{bmatrix} \text{ Verb} \text{ Prefix}
    \text{Condition: } \langle V_1 = V_2 \rangle

16. Regressive Vowel Deletion (Rule 53 of Ch. II):
    \begin{bmatrix} V_1 \end{bmatrix} \rightarrow \emptyset / \begin{bmatrix} V_2 \end{bmatrix} \text{ Prefix}
    \text{Condition: } \langle V_1 = V_2 \rangle

17. Vocalization (Rule 56 of Ch. II):
    C \begin{bmatrix} - \text{voc} \\ + \text{high} \\ a \text{ back} \\ a \text{ round} \end{bmatrix} \rightarrow [+\text{voc}] / __ [+\text{voc}]
    \begin{bmatrix} + \text{high} \\ a \text{ back} \\ a \text{ round} \end{bmatrix}

18. Long Vowel Shortening (Rule 57 of Ch. II):
    \begin{bmatrix} + \text{voc} \\ + \text{long} \end{bmatrix} \rightarrow [-\text{long}]
19. Regressive Vowel Deletion (Rule 61 of Ch. II):
\[ V_1 \rightarrow \emptyset / \underbrace{\text{DA}}_{\text{Prefix}} \]
\[ V_2 \]

20. Regressive Vowel Deletion (Rule 62 of Ch. II):
\[
\begin{array}{c}
V_1 \\
\{ \text{N} \} \\
\{ \text{DA} \}
\end{array}
\rightarrow \emptyset / \underbrace{\text{DA}}_{\text{Prefix}} \]
\[ V_2 \]
Condition: \[ V_1 = V_2 \]

21. Progressive Vowel Deletion (Rule 64 of Ch. II):
\[ V \rightarrow \emptyset / \underbrace{\text{N}}_{\text{Dem}} \]
\[ \underbrace{\text{Adj}}_{\text{Rel}} \]

22. Low Tone Insertion/Pre-Pause Tone Rule (Rule 11 of Ch. III):
\[ \emptyset \rightarrow [-\text{HIGH}] / [+\text{HIGH}]_Z \] (where \( Z = \) pause)

23. Downstep (Rule 20 of Ch. III):
\[ [+H] \rightarrow [+D] / [-H]__ \]

24. High Tone Insertion (Rule 23 of Ch. III):
\[ \emptyset \rightarrow [+\text{HIGH}] / [-\text{HIGH}]_N ___? \]

25. Mapping Rule (Rule 30 of Ch. III):
Map tones onto segments within innermost brackets; map first tone onto first vowel, second tone onto second vowel, etc. If there is no vowel, let tone 'float'. Remove innermost brackets whether or not rule can apply. Map tone onto segments only where segments have not yet been specified by tone features.

26. Mapping Rule (Rule 31 of Ch. III):
Map 'floating' tones onto closest immediate vowel (not separated by a consonant).

27. Tone Simplification (Rule 35 of Ch. III):
\[ [-\text{HIGH}] \rightarrow \emptyset / \underbrace{[+\text{HIGH}]}_{+\text{Vocalic}} \]

28. Low Tone Raising (Rule 3 of Ch. IV):
\[ a. \] \[ [-\text{HIGH}]_1 \rightarrow [+\text{HIGH}] / ___[+\text{HIGH}]_\text{Assoc} \]
\[ b. \] \[ [-\text{HIGH}]_1 \rightarrow [+\text{HIGH}]_\text{Assoc} \Rightarrow H_1 \emptyset \]

29. Tone Absorption Rule (Rule 4 of Ch. IV):
\[ [a \text{HIGH}]_1 \rightarrow \emptyset / \underbrace{a \text{HIGH}}_{+\text{Vocalic}} \]
30. Tone Simplification (Rule 19 of Ch. IV):
\[ [+ \text{HIGH}] \rightarrow \emptyset / [+ \text{HIGH}] \begin{array}{c}
\text{HIGH} \\
\text{+ Vocalic}
\end{array} \]

31. Tone Simplification (Rule 39 of Ch. IV):
\[ \text{TONE} \rightarrow \emptyset / \begin{array}{c}
\text{TONE TONE} \\
\text{+ Vocalic}
\end{array} \]

32. Tone Simplification (Rule 55 of Ch. IV):
\[ \begin{array}{c}
[\text{HIGH}] [\text{HIGH}] \\
[\text{HIGH} \quad \text{Downstep}]
\end{array} \Rightarrow \begin{array}{c}
[\text{HIGH}] \\
[\text{+ Vocalic}]
\end{array} \]

33. Low Tone Deletion (Rule 57 of Ch. IV):
\[ [- \text{HIGH}] \rightarrow \emptyset / \begin{array}{c}
[+ \text{HIGH}] \\
\text{+ Vocalic}
\end{array} \begin{array}{c}
\text{+ DOWNSTEP}
\end{array} \]

34. Low Tone Raising (Rule 7 of Ch. V):
\[ [- \text{HIGH}]_1 \rightarrow [+ \text{HIGH}]_1 / \begin{array}{c}
[+ \text{HIGH}]_1 \\
\text{N}
\end{array} \]
Future
Present Progressive
Past Habitual
NEGATIVE

35. Tone Lowering of Mono-syllabic Verb (Rule 9 of Ch. V):
\[ [+ \text{HIGH}] \rightarrow [- \text{HIGH}] / \begin{array}{c}
[- \text{HIGH}]_2 \\
\text{N}
\end{array} \begin{array}{c}
\text{V}
\end{array} \]
Present Progressive
Future
Past Habitual
NEGATIVE

36. Tone Lowering of Bi-syllabic Verb (Rule 10 of Ch. V):
\[ [+ \text{HIGH}]_2 \rightarrow [- \text{HIGH}] / \begin{array}{c}
[- \text{HIGH}]_1 \\
\text{N}
\end{array} \begin{array}{c}
\text{V}
\end{array} \]
Present Progressive
Future
Past Habitual
NEGATIVE

37. Tone Dissimilation of Bi-syllabic Verb (Rule 11 of Ch. V):
\[ [+ \text{HIGH}]_1 \rightarrow [- \text{HIGH}] / \begin{array}{c}
[- \text{HIGH}]_1 \\
\text{N}
\end{array} \begin{array}{c}
\text{V}
\end{array} \]
Present Progressive
Future
Past Habitual
NEGATIVE
APPENDIX A.

A COMPARATIVE WORDLIST

This is a comparative wordlist of 542 forms -- nouns, verbs, adjectivals, adverbs, and particles in the eight dialects examined for this study. The transcription is in phonetics. A description of the segments are given in Chapter II, and of the tones in Chapter III.
<table>
<thead>
<tr>
<th>English</th>
<th>Ekpheli</th>
<th>Weppa-Wano</th>
<th>Auchi</th>
<th>Aviele</th>
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<tbody>
<tr>
<td>1. able, to be</td>
<td>ụmạtì</td>
<td>ụmạtì</td>
<td>ụmạtì</td>
<td>ụmááblì</td>
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<td>ọpè</td>
<td>ọpè</td>
<td>ọfè</td>
<td>ọfwè</td>
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<td>3. afternoon</td>
<td>ùwàm̄hì</td>
<td>òtà</td>
<td>òtà</td>
<td>èlōtà</td>
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<td>òtù</td>
<td>òtù</td>
<td>òtù</td>
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<td>ùlàm̄h̄ã</td>
<td>ùyáhm̄à</td>
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<td>6. albino</td>
<td>ákèčì</td>
<td>ákèčì</td>
<td>ákèčì</td>
<td>áñã</td>
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<tr>
<td>7. all</td>
<td>èθèbèk̄p̄</td>
<td>èθèbè</td>
<td>ègèlè</td>
<td>èrèbè</td>
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<tr>
<td>8. alligator</td>
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<td>áçè</td>
<td>áçè</td>
<td>ákɔ̀gyà</td>
</tr>
<tr>
<td>pepper</td>
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<td></td>
</tr>
<tr>
<td>9. and</td>
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<td>làgí</td>
<td>làgí</td>
<td>màbìlèḡ</td>
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<td>òfù</td>
<td>òfù</td>
<td>òfù</td>
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<tr>
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<td>òwàŋè</td>
<td>òwàŋè</td>
<td>ùyàyè</td>
</tr>
<tr>
<td>12. ant</td>
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<td>âsì</td>
<td>âsìsì</td>
<td>ádòdòlò</td>
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<tr>
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<td>èjèdè</td>
<td>èjèdè</td>
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<td>ùvémhì</td>
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