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TOPICS IN EWE PHONOLOGY.

University of California, Los Angeles,
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UNIVERSITY OF CALIFORNIA
Los Angeles

Topics in Ewe Phonology

A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Linguistics

by

Herbert Frederic Walter Stahlke

Doctoral Committee:
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1971
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Charles H. Kraft

Christopher Ehret

Vincent A. Francia

Wm. E. Welsbier Committee Chairman

University of California, Los Angeles 1971
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Some Pages have indistinct print. Filmed as received.

UNIVERSITY MICROFILMS
To my wife, Paulette,
who provided more
help and encouragement than
she could ever imagine.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>Page vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>viii</td>
</tr>
<tr>
<td>VITA AND PUBLICATIONS</td>
<td>x</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xii</td>
</tr>
<tr>
<td>PREFACE</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER 1. THE CONSONANT SYSTEM</td>
<td>5</td>
</tr>
<tr>
<td>1.0 Introduction</td>
<td>5</td>
</tr>
<tr>
<td>1.1 The Labial Consonants</td>
<td>6</td>
</tr>
<tr>
<td>1.1.1 The Status of /p/</td>
<td>7</td>
</tr>
<tr>
<td>1.2 The Coronal Consonants</td>
<td>10</td>
</tr>
<tr>
<td>1.2.1 The Relationship between l, r, and gl</td>
<td>11</td>
</tr>
<tr>
<td>1.2.2 The Nasalization of /l/</td>
<td>18</td>
</tr>
<tr>
<td>1.2.3 Distinctive Features of Ewe Consonals</td>
<td>21</td>
</tr>
<tr>
<td>1.3 The Back Consonants</td>
<td>23</td>
</tr>
<tr>
<td>1.3.1 The Treatment of Labial-velars</td>
<td>24</td>
</tr>
<tr>
<td>1.3.2 Smith's Treatment of Distributedness</td>
<td>26</td>
</tr>
<tr>
<td>1.3.3 The Pharyngeals</td>
<td>27</td>
</tr>
<tr>
<td>1.4 A Sequential Constraint of Velars and Palatals</td>
<td>30</td>
</tr>
<tr>
<td>1.5 Summary of the Consonant System</td>
<td>36</td>
</tr>
<tr>
<td>Notes</td>
<td>39</td>
</tr>
<tr>
<td>CHAPTER 2. THE VOWEL SYSTEM</td>
<td>42</td>
</tr>
<tr>
<td>2.0 Introduction</td>
<td>42</td>
</tr>
<tr>
<td>2.1 Cavity Features of the Short Vowels</td>
<td>43</td>
</tr>
<tr>
<td>2.1.1 The Representation of Vowel Length</td>
<td>43</td>
</tr>
<tr>
<td>2.1.2 The Specification of Vowel Height</td>
<td>48</td>
</tr>
<tr>
<td>2.1.3 High Covered Vowels</td>
<td>55</td>
</tr>
<tr>
<td>2.2 Nasalization</td>
<td>56</td>
</tr>
<tr>
<td>2.2.1 Review of Earlier Analyses</td>
<td>56</td>
</tr>
<tr>
<td>2.2.2 The Derivation of Nasalized Vowels</td>
<td>59</td>
</tr>
<tr>
<td>2.3 The Distribution of /e/ and a</td>
<td>69</td>
</tr>
<tr>
<td>2.4 Summary of the Vowel System</td>
<td>75</td>
</tr>
<tr>
<td>Notes</td>
<td>78</td>
</tr>
</tbody>
</table>

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CHAPTER 3. DIPHTHONGS AND VOWEL SEQUENCES .......... 80

3.0 Introduction ........................................... 80
3.1 Ansre's Analysis of Diphthongs ....................... 80
3.2 /yV/ Sequences ......................................... 83
3.3 Vowel Assimilations .................................... 87
   3.3.1 Word-Level Vowel Assimilations ................. 87
   3.3.1.1 The Third Person Singular Object Pronoun ... 87
   3.3.1.2 Noun-Final Vowel Assimilations .............. 92
   3.3.2 The Thematic Particle ............................ 102
3.4 Surface Conditions on Vowel Sequences ............... 112
   3.4.1 The Equal-Height Condition ..................... 113
   3.4.2 The Two-Vowel Condition ......................... 119
3.5 A Historical Look at /e/-lowering ..................... 125
Notes ....................................................... 132

CHAPTER 4. PREVIOUS STUDIES OF TONE IN EWE .......... 133

4.0 Introduction ........................................... 133
4.1 Westermann's Analysis .................................. 135
4.2 Ansre's Analysis ....................................... 139
4.3 Smith's Formalization .................................. 144
Notes ....................................................... 158

CHAPTER 5. THE MID/LOW ALTERNATION ................. 159

5.0 Introduction ........................................... 159
5.1 The Tone Insertion Hypothesis ....................... 160
5.2 The Prefix Hypothesis ................................ 173
5.3 Low Tone Assimilation ................................ 178
5.4 The Role of the Noun Prefix in Derived Nominals .... 185
   5.4.1 Gerunds and Gerundive Nominalizations .......... 185
   5.4.2 Nouns Derived from Other Sources .............. 190
5.5 Some Implications of the Prefix Hypothesis ........ 193

CHAPTER 6. OTHER TONAL PHENOMENA ................. 203

6.0 Introduction ........................................... 203
6.1 The 'High Tone Suffix' ................................ 203
6.2 High Tone Alternations ................................. 217
6.3 Exceptions to Lowering Rules ......................... 238

CHAPTER 7. CONCLUSIONS .............................. 241

REFERENCES ............................................... 252
SYMBOLS

For typographical reasons the following non-standard symbols are used.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ə</td>
<td>an open, mid front vowel, equivalent to IPA ɛ.</td>
</tr>
<tr>
<td>ə</td>
<td>an open, mid back vowel, equivalent to IPA ɔ.</td>
</tr>
<tr>
<td>ʄ</td>
<td>an apico-post-alveolar voiced stop.</td>
</tr>
<tr>
<td>ɸ</td>
<td>a voiceless, bilabial fricative, equivalent to IPA ɸ.</td>
</tr>
<tr>
<td>ɓ</td>
<td>a voiced, bilabial fricative, equivalent to IPA ʄ.</td>
</tr>
<tr>
<td>ʂ</td>
<td>a velar approximant, equivalent to IPA ɣ.</td>
</tr>
</tbody>
</table>

Tones are marked in a way which has become standard in West African linguistic studies, using ˘ for high tone, ˚ for low tone, and no mark for mid tone. Where necessary to avoid misunderstanding, mid tone is marked ˚.

Diagonals (/X/) are used only to set off systematic phonemic segments, all other segments being underlined.

vi
**TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table I:</td>
<td>Phonetic Inventory of Ewe Consonants</td>
<td>5</td>
</tr>
<tr>
<td>Table II:</td>
<td>Feature Specifications for Ewe Labial Consonants</td>
<td>7</td>
</tr>
<tr>
<td>Table III:</td>
<td>Smith's Analysis of Ewe Coronals</td>
<td>10</td>
</tr>
<tr>
<td>Table IV:</td>
<td>Feature Analysis of Ewe Coronals</td>
<td>23</td>
</tr>
<tr>
<td>Table V:</td>
<td>Cavity Features of Ewe Systematic Phonetic [-anterior] Consonants</td>
<td>24</td>
</tr>
<tr>
<td>Table VI:</td>
<td>Phonological Matrix of Ewe Consonants</td>
<td>37</td>
</tr>
<tr>
<td>Table VII:</td>
<td>Ewe Systematic Phonemic Vowels</td>
<td>76</td>
</tr>
<tr>
<td>Table VIII:</td>
<td>Kpando Systematic Phonemic Vowels</td>
<td>77</td>
</tr>
</tbody>
</table>

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A work such as this owes a great deal to many people, more than I have space to thank here individually. There are, however, a number of friends, colleagues, and teachers who have been of especially great help during my graduate work and during the research and writing of this dissertation. I would first of all like to thank William Welmers for more things than I can keep track of. It was he who made it possible for me to study linguistics at UCLA in the first place, and I owe to him much of what understanding I have of the complexities of language. In particular I owe to him the awareness that formalism is valid in science only insofar as it makes correct claims about the phenomena to be explained. I would also like to thank Michael Kenstowicz, Chin-Wu Kim, Charles Kisseberth, and Dieter Wanner for their patient listening and careful criticism of my work. Needless to say, this monograph would have been impossible without the assistance of my informant, Agogo Mawuli. He has been a patient and reliable source of information, and he has frequently made incisive suggestions about the structure of his language. Naturally, I can blame no one but myself for whatever blunders, analytic or theoretical, which this work may contain. Finally, the debt I owe to my wife Paulette is

viii
incalculable. She has endured the absentmindedness and almost constant preoccupation with linguistics which has sometimes made me unfit to live with, and she has borne the loneliness and added work with grace and love. To her go my love and my gratitude.
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ABSTRACT OF THE DISSERTATION

Topics in Ewe Phonology

by

Herbert Frederic Walter Stahlke

Doctor of Philosophy in Linguistics

University of California, Los Angeles, 1971

Professor William E. Wemmer, Chairman

This dissertation describes several major areas of Ewe within the framework of generative phonology. Special attention is given to the Kpando dialect. Two earlier works on Ewe are discussed and criticized in detail: Gilbert Anse's *The Tonal Structure of Ewe* and H. V. Smith's 'Tone in Ewe' (MIT Quarterly Progress Report No. 28:294-305). In Chapter One it is shown that the traditional analyses of the consonant system claiming the ɔ as an allophone of ɛ/ found only after coronal consonants is incorrect. Rather, the intrinsic phonetic content of ɔ, the distribution of ɔ, ɛ, and ɛ, and alternations between ɔ and ɛ dictate that both /ɛ/ and /ɛ/ be posited as underlying segments and that ɛ be a predictable variant of /ɛ/ rather than an underlying segment. In Chapter Two it is shown that the Ewe vowel system is analyzable as having only the seven oral vowels /i/, /e/, /ɛ/, /ɜ/, /a/, /o/, /ɔ/, and /u/. Evidence is presented to show

xii
that nasalized vowels are derived by assimilation to a final nasal which is then deleted in nouns and verbs, but not in adverbs and ideophones. The Kpando dialect is shown to have a complex of rules lowering /e/ to \( \emptyset \), with the result that underlying /\( \emptyset \)/ has merged with /e/, giving Kpando a six-vowel system. In Chapter Three Anser's analysis of diphthongs is criticized, and it is shown that all of his /i\( iV \)/ sequences are in fact /y\( V \)/. All surface vowel sequences in Kpando are subject to two strong conditions: The Equal Height Condition and the Two Vowel Condition. The former requires that in a surface vowel sequence within a word the two vowels must have the same tongue height and tongue root position. The second requires that surface syllables contain no more than two vowels in sequence, further vowels being either eliminated or resyllabified in a number of ways. On the basis of these conditions it is suggested that phonological theory be modified to permit such surface constraints to state generalizations about the function of several distinct rules. In Chapter Four earlier analyses of the Ewe tonal system are discussed and criticized. In Chapter Five the mid/low tonal alternation is discussed and it is argued that all Ewe nouns, both lexical and derived, have prefixes. In some cases this prefix consists solely of tonal features, and it is argued that such incompletely specified segments must be permitted in phonological theory. Chapter Six is devoted to certain high tone phenomena. It
is shown that Anse's claim that no nouns with initial voiced obstruents may have high tone stem vowels is false and that in fact many nouns which Anse claims have high tone suffixes actually are underlyingly high-toned and become rising tone by a rule of low tone insertion. The rising tone of the imperative verb is also due to this rule.
PREFACE

This monograph reports research on the segmental and tonal structure of the Kpando dialect of Ewe. The Ewe language has been the subject of a fairly large amount of excellent work in the past eighty years, beginning with Henrici's Lehrbuch der Ephe Sprache (1891), continuing through Westermann's landmark studies—his Grammatik der Ewe Sprache (1907) and Die westlichen Sudansprachen und ihre Beziehungen zum Bantu (1927)—and reaching a high level recently in Gilbert Ansre's The Tonal Structure of Ewe (1961) and The Grammatical Units of Ewe (1966). The existence of an extensive literature of such high quality may well cause one to wonder why yet another phonology should be written. The reasons for this are twofold: first of all, there has as yet been no in-depth study of the Kpando dialect, a dialect which differs in both tonally and segmentally interesting ways from other dialects which have been reported, and second, there has as yet been no serious attempt to study the implications of a phonological system such as is found in Ewe for phonological theory.

The description of Ewe phonology presented here will be organized and formulated basically along the lines of the theory of generative phonology as described in such works as
Chomsky and Halle's *The Sound Pattern of English* (1968), Robert Harms' *Introduction to Phonological Theory* (1968), and numerous journal articles. We feel that this formalism is sufficiently familiar to linguists by this time that it is not necessary to present an outline of the theory here. At those points where a formal device or theoretical concept is introduced which might not be immediately clear, we will add an explanatory note. The benefit of using a formal, explicit theoretical formalism is that it permits the consistent statement of linguistically significant generalizations in an unambiguous manner, but at the same time there are certain drawbacks. Any meaningful theory of language must define the sorts of generalizations which can be significant to linguistic structure. Where generalizations are found which are not easily statable, or perhaps impossible to state, by means of the available notations, the generalization must still be stated, and, if possible, the theory must be revised to accommodate such generalizations. We will, when the data demand it, suggest a number of revisions which might be considered in the formulation of a more adequate theory of language.

The thrust of this monograph will be primarily descriptive, presenting what we hope will be a descriptively adequate statement of certain important areas of Ewe phonology. Theoretical discussion will be of secondary importance. Chapter One is devoted to the phonetics and phonology of the consonant system, a system which has been generally ignored
because of its apparent simplicity. As a result, certain phonetic and phonological problems of some interest have been generally overlooked. Among these questions are the phonological status of the so-called 'retroflexed d', the articulatory properties of x, h, kp, and gb, and the problem of whether p is a native or foreign segment. Chapter Two considers the vowel system, examining the phonological status of vowel length, nasalization, and the open mid front vowel e. In Chapter Three we investigate the behavior of diphthongs and vowel sequences, showing that there are certain restrictions on vowel sequences which can be stated only at the systematic phonetic level and must be regarded as conditions on the output of the phonological component, since each of these restrictions is the result of several different, non-collapsible phonological rules. In Chapter Four we will begin our reanalysis of the tonal system, giving a detailed critique of Ansre's analysis of tone in Ewe, particularly as it has been reformulated by Smith (1968) in his article 'Tone in Ewe'. The reanalysis of Ewe tone will continue in Chapter Five, where we will argue that all nouns in Ewe have prefixes and that it is basically these prefixes that account for the alternations which are found between mid tone and low tone. This claim will require that phonological theory be revised to permit certain incompletely specified segments in the phonology. We will conclude our discussion of the tonal system in Chapter Six, where we will discuss the so-called 'high
tone suffix first reported in Ansre (1961). We will discuss in detail the behavior of tone in the final syllables of nouns which end in a geminate vowel or a vowel sequence, and we will show that there is a systematic contrast between voiced obstruent initial noun stems with short high tones and similar noun stems with long rising tone vowels. In Chapter Seven we will present a summary of our results.

Since this work is directed at both Africanists and theoretical linguists, I have had to be somewhat more discursive in certain places than might seem necessary to some readers. I ask the indulgence of both groups, and I hope that the results of this research will be of interest to both.
Chapter 1
THE CONSONANT SYSTEM

1.0 Introduction

The consonant system of Ewe includes the following inventory of systematic phonetic segments.

<table>
<thead>
<tr>
<th>stop</th>
<th>affricate</th>
<th>fricative</th>
<th>sonorant</th>
</tr>
</thead>
<tbody>
<tr>
<td>vls vcd</td>
<td>vls vcd</td>
<td>vls vcd</td>
<td>nas lig gld</td>
</tr>
<tr>
<td>bilabial</td>
<td>p b</td>
<td>p b</td>
<td>m</td>
</tr>
<tr>
<td>labio-dental</td>
<td></td>
<td>f v</td>
<td></td>
</tr>
<tr>
<td>dental</td>
<td>t d</td>
<td>ts dz</td>
<td>n l, ł</td>
</tr>
<tr>
<td>alveolar</td>
<td></td>
<td>s z</td>
<td></td>
</tr>
<tr>
<td>retroflexed</td>
<td>θ</td>
<td></td>
<td>r</td>
</tr>
<tr>
<td>alveo-palatal</td>
<td></td>
<td></td>
<td>ny y</td>
</tr>
<tr>
<td>velar</td>
<td>k g</td>
<td></td>
<td>g</td>
</tr>
<tr>
<td>labial-velar</td>
<td>kp gb</td>
<td></td>
<td>w</td>
</tr>
<tr>
<td>pharyngeal</td>
<td>x h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table I: Phonetic Inventory of Ewe Consonants.

The passive articulators assigned to these consonants differ in some cases from those given in other works on Ewe, the most important being Westermann (1927) and (1930), Ansre (1961), and Smith (1968). These cases will be discussed as their respective sections come up below. The order of sections follows the order of passive articulators, from front
to back.

1.1 The Labial Consonants

Ewe is one of the rare languages (Ladefoged, 1964:25-28) which makes a systematic distinction between bilabial and labio-dental consonants. This contrast, as might be expected, does not occur in the entire labial series, but only in the fricatives, and thus we must distinguish between the [+distributed] bilabials and the [-distributed] labio-dentals.\(^1\) We will claim that labial consonants, that is, those consonants which are distinguished by the features [+anterior, -coronal], are redundantly [+distributed], with the exception of those which are [+continuant], which must also be specified for [distributed]. The feature [distributed] defines consonants which have a relatively long point of constriction, as opposed to those, like /f/ and /v/, which have a relatively short point of constriction.

The labial consonants are also differentiated by the features [continuant] and [nasal]. /p/, /b/, and /m/ are [-continuant], that is, their articulation involves a complete closure in the oral cavity, and the fricatives, /f/, /θ/, /θ/, and /v/ are [+continuant]. Nasality distinguishes /m/ from the rest of the labials. A labial nasal will also, of course, be marked [+sonorant]. Finally, voicing is distinctive among the labial consonants.
Table II: Feature Specifications for Ewe Labial Consonants.

1.1.1 The Status of /p/

Many earlier writers on Ewe, especially Westermann (1928:31) and Ansre (1961:12), claim that /p/, as found in Ewe today, is not a native sound. Westermann claims that "das West-Ewe hat p nur in wenigen, meist dem T[wi] entlehnten Wörtern. In Dah[omey] fehlt p ... ganz." He goes on to remark that the Anexpo dialect does have a heavily aspirated /p/ which in the Western dialects corresponds to /p/ and in Dahomey to /z/. /p/, he points out, is found only in the Western dialects, and is probably derived from Proto-Ewe */p/*. He cites the following correspondences as evidence.

\[
\begin{array}{ccccccc}
\text{Western} & \text{Anexpo} & \text{Dahomey} & \\
\ \ 'pa' & \ 'pa' & \ 'outcry' \\
\ \ 'pe' & \ 'pe' & \ 'year' \\
\ \ 'ple' & \ 'ple' & \ 'buy' \\
\end{array}
\]
It is certainly true that ṭ is rare in Kpando, and in some cases when a word containing ṭ is borrowed into Western and Central dialects of Ewe, it becomes /kp/ (Westermann, 1930: 21). Possibly, then, a segment structure condition like (2) is needed to block /p/ from the native lexicon.

(2) \([-\text{continuant}] \rightarrow [+]\text{voiced}] / \begin{array}{c}
\underline{\text{-sonorant}} \\
+\text{anterior} \\
-\text{coronal}
\end{array}\]

The adoption of a condition like (2) is a decision which must be motivated in some way by the data of Ewe. If all synchronic instances of ṭ are indeed due to borrowing, then (2) will require that lexical items containing ṭ be marked as \([+]\text{foreign}\]. However, if they are so marked, the substantive claim is made that the native speaker is somehow aware of their foreignness, and we expect this foreignness to show up in some way in the phonological behavior of ṭ. Since morphemes containing ṭ behave in all respects like native lexical items, the lexical specification of these forms as \([+]\text{foreign}\] does not seem to be motivated. As to native speaker reaction to ṭ, we have little to go on. Our informant also speaks Akan, the language from which many of the words in question are borrowed, and so he may be aware of borrowings which a monolingual Ewe speaker would consider
A condition like (2) could be motivated by the fact that in borrowed words original \( p \) often becomes /kp/, as in (3).

(3) Ewe form | Source
---|---
kpáta | 'assuage' pata (Twi)
akpatá | 'verandah' apata (Twi)
akpása | 'falseness' apasa (Twi)
kpete | 'vulture' opete (Twi)
kokpla | 'copra' copra (Port.)
kpataga | 'money' prata 'silver' (Port.)
kpadle | 'priest' padre (Port.)
kpeni | 'penny' (Eng.)
kpali | 'Paris' (French)

(from Westermann, 1930:21)

But perhaps equally as often this change does not occur, as the examples in (4) show.

(4) Ewe form | Source
---|---
pépa | 'writing paper' (Eng.)
prusi | 'police' (Eng.)
kapisi | 'caps' (Eng.)
kapita | 'carpenter' (Eng.)
pépi | 'harmattan' g\( \phi \) (Twi)
apáa | 'paid labor' pad (Twi)
pé | 'exactly' p\( \dot{e} \) (Twi)
p\( \dot{e} \) | 'chisel' p\( \dot{e} \) (Twi)
Thus it seems that the $p/kp$ correspondence, which seems to hold consistently for older borrowings (cf. Westermann 1919: 250-254), indicates a once productive borrowing change, but that the process has ceased to be productive and $p$ begins to appear more frequently. If borrowed $p$ always became $/kp/$, then (2) would be supported, as at one time it probably was, but since more and more words with $p$ are occurring, and since such morphemes are not exceptions to any phonological rules, we feel that marking them as $^[+\text{foreign}]$ in the lexicon makes too strong a claim and that $/p/$ must be considered an underlying segment in Ewe.

1.2 The Coronal Consonants

The consonants specified $^[+\text{coronal}]$ all have passive articulators in the dental, alveolar, or post-alveolar regions, including the retroflexed consonants of Table I. Smith gives the feature specifications in Table III for these consonants, treating $l$ and $r$ as variants of one underlying coronal liquid.

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>d</th>
<th>$\emptyset$</th>
<th>ts</th>
<th>dz</th>
<th>s</th>
<th>z</th>
<th>n</th>
<th>l</th>
<th>ny</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coronal</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Anterior</td>
<td>+</td>
<td>+</td>
<td>-</td>
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</tbody>
</table>

Table III: Smith's Analysis of Ewe Coronals (1963:291-292).
In their discussion of coronal sounds, Chomsky and Halle (1968:302) make it clear that by 'blade' they mean the entire front of the tongue, including the tip. The distinction between apical and laminal segments, which will become important below, is to be handled by the feature \([\text{distributed}]\)\(^2\), and so we would mark all \([+\text{coronal}]\) segments except \(\&\) as \([+\text{distributed}]\) \(\&\), then, is \([-\text{distributed}]\), contrasting with the dental and alveolar coronals in that it is articulated with the tip of the tongue, rather than the blade, producing a distinctly narrower area of contact. \(\&\) also differs in that the passive articulator is alveo-palatal, rather than alveolar or dental, a property which it shares with \(\mathfrak{n}\) and \(\mathfrak{v}\), all three being \([-\text{anterior}]\). With these changes in the specification of the feature \([\text{distributed}]\), we would accept the phonetic properties of the Ewe coronals as Smith gives them.

Ansre (1961:11) treats \(\mathfrak{n}, \mathfrak{l}, \) and \(\mathfrak{r}\) as alveolars, rather than as dental (\(\mathfrak{l}\) and \(\mathfrak{n}\)) and alveo-palatal (\(\mathfrak{r}\)). As far as \(\mathfrak{n}\) and \(\mathfrak{l}\) are concerned, we observe that they are, however, laminal, while \(\mathfrak{r}\) is apical, and so here we must contrast \([+\text{distributed}]\) and \([-\text{distributed}]\) segments. The differences between our analyses of the anterior coronals may be due to dialectal variation.

1.2.1 The Relationship Between \(\mathfrak{l}, \mathfrak{r}, \) and \(\&\)

In all of the analyses to which we have had access, it has been assumed that \(\mathfrak{r}\) and \(\mathfrak{l}\) are in complementary distribu-
tion and are allophones of one alveolar liquid phoneme ɬ. Only Westermann (1927:31) discusses the question at any length, and he too arrives at roughly the same conclusion. The complementarity lies in the very evident fact that r occurs only after [+coronal] consonants, while ɬ occurs after [-coronal] consonants as well as in inter-vocalic and stem-initial positions.³

(5) Initial

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ɬɛ́</td>
<td>'catch'</td>
</tr>
<tr>
<td>lɔ́</td>
<td>'crocodile'</td>
</tr>
<tr>
<td>alɔ́</td>
<td>'cheek'</td>
</tr>
<tr>
<td>alɛ́</td>
<td>'sheep'</td>
</tr>
</tbody>
</table>

**After non-coronals**

<table>
<thead>
<tr>
<th></th>
<th>After coronals</th>
</tr>
</thead>
<tbody>
<tr>
<td>ɣlɪ́</td>
<td>'slip'</td>
</tr>
<tr>
<td>blù</td>
<td>'mix'</td>
</tr>
<tr>
<td>trɔ́</td>
<td>'twist'</td>
</tr>
<tr>
<td>yrɔ́</td>
<td>'hoot'</td>
</tr>
</tbody>
</table>

Both Smith and Ansre overlook several important points in their discussion of the behavior of these consonants. The first of these is the assimilation of dentals to a following ɬ, as illustrated below.

(6) **Underlying form** | **Assimilated form**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>tr</td>
<td>ṭr</td>
</tr>
<tr>
<td>dr</td>
<td>ḍr</td>
</tr>
<tr>
<td>tʃr</td>
<td>ḩʃr</td>
</tr>
<tr>
<td>dzr</td>
<td>ḡzr</td>
</tr>
</tbody>
</table>

[,] indicates that the active articulator is apical, rather than laminal. Thus /t/, /d/, /ts/, and /dz/, which are all basically lamino-dental, as discussed above, become distinctly apico-alveolar, or even post-alveolar. This change

12
is not quite so noticable in /s/, /z/, and /n/, although some assimilation is evident. r does not occur after l, apparently because a sequence of two liquids is not permissible in Ewe. The auditory effect of these assimilations, especially with /t/ and /d/, is very much like the phonetic affricate which results from tr and dr sequences in English. If this assimilation is to be explained on phonetic grounds, then r must be regarded as apical, that is, [-distributed], and post-alveolar, that is, [-anterior]. It therefore differs from l, as shown below.

(7)  

\[
\begin{array}{c|c|c}
 & \text{l} & \text{r} \\
\hline 
\text{Sonorant} & + & + \\
\text{Continuant} & + & - \\
\text{Voiced} & + & + \\
\text{Anterior} & + & - \\
\text{Coronal} & + & + \\
\text{Lateral} & + & - \\
\text{Distributed} & + & - \\
\end{array}
\]

In order to handle the supposed l-r allophony, we need a rule changing four feature specifications.

(8) [+consonantal] \rightarrow [+continuant] / [-anterior [-lateral [-distributed]]] / [+coronal] \quad V

The changes in the features [continuant], [lateral], and [distributed] are either self-evident or have been discussed above. The change in the specification of [anterior] is motivated in part by the assimilation of dentals and alveolars.
to r. Auditorily, however, the [-anterior] passive articulator is particularly clear after the alveo-palatal consonants, ny and y, which are themselves [-anterior].

The second point frequently overlooked is the actual articulatory description of the segment d. This segment has been described as a voiced retroflexed stop (Westermann, 1927:27, 1930:14, and Ansre, 1961:11), but Ladefoged (1964:18) notes that it is distinct from the retroflexed stops of Hindi and Tamil. d, as Ladefoged describes it, is somewhat farther forward in the alveo-palatal region than the sounds usually described as retroflexed, and the contrast which he finds between the Ewe consonants d and r lies in the fact that the former 'is articulated with the blade of the tongue against the teeth and alveolar ridge', while the latter 'is articulated with the tip of the tongue against the alveolar ridge (usually, but not always, the posterior part)' (Ladefoged, 1964:20). Ewe d and r, then, differ only in that the latter is a liquid, and thus a [+sonorant, +vocalic] segment, while the former is a true consonant, that is, a [-sonorant, -vocalic] segment. Since all vocalic segments must be marked [+sonorant], that difference between the two is not distinctive, and all that is crucially distinctive between them is that d is non-vocalic and r is vocalic.

The third point is the anomalous position of d in the phonology of Ewe. d is anomalous in two ways. First of all, it is the only voiced obstruent without an obvious voiceless
counterpart, and this is an obstruent system which is strikingly symmetrical in all other cases. Secondly, it is the only obstruent which cannot be immediately followed by a liquid, a distributional property which is shared only with the liquids. Because of the phonetic similarity between \( \text{\textit{d}} \) and \( \text{\textit{r}} \), and because of the distributional similarity between \( \text{\textit{d}} \) and the liquids, let us consider what the consequences would be of treating \( \text{\textit{d}} \) as an allophone of \( /r/ \), that is, as an underlying liquid sonorant instead of as a voiced obstruent. First of all, we would have a natural explanation for the fact that there is no voiceless counterpart to \( \text{\textit{d}} \), since \( \text{\textit{d}} \) is not an obstruent to begin with. Following from this is the fact that we now have an entirely symmetrical set of voiced and voiceless obstruents. Secondly, we have an explanation for the fact that it cannot be followed immediately by a liquid, since it is itself a liquid, and, as we have seen, sequences of two liquids are not permitted. This restriction can be handled by a morpheme structure condition like the following.

\[
(9) \quad [+\text{segment}] \rightarrow [-\text{consonantal}] \quad / [+\text{vocalic} \quad [+\text{consonantal}]
\]

Third, it is no longer necessary to produce a \([-\text{anterior, +coronal, -distributed, -lateral}] \) sonorant, such as we get from the application of (8), to cause the assimilation of dentals and alveolars to an apical articulation, since we already have one in the underlying forms: \( /r/ \). The complementarity of \( /l/ \) and \( /r/ \) observed by previous investigators must
now be considered a partial complementarity and will be handled in the lexicon by the following morpheme structure condition.

(10) \[[+\text{vocalic}] \quad \rightarrow [\text{continuant}] / [\text{coronal}] \]

Fourth, resulting from (9) and (10) above, we can now replace the \(l-r\) alternation rule (8) by a much simpler rule (11) changing /r/ to \(q\) initially and intervocally.

(11) \(r/-\text{desonorization}\)

\[[+\text{vocalic}] \quad \rightarrow [\text{sonorant}] / \left\{ \text{\#} \right\} [\text{continuant}] \]

Thus the morpheme structure conditions (9) and (10), blocking sequences of two liquids and defining the distribution of /l/ and /r/ after consonants, respectively, together with (11), changing /r/ to \(q\), account for all of the facts of the distribution of phonetic \(l, r,\) and \(q\) without the inherent disadvantages of previous analyses.

Up to this point, our argument for deriving \(q\) from /r/ has been based entirely on distributional and phonetic evidence, but there is also some evidence for this analysis, as opposed to the /l-r/ alternation analysis, in alternate forms of words, both of which are found in the surface phonology. The number 'one' is \(q\)\(\text{êká}\), or, by our analysis, \(\text{êká}\), with initial /r/ becoming an obstruent by (11). \(\text{êká}\) has the alternate form \(q\)\(\text{dé}\), underlyingly \(\text{ré}\), which occurs, among other environments, in the words for 'seven' and 'nine'. Both numbers show alternate surface forms, as follows: for
'seven' adédé, that is, adé 'six' + dé 'one', that form, the shortened form adré, and the underlying form adéré are all found; and for 'nine' envíié, that is, 'eight' enví + dé 'one', the underlying form envíré is also found, although there is no form for 'nine' which has undergone vowel deletion. adré 'seven' has undergone an optional rule of vowel deletion, thus eliminating the environment required for (11) to operate. The alternate forms for 'nine' show that the lower half of rule (11), the intervocalic environment, must be optional, depending probably on the style and speed of speech. We have, then, the following derivations.

(12) (i) adé+ré (ii) enví+ré
   vowel deletion /r→q/ /r→q/
   adré adéré adédé envíré envíié

The existence of such alternate forms would be inexplicable if /r/ were a variant of /l/, but by treating /r/ as the underlying form of q we have a natural explanation for the alternations shown in (12). It is interesting to note, in addition, the comment in Westermann (1930:15) that 'in the run of conversation q often resembles an r with a single trill'. He cites the example of àti dé 'one tree', which is sometimes pronounced àtíré (1930:19). Finally, Westermann cites one case in which intervocalic q seems to be in free variation with l: súdasúda and súlasúla. This is an isolated case and does not represent a regular alternation.

Before leaving this topic, we would like to consider one
alternative analysis. It might be argued that intervocalic consonant reduction is a more natural process than consonant strengthening in initial position, the process which we have suggested. Thus those cases of intervocalic \( r \) cited above would be underlyingly \( /\dot{q}/ \) and would have undergone some sort of lenition process. The absence of \( r \) in initial position could then be explained in two ways. First of all, the condition for lenition is intervocalic position, and a post-pausal \( \dot{q} \) fails to meet this condition. Secondly, \( r \) is an alternant of \( \dot{1} \) after coronal consonants only, and therefore it cannot occur in initial position. This analysis would support the traditionally held belief that \( r \) is an allophone of \( /l/ \), being produced by a rule like (3). We reject this proposal for three reasons given earlier. First, it fails to explain the fact that \( \dot{q} \) is the only voiced obstruent without a voiceless counterpart; second, it fails to explain why \( \dot{q} \) is the only obstruent which cannot be followed by a liquid; and third, it fails to explain why (3) must make \( r \) \([-\text{anterior},\text{-distributed}]\), instead of something closer to \( \dot{1} \), and therefore cannot offer a natural explanation for the assimilation of dentals to \( r \).

1.2.2 The Nasalization of \( /l/ \)

The only coronal consonant in Table I which remains to be discussed is the nasalized lateral \( \hat{\dot{1}} \). This is simply a lateral sonorant of exactly the same description as the oral lateral \( /l/ \), with the exception that it is articulated with a
lowered velum and is therefore [+nasal]. This segment is very obviously in complementary distribution with its oral counterpart, the nasalized variant occurring only before a nasalized vowel and the oral variant only before an oral vowel. Thus we have the forms

(13) (i) ʰɪ̱  'take from stove'
    ʰəñ̪ə̆  'antelope'
    ʰə̥  'meat, animal'

(ii) ʰl̪̃  'seize'
    bl̪̃  'growl'
    lá  (agentive suffix)

On the basis of this information it is impossible to decide uniquely whether the distribution is to be treated as a condition on morpheme structure, implying that both ʰ̱ and ʰl are systematic phonemes, or whether it is to be stated as a phonological rule, claiming that only one, presumably /l/, is a systematic phoneme. Whether as a P-rule or as a morpheme structure condition, the generalization will be stated as (14).

(14) [+vocalic
    +consonantal
    +distributed]  --->  [+nasal] /  [+] [+nasal]

It may seem unduly pedantic to claim that both of these alternatives exist, particularly in light of the fact that it is a basic tenet of structural phonology that if two forms are in complementary distribution and are phonetically similar, they are ipso facto members of one phoneme. Fortu-
nately or unfortunately, this claim is neither explicit nor implicit in the theory of generative phonology within which we are working. From a generative point of view, the only time a phonological rule can be considered strongly motivated is when there exists some phonological alternation which must be captured as a generalization by such a rule (cf. Kiparsky, 1968). Otherwise the complementarity is only distributional and must be stated as a morpheme structure condition. While to a structuralist it may seem patently obvious that ñ is an allophone of /l/, it is not obvious why this must be so in a generative grammar. We do not place any greater value on the one treatment than on the other; we wish merely to acknowledge one of the consequences of the theory within which we are working.

It happens that there is in Ewe a living alternation which gets us out of our difficulty in this particular case. A rule of reduplication, which we will formalize in Chapter Two, copies the initial consonant and vowel of the verb root with only one change: if the root vowel is [+nasal] it is copied as [-nasal]. Thus ṣé 'hard' reduplicates as ṣéṣé, with the copied vowel losing its nasalization. If the initial consonant of a verb whose initial vowel is [+nasal] is /l/, the surface form of the reduplication will be nasalized throughout. Thus ṣe reduplicates to ṣéṣé. If a rule of regressive nasalization (14) is ordered after reduplication, then the correct form will be produced. If the relative
order of the two rules is reversed, the output will be the incorrect *lə₁tə. And if ₁l is considered an underlying segment on a par with /l/, then reduplication will produce the incorrect form *lulul. There must, therefore, be a rule like (14) in the phonology, and there is no underlying ₁l in the lexicon.

(14) can be simplified slightly if we order it after (11), since (11) changes the other liquid, /r/, to an obstruent. The simplified form (15), regressive nasalization, need not mention [+distributed] its structural description since the prior application of (11) ensures that the only liquid still present by the time (15) applies will be /l/, /r/ having become /ə/ by (11).

(15) Regressive nasalization

[+sonorant] → [+nasal] / ___ [+nasal]

1.2.3 Distinctive Features of Ewe Coronals

With respect to place of articulation, the [+coronal] consonants can be divided distinctively into two groups: those that are in the back half of the oral cavity, that is, behind the alveolar ridge, and those that are in the front half of the oral cavity, that is, on or in front of the alveolar ridge. The latter are marked [+anterior], a feature which they have in common with the labial consonants, and include /t/, /d/, /ts/, /dz/, /s/, /z/, /n/, and /l/. The former have an alveo-palatal passive articulator. Thus they are marked [-anterior], a feature which they share with the
velar, labial-velar, and pharyngeal consonants. The [-anterior, +coronal] consonants are /r/, /ny/, and /y/. The af-
fricates are distinguished from the fricatives in that the
former are [-continuant] and the latter are [+continuant].
We interpret both as having a delayed release.

Since there are no further liquids to be discussed, a
word should be said about their segmental structure. Liquids
are distinguished from all other segments in that they are
[+consonantal] and [+vocalic]. It follows from this that
they are [+sonorant], [-nasal], [+voiced], [+coronal].
As with all sonorants, the feature [delayed release] is pro-
ably irrelevant to their description and so is not specified
at all. The two liquids found in Ewe are distinguished from
each other by the fact that /l/ is [+distributed] and /r/ is
[-distributed]. /l/ is redundantly [+anterior] and [+con-
tinuant]. /r/ is redundantly [-anterior] and [-continuant].
Needless to say, some of these predictions are language-
specific, rather than universal.

Our proposed systematic phonemic coronal segments for
Ewe and their feature analysis are given in Table IV.
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</tbody>
</table>

Table IV: Feature Analysis of Ewe Coronals.

1.3 The Back Consonants

Back consonants are all those involving a retracted tongue body as the active articulator. This marks the velars, labio-velars, and pharyngeals of Table I as [+back] and all other consonants in Ewe as [-back], including the alveopalatals. These last are articulated with the tongue body, but not with the tongue body in a retracted position. In 1.2 we described the alveo-palatals as [+coronal], meaning that they are articulated with a raised tongue blade. This is, in fact, the case, but the [-anterior] and [+distributed] articularatory properties require that the tongue body be raised, so that the blade makes contact along the alveolar ridge, and the body makes contact higher up, towards the palatal region. The velars and labial-velars share with the alveo-palatals
this raising of the tongue body, but they differ in that the alveo-palatals do not involve tongue body retraction. What characterizes alveo-palatals, palatals, velars, and labial-velars, then, is a raised tongue body. These segments are marked [+high], and segments not involving a raised tongue body, such as anterior and pharyngeal consonants and non-high vowels, are marked [-high]. The cavity features of the [-anterior] consonants of Ewe, therefore, are specified as in Table V.

<table>
<thead>
<tr>
<th></th>
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<th>ny</th>
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</table>

Table V: Cavity Features of Ewe Systematic Phonetic [-anterior] Consonants.

Since the non-anterior coronal consonants have already been discussed, we will limit ourselves in this section to those which are marked [-coronal] in Table V.

1.3.1 The Treatment of Labial-velars

The back consonants fall neatly into two groups in terms of their cavity features: [+high, +back], or velar consonants, and [-high, +back], or pharyngeal consonants. Table V makes the claim that there is a further division of velar consonants into rounded and unrounded segments, the rounded consonants including kp, gb, and w. This is by no means an
obvious analysis, in that it must follow from some fact of universal phonetics. In fact, studies of African languages have treated these consonants variously as co-articulated stops (Westermann and Ward, 1933:58-59), velarized labials (Bird, 1970:5), and labialized velars (Westermann 1919:245). All three possibilities exist, and so the treatment of consonants of this sort in any given language must be based on evidence found within the phonological system of that language.4

In Ewe there is one interesting distributional phenomenon which provides us with some of the evidence we need to defend one or another interpretation of labial-velars. Earlier works on Ewe phonology have noted that the velar and labial-velar sonorants seem to be in complementary distribution, ɛ occurring before unrounded vowels and /l/, and w occurring before rounded vowels, as in (16).

(16) ɛ  w
  ɛi  'white'  wu  'kill'
  ɛɛ  'sun'  ewɔ́  'ten'
  ɛa  'compete'  wɔ́  'do, work'
  ɛleti  'moon'

For reasons which will be made evident in Chapter Four, we agree with Ansre that ɛ is a velar sonorant, rather than a velar fricative, and so we suggest that the two velar sonorants, are in complementary distribution. Whether to treat them as allophones of a single velar sonorant, perhaps /ɛ/,
or as separate underlying segments is essentially a theoretical question. Since there are no alternations between them, we are tempted to regard them as distinct, although this analysis will cause a complication later on. Since they are in complementary distribution, there must be a morpheme structure condition stating that /ś/ occurs only before unrounded vowels and /w/ before rounded. We formulate this as (17), where the $\Phi$-notation merely denotes feature agreement, without specifying one or the other segment as basic.

(17) $\begin{bmatrix} +\text{sonorant} \\ \text{+back} \end{bmatrix} \rightarrow [\alpha\text{rounded}] / \quad [\sigma\text{rounded}]$

Since /w/ is a labial-velar and must be regarded as back and rounded, rather than as back and anterior, it is not unreasonable to expect that the other labial-velars are also to be treated phonologically as labialized velars rather than as velarized labials or instances of co-articulation. Westermann (1919) also gives convincing comparative evidence that /kp/ and /Gb/ are historically $\ast k$ and $\ast G$ followed by a rounded glide ($\ast w$) or a rounded vowel. We feel, then, that the correct synchronic treatment of /kp/ and /Gb/ is as velar stops with extreme rounding.

### 1.3.2 Smith's Treatment of Distributedness

We differ extensively with Smith in our specification of [distributed] in the Ewe consonant system. In Smith's analysis, the only consonants which are marked [+distributed] are /p/ and /s/, and it is this feature alone which
distinguishes bilabial from labio-dental fricatives. It is not clear to us, however, why /p/ and /b/ should be specified [-distributed] when they too are bilabial, rather than labio-dental, unless this is an error on Smith's part. The specification of other consonants is not quite as straightforward, unfortunately. Smith chooses to mark all of them [-distributed], including Ɂ, which he posits as underlying. We, of course, disagree with Smith on the status of this segment for the reasons given in 1.2.1, but we would go along with Chomsky and Halle (1968:313) in characterizing Ɂ as contrasting with /d/ in exactly this feature, at whatever level it occurs. Ɂ is [-distributed] and /d/ is [+distributed], or, in more traditional articulatory terms, the former is apical and the latter is laminal. If /d/, a lamino-dental stop, is [+distributed], then all the rest of the Ewe laminals, that is, the [+anterior, +coronal] segments, must also be [+distributed], as we have marked them. The alveo-palatals have, if anything, an even longer area of contact than the dentals, and so they too should be characterized as we have suggested in 1.2, that is, as [+distributed].

1.3.3 The Pharyngeals

In general, previous works on Ewe have regarded the back fricatives, which we called pharyngeals in Table I, as velars. This may be due to dialect differences, as between Peki (Ansre 1961) and the Kpando material on which this work
is largely based. Ansre does not consider the question at all of what distinction there might be between his /h/ and his /g/, beyond the claim that the latter patterns as a sonorant and the former as an obstruent. We have never heard the Peki dialect spoken and so cannot comment on how else these two segments might differ there. Westermann, in his works specifically dealing with Ewe, regards both /h/ and /g/ as voiced velar fricatives and /x/ as a voiceless velar fricative. He does, of course, make a distinction between the two sounds, and he shows separate diachronic developments for them, but in both his Grammar... (1930) and his Die westlichen Sudansprachen... (1927) he specifically classifies /h/, /g/, and /x/ as velars. Ladefoged, who worked with both Peki and Kpando informants (1964:20), also misses the distinction. He, in fact, completely omits pharyngeals from his consonant chart (1964:xvi). Only in Westermann and Ward (1933:86) is there reference to back fricatives which are below the velar region. They cite a contrast between a 'voiced /h/' and a 'voiceless sound...a kind of weak /x/ [/x/ symbolizes a voiceless velar fricative (HS)]' in the Gɛ dialect of Ewe. Their voiced /h/ is described as having vibration along a considerable part of the length of the vocal cords, while air escaping through a triangular opening at the anterior end of the vocal cords causes friction, the sound being a type of 'breathy' voicing. This, however, is not the sound found in Kpando, nor
is Kpando /x/ a weak voiceless velar fricative. Our informant consistently rejected velar or glottal substitutes for his /x/ and /h/.

We have analyzed the Ewe pharyngeals as [+back, -high] consonants. A third feature is very important in characterizing pharyngeals and is also central to an understanding of vowel harmony in many Kwa languages. This feature, called [covered] in Chomsky and Halle (1968:315), defines those sounds which are produced 'with a pharynx in which the walls are narrowed and tensed and the larynx raised.' This narrowing and tensioning is precisely what would occur in the production of a pharyngeal fricative of the sort which is found in Kpando. In more traditional articulatory terms, what is happening in this sound is that the root of the tongue is being retracted, constricting the pharyngeal cavity. As Stewart (1967) has convincingly demonstrated, this is precisely the distinctive gesture involved in Akan vowel harmony. We would expect, then, that if the pharyngeals in Kpando are [+covered, +back, -high], the quality of succeeding vowels will be affected. This does, in fact, happen, but only, or at least most clearly, to high vowels. In the words xixe 'outside' and hiha 'yawn', /i/ has a distinctly duller quality, very much like the Akan /ɪ/, betraying the fact that the retracted tongue root position has caused a change in the tongue height position in the oral cavity. The role of the tongue root position in vowel harmony has
been discussed elsewhere (Stewart, 1967, and Stahlke, 1970), and we take this change in vowel quality to be particularly strong support for our claim that these sounds are indeed pharyngeal. The vowel change can be handled by a simple assimilation rule (18) which is quite similar to vowel assimilations which will be discussed in Chapter Two.

(18) High Vowel Coveredness Assimilation

\[
\begin{array}{c}
V \\
+\text{high}
\end{array}
\longrightarrow [+\text{covered}] \quad / [+\text{covered}] \\
\end{array}
\]

1.4 A sequential Constraint on Velars and Palatals

In addition to the restrictions on vowel + consonant sequences presented above in our discussion of /e/ and /u/, there is another constraint on morpheme structure which is of interest. For purposes of discussion, we will break the constraint down into two fairly natural sub-conditions. The first of these (19) prevents sequences of a [+back] segment and the vowel /i/.

(19) \[
\begin{array}{c}
V \\
+\text{high}
\end{array}
\longrightarrow [+\text{back}] \quad / [-\text{vocalic} \\
\quad [-\text{anterior}] \\
\quad [+\text{back}]
\end{array}
\]

What (14) states is that there will be no underlying forms in which sequences of /k/, /g/, /kp/, /gb/, /g/, /x/, or /h/ followed by a high front vowel /i/ are found. Exceptions, apparent and otherwise, will be discussed below. The second of these (20) prevents sequences of an alveo-palatal segment and the vowel /u/.

(20) \[
\begin{array}{c}
V \\
+\text{high}
\end{array}
\longrightarrow [-\text{back}] \quad / [-\text{vocalic} \\
\quad [-\text{anterior}] \\
\quad [-\text{back}]
\end{array}
\]

30
Using the @-notation used in (10) above, conditions (19) and (20) can be collapsed into (21).

\[
\begin{align*}
(21) \quad \left[ \begin{array}{c} V \\ +\text{high} \end{array} \right] & \rightarrow \left[ \begin{array}{c} @\text{back} \\ -\text{vocalic} \end{array} \right] / \left[ \begin{array}{c} @\text{back} \\ \text{anterior} \end{array} \right] \end{align*}
\]

(21) places a rather strong, though by no means unnatural, restriction on the class of morphemes which can be found in the lexicon of Ewe, and there are a number of apparent and possibly real counter-examples to it. The first of these is the form ṭl 'white' cited earlier. We will show in Chapter Two that this form is not, in fact, an exception to (21), but rather that its underlying form is ṭe and that it has undergone a rule of vowel raising. Such changes are far from rare in Ewe, and a similar one has occurred in another apparent counter-example, the form nyùìé 'It is good.' Here the /u/ is the result of vowel raising, and the underlying form nyó 'good' is found in other environments.

In working with the Kpando dialect, we were unable to find any root morphemes in violation of (21), nor was our informant willing to accept any such forms. However, as we have suggested for nyùìé and ṭl, the impermissible sequences can crop up in the course of a derivation. Reduplicated forms are an excellent example of this. Ewe root morphemes can begin with a sequence of a consonant and a liquid, but the liquid is not copied in the process of reduplication, so that the reduplicated forms of such verb stems as ṭli 'rub',

31
and yru 'hoot' are njili and yuyru, respectively. Since (21) is a condition on morpheme structure, and not an output condition, such derived forms cannot be considered exceptional.

The generalization stated in (21) is supported in published vocabularies as well. Henrici (1891) lists only one violation of (21), nji, which we have already accounted for. Warburton (1968) and Westermann (1928 and 1950) give the same one. In a list of approximately 1200 words, Kropp (1966) gives only the form akitakaka 'Pledge', her form (Lome dialect) for 'white' being héé. On the other hand, Ansre (1961) and Westermann (1928) both give words which are apparently in violation of (21). Ansre's are those in (22).

(22) kisi 'rat'
    gbwigbi 'to make a nasty face'
    nginingini 'worm-like movement'

Only the first of this constitutes a real problem, the other two being ideophones, a class of morphemes found widely in African languages and defined in part by such properties as reduplication, phonological divergence from other morpheme classes, and onomatopoea. Westermann (1928) gives quite a few forms which appear to violate (21), including those given in (23).
(23) (i) /ɡ/ + /ɪ/ sequences

\[ \begin{align*}
gi\text{gli} & \quad 'grind' \\
gi\text{idi}, gi\text{di}\text{idi} & \quad 'loudly, tumultuously, violently' \\
gi\text{idi}\text{ada}, gi\text{idi}\text{bladza} & \quad 'overwhelming' \\
og\text{id}i\text{idi} & \quad 'thunder' \\
\end{align*} \]

(ii) /k/ + /ɪ/ sequences

\[ \begin{align*}
ki\text{ke}, ke\text{ke} & \quad 'spindle' \\
ki\text{si}, ki\text{ti} & \quad 'rat' \\
ki\text{tsikpui} & \quad 'locust' \\
k\text{itsikpøkø}, ki\text{tikpøbø} & \quad 'mumps' \\
ki\text{tsi}, ki\text{tsiktsi} & \quad 'tiny, pointed' \\
k\text{itiwø}, k\text{itsiwø} & \quad 'groundnut' \\
ak\text{iti} & \quad 'a small parasitic insect found in the hooves of sheep' \\
\end{align*} \]

(iii) /ɡb/ + /ɪ/ sequences

\[ \begin{align*}
ag\text{bina} & \quad 'type of lizard' \\
ag\text{bii} & \quad 'strained, tense' \\
ag\text{bi}, in do ag\text{bi} anyi & \quad 'moisten clay for house building' \\
\text{g}bi & \quad 'rear opening of tortoise shell' \\
\end{align*} \]

(iv) /kp/ + /ɪ/ sequences

\[ \begin{align*}
ak\text{pi} & \quad 'musk' \\
k\text{pii} & \quad 'dark, grey, blurred' \\
k\text{piti} & \quad 'mange' \\
ak\text{kpiti} & \quad 'unleavened bread' \\
\end{align*} \]

Of the four lists given above, (23i) and (23ii) are comprehensive. Westermann (1928) gives other examples of the
sequences in (23ii) and (23iv), but all of them seem to be clear cases of ideophones. In any case, the forms given in sections (iii) and (iv) above are adequate for our purposes.

Of the forms given in (23i), gidi has already been discussed, and Westermann also gives the unreduplicated form gii with the same meaning. The other three all seem to be clear cases of variation on the same ideophonic root, gidi, connoting intensity of action. The words found in (23ii) are also suspicious. In no case is ki or aki found by itself as a lexical item. In kike, the source of the /i/ is obvious from the presence of a variant form keke and from the fact that the vowel of the stem (second syllable) is also /a/. The forms kitsi, kitsikitsi, and kitsikwui are very likely ideophonic, and the same may be true of skiti, kitiwo, kitsiwgo, kitsikpokpo, and kitikpofo, but this remains to be demonstrated. Thus the only form in Westermann (1928) which may contain a true counter-example to (21) is kisi, kiti.

In any case, all of the examples in (23i and ii) are suspect on other grounds. All are at least disyllabic, and there is a striking concomitant absence of verb roots consisting of only the sequences in questions, just as there seem to be no monosyllabic noun roots violating (21) with /k/ or /g/ as the initial consonant. In all the words in (23ii) except for kike, keke, which is explainable on other grounds, the second vowel is also /i/, and the intervocalic

34
consonant is always /t/, /ts/, or /s/, with some instances of free variation between two of the three. As Westermann (1930:16-21) shows, alternations between these three consonants are anything but rare in Ewe. We feel that these reasons are sufficient grounds for considering ki and gi sequences to be exceptional in Ewe, and therefore a condition at least similar to (21) must be stated in the grammar.

The evidence for including rounded velar consonants /kp/ and /gɔ/ in (21) is not quite so strong. Kropp (1966) gives no kpi or gbi sequences, but none of the English glosses found in (23iii and iv) are used in the Comparative African Wordlists series, of which her list is a part. However, the fact that no such sequences are found suggests that at least for the Lome dialect, which she reports, (21) may be valid as given. On the other hand, in Angl9, the dialect from which Westermann draws most of the vocabulary found in his dictionary, all the forms given in (23iii and iv) are found, along with a number of ideophones and obvious loanwords. These words are also found in the Central dialects, of which Kpando is an example. The items containing kpi and gbi sequences above seem convincing, and so it may be necessary to add [-rounded] to (21), as in (24), in order to permit these sequences.
(24) \[\begin{array}{c}
+\text{high} \\
V
\end{array}\] \quad \Rightarrow \quad \left[\begin{array}{c}
+\text{back}
\end{array}\right] / \left[\begin{array}{c}
-\text{vocalic} \\
-\text{anterior} \\
-\text{rounded} \\
\text{back}
\end{array}\right]

In those dialects where /kp/ and /gb/ also participate in this distributional condition we have a further argument that these segments are to be considered rounded velars rather than velarized labials. The fact that they can be followed by /i/ in some dialects is not an argument against the rounded velar analysis, since the rounding alone would be sufficient grounds for excluding them from the restriction, as in (24).

Nothing has been said so far about \textit{xi} and \textit{hi} sequences, which are also blocked by (24), since the pharyngeal consonants too are \left[+\text{back}\right]. The only such sequences found in Kpando or in any of the published sources are \textit{xixe} 'open space, outside' and \textit{hiha} 'yawn'. Both are clearly reduplicated forms, and the second may also be an ideophone. Both have variant forms in which the /i/ is replaced by a copy of the second vowel. There are no root morphemes, verbal or nominal, showing these sequences, so we feel that (24) correctly blocks such sequences from the lexicon.

1.5 Summary of the Consonant System

We can now present a systematic phonemic consonant matrix as in Table VI.

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Table VI: Phonological Matrix of Ewe Consonants.
1. The feature framework advanced in SPE makes possible two ways of distinguishing labio-dentals from bilabials. Labio-dentals could be specified [+strident] and bilabials [−strident], or, as we have done, labio-dentals could be specified [−distributed] and bilabials [+distributed]. On the surface of it there is no way to choose one feature as being distinctive and the other as being redundant, at least not on the grounds of synchronic evidence from Ewe alone. Harris (1969:547) suggests that stridency may be entirely redundant in natural language; that is, there are no cases of two segments which differ in stridency alone, and not in other features as well. This is certainly true of Ewe, and we will tentatively adopt Harris' hypothesis omitting stridency entirely from our description.

2. The feature [distributed], as defined by Chomsky and Halle (1968:302), does not refer only to the blade of the tongue, but rather, as will be made clear later, to the relative length of the area of articulation. In dealing just with coronals, however, [+distributed] can be taken to mean laminal, and [−distributed] apical. For further discussion of this feature, see Section 1.4.2

3. Two exceptions to this complementarity are akrö 'canoe' and adikrë 'reddish-brown'. The former may be a member of a doublet with akpiö.

4. It should be pointed out that within the feature framework of Chomsky and Halle (1968) there are only two alternatives: such sounds may be rounded velars, specified

    (i)  
    [−anterior  
    −coronal  
    +back  
    +high  
    +rounded  

or they may be velarized labials, specified
In (ii), a very low level phonetic rule would specify an extreme degree of rounding, or, for continuants, a degree of labial closure equal to the degree of velar closure. In (ii) as well a low level phonetic rule would be required, this time to specify that the front and back closures must be equal in degree.

Such a feature system makes the claim that a language cannot have both /kʷ/, /gʷ/ and /kp, gb/ or both /pʰ/, bʰ/ and /pk, bg/ as underlying contrasting segments. A claim as strong as this should not be difficult to refute, and at least two languages provide the necessary evidence. Carrell (1966) reports that Igbo has /k/, /kʷ/, and /kp/. Some dialects are also reported to have /g/, /gʷ/, and /gb/, although in the dialects described by Carrell /gb/ has been replaced by an implosive /b/. Paul Bruns (personal communication and classroom discussion at UCLA, Winter, 1967-68) reports that the Keowan dialect of Bokyi, a language spoken in the Cross River region of Nigeria, has systematic labialization as well as systematic palatalization and velarization of both labials and velars, and also /kp/ and /gb/. According to his work, Bokyi then has /k/, /kʷ/, /kʸ/, /kʰ/, /p/, /pʰ/, /pʷ/, /pʰ/, and /pʰ/, with the same series in voiced consonants. These segments contrast in both nouns and verbs. It is apparent that the Chomsky-Halle feature system is inadequate to describe either Igbo or Bokyi.

5. We have purposely not specified the pharyngeals for the feature [+low]. The pharyngeals of Arabic and Ubykh are specified as [+low, -high], in contrast to uvulars, which are [-low, -high]. While the Ewe pharyngeals are clearly not uvular, they are produced by a much slighter constriction than the highly distinctive pharyngeals of Arabic, and thus we suspect that they may have a different feature composition. Chomsky and Halle (1968:315) comment that they have found no evidence that the feature [covered] refers to anything but vowels, but as the assimilation of vowels to /x/ and /h/ suggests, the feature composition of Ewe pharyngeals must contain this feature, and the difference between the Arabic and Ewe pharyngeals may lie in the fact that those of Arabic are [+low, -high, +covered] while those of Ewe are [-low, -high, +covered].

40
6. We will not go into a discussion of the difficult and often perplexing problem of ideophones. This is not because they are not both important and interesting, but because this class of morphemes occurs largely in folktales, proverbs, and highly colloquial speech, and therefore a high degree of native speaker competence is required before ideophones can be properly studied. For some recent studies in this area as well as additional bibliography on the subject, see Courtenay (1969) and Voeltz (1970).
Chapter 2
THE VOWEL SYSTEM

2.0 Introduction

At the systematic phonetic level the Ewe vowel system is strikingly varied and complex. It exhibits seven short oral vowels,

(1) 

\[ \begin{array}{cccc}
  & i & u & \\
 e & o & \\
 \end{array} \]

\[ \begin{array}{cccc}
  & \vartheta & \varphi & \gamma \\
 a & \\
\end{array} \]

nine short nasalized vowels,

(2) 

\[ \begin{array}{cccc}
  & \tilde{i} & \tilde{u} & \\
 \tilde{\imath} & \tilde{\upsilon} & \\
 \tilde{\varepsilon} & \tilde{\omicron} & \\
 \tilde{\vartheta} & \tilde{\varphi} & \tilde{\gamma} & \tilde{\upsilon} \\
 \tilde{\alpha} & \\
\end{array} \]

seven one and one half mora oral and nasalized vowels,

(3) (i) i: \quad u: \quad (ii) \tilde{i}: \quad \tilde{u}:

\[ \begin{array}{cccc}
  & e: & o: & \\
 \hat{e}: & \hat{o}: & \\
 \end{array} \]

\[ \begin{array}{cccc}
  & \vartheta: & \varphi: & \gamma: \\
 \hat{\vartheta}: & \hat{\varphi}: & \hat{\gamma}: & \hat{\upsilon}: & \\
 a: & \tilde{\alpha}: & \\
\end{array} \]

and identical sets of two mora vowels.
There is also a complex set of diphthongs and vowel sequences which will be dealt with in Chapter Three. In Section 2.1 we will discuss the distinctive features of short vowels and the problem of representing vowel length in a phonology. In Section 2.2 we will show that nasalized vowels in Ewe are derived from an underlying sequence of oral vowel + nasal consonant, the nasal then being deleted. In Section 2.3 we will argue that Kpando has no underlying e, as the result of a number of rules which have merged e and o. In Section 2.4 we will present a summary of the general Ewe and Kpando vowel systems.

2.1 Cavity Features of the Short Vowels

Before discussing the vowel system, we must establish certain points about length and quality features.

2.1.1 The Representation of Vowel Length

In both generative and taxonomic studies the representation of vowel length has been a long-standing problem. Length can be shown either as a feature [*long] in the phonological matrix, or by a vowel sequence, and linguists have generally chosen whichever alternative best suited their purpose. This is not to say that the choice between the two is arbitrary. Often one or the other representation is
strongly motivated by the data, as in a language where vowel sequences and long vowels shorten under the same circumstances. In classical Greek, for example, there is a rule which shortens the verb stem in forming the verbal adjective.

(5) \[ \text{tithe:mi} \rightarrow \text{thetos} \]
\[ \text{dido:mi} \rightarrow \text{dotos} \]

In such forms it is not clear whether length should be represented by a vowel sequence or by a feature, but there are certain other verbs which lose one element of a sequence in forming the second aorist.

(6) \[ \text{leipo:} \rightarrow \text{elipon} \]
\[ \text{pheugo:} \rightarrow \text{ephugon} \]
\[ \text{kaino:} \rightarrow \text{ekanon} \]

To handle the shortening in (6), a sequence representation is needed. Certain aorist passives have the same sort of vowel shortening shown in (5).

(7) \[ \text{du:o} \rightarrow \text{eduthe:n} \]
\[ \text{lu:o:} \rightarrow \text{eluthe:n} \]
\[ \text{tri:bo:} \rightarrow \text{etribe:n} \]

and some also delete a short vowel.

(8) \[ \text{pelomai} \rightarrow \text{eplome:n} \]
\[ \text{petomai} \rightarrow \text{eptome:n} \]

These facts suggest that for Greek, long vowels should be interpreted as vowel sequences, so that the similarities between these various shortening rules can be exploited.
There are, however, problems which cannot be treated properly by the sequence notation. One such problem is the distinction between one and one half mora vowels and two mora vowels in Ewe. Sets (3) and (4) are in complementary distribution, and so there should be no need to set up two degrees of vowel length beyond one mora. Two mora vowels occur only in adjectives and adverbs.

(9)  
\[ \text{\textit{fi\textasciitilde}}} \quad \text{'indeed'} \\
\text{\textit{l\textasciitilde\textasciitilde}} \quad \text{'slender and long'} \\
\text{\textit{t\textasciitilde\textasciitilde}} \quad \text{(term of endearment)}
\]

One and one half mora vowels, on the other hand, occur in nouns and verbs, for example,

(10)  
\[ \text{\textit{p\textasciitilde\textasciitilde}} \quad \text{'chisel'} \\
\text{\textit{t\textasciitilde}} \quad \text{'head'} \\
\text{\textit{n\textasciitilde\textasciitilde}} \quad \text{'mouth'} \\
\text{\textit{n\textasciitilde\textasciitilde}} \quad \text{'give him'} \\
\text{\textit{v\textasciitilde'}} \quad \text{'Come!'} \\
\text{\textit{g\textasciitilde'}} \quad \text{'money'} \]

There are no two mora vowels in nouns, and there are no one and one half mora vowels in adjectives or adverbs. Thus we need a rule which we will state informally as follows:

(11) Two mora vowels lose a half mora in nouns.

How such a rule is to be formulated is a good question. The representation of segments as phonological matrices does not permit reference to just a linear part of a segment, but that is clearly what is needed here. Obviously using a
feature of length will not help either, since [+long] would contrast both degrees of length with [-long] vowels, and we would be left with the problem of distinguishing between the two types of [+long] vowel. Possibly a multi-valued feature system would provide a solution of sorts, but we would then need fractional values to express rule (11) as something like (12).

(12) \[2 \text{ long}] \rightarrow \frac{3}{2} \text{ long} / \quad \text{Noun} \quad \text{Verb} #

While such numerical values are generally acknowledged as necessary in phonetic realization rules, it is not likely that such a far-reaching, category-specific rule as (11-12) could be other than a phonological rule. In Section 2.2 we present a similar rule for final nasals which is critically ordered before certain vowel assimilation rules and thus must be a phonological rule.

Before leaving the subject of vowel length, we would like to review briefly some work reported in Kenstowicz (1970). Kenstowicz presents a number of rules for Lithuanian vowels and suggests that there is a systematic and formal distinction between rules which require a sequence representation and rules which require a feature representation of length. The former are usually rules of elision, shortening, and accent placement or movement, all rules of a type which will obviously require a mora notation in many languages. The latter are more often rules affecting changes in vowel qual-
ity and lengthening short vowels. It is not obvious that vowel lengthening rules should use a feature than a mora notation, since both (13) and (14) would seem to have the same result.

(13) \( V \rightarrow [+\text{long}] / X \)
(14) \( \emptyset \rightarrow V / V \)

However, (14) not only has the form of an epenthesis rule but will also have to specify the inserted vowel as having the same feature analysis as the vowel next to which it is inserted, a condition which is not at all natural for rules of epenthesis and is, in fact, fairly complex. Furthermore, epenthesis normally breaks up consonant clusters, while (14) operates only before another vowel. Thus (13) seems preferable.

The whole problem of how to represent vowel length and the fact that some generalizations seem to require one representation rather than another are very likely artifacts of a theoretical assumption which is probably as old as linguistics itself. This is the claim that the acoustic image of an utterance is comprised of a sequence of discrete units. While such an assumption seems indispensable for most linguistic analysis, it has also been the source of numerous problems, particularly in the treatment of prosody. In the following chapters we will use whichever interpretation seems to permit the simpler statement of a generalization. We will treat one and one half and two mora vowels as
being underlying vowel sequences, as indeed many will be shown conclusively to be.

2.1.2 The Specification of Vowel Height

One of the more controversial points in the feature framework proposed in Chomsky and Halle (1968) is the treatment of vowel height. Two features directly specifying tongue height are proposed: [high] and [low]. [+high] means that the tongue body is raised above neutral position and [+low] that the tongue body is lowered below neutral position, where neutral position refers to the position which the vocal tract holds immediately before the speech act. Chomsky and Halle (1968:300) claim that this position, which is distinct from rest position, has been verified by X-ray motion pictures of speech, which show the neutral position of the tongue to correspond roughly to the tongue position for the vowel in the English word bed. The controversy arises from a consequence of using these two features to define vowel height—the fact that only three heights are possible. Wang (UCLA lecture, 1968) has claimed that some languages have more than three vowel heights and that a different classification is needed. At that time he proposed that a feature [mid] replace the feature [low]. In this way, high vowels would be [+high, -mid], close mid vowels would be [+high, +mid], open mid vowels would be [-high, +mid], and low vowels would be [-high, -mid]. The difficulty to which this proposal falls prey is evident when
one attempts to suggest articulatory correlates for his features. If \([\text{high}]\) is defined as a raising above some sort of neutral position, than a \([\text{+high, +mid}]\) vowel would have conflicting directions, one raising the tongue and one keeping it from going too high. \([\text{-mid}]\) would have two opposite values, depending on how \([\text{high}]\) is marked; thus the positive exponent, which for all other features indicates the presence of some gesture, would here indicate the absence of any gesture, and the negative exponent would indicate two contradictory gestures.

We feel that Wang's proposal is not correct, but the problem he attempts to solve is very real. There are languages which have more than three vowel heights. Ewe, according to charts (1) through (4), seems to be one such language, as do Anyi, with its system of ten vowels,

(15) Anyi Vowel Chart

\[
\begin{array}{ccc}
  \text{i} & \text{u} \\
  \text{I} & \text{U} \\
  \text{e} & \text{o} \\
  \text{a} & \text{A} & \text{a} \\
\end{array}
\]

Igbirra, with its nine vowels,
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feature \[\text{covered}\], \[\text{+covered}\] vowels having a retracted tongue root, and therefore a constricted pharynx, and \[\text{-covered}\] vowels having an advanced tongue root. If we interpret the Anyi and Akan vowel systems in terms of the features \[\text{high}\], \[\text{low}\], and \[\text{covered}\], the two sets come out as follows:

(17) (i) \[
\begin{array}{ccc}
\text{i} & \text{e} & \text{A} & \text{o} & \text{u} \\
\text{high} & + & - & - & - & + \\
\text{low} & - & - & + & - & - \\
\text{back} & - & - & - & + & + \\
\text{covered} & - & - & - & - & - \\
\end{array}
\]

(11) \[
\begin{array}{ccc}
\text{I} & \varphi & \text{a} & \varphi & \text{U} \\
\text{high} & + & - & - & - & + \\
\text{low} & - & - & + & - & - \\
\text{back} & - & - & - & + & + \\
\text{covered} & + & + & + & + & + \\
\end{array}
\]

Stewart succeeds in demonstrating that the gesture which accounts for the generally lower tongue positions of (17ii), as opposed to (17i), is precisely this matter of tongue root position, or, as we prefer, the feature \[\text{covered}\].

Stewart's claims are further supported by X-ray tracings in Ladesfeld (1964).

In Stahlke (1970) we argued that \[\text{covered}\] can, in terms of markedness theory, be predicted to a degree for languages with seven vowel systems like Ewe and Yoruba. High vowels are articulated with a distended tongue body, while low
vowels characteristically have a more compressed tongue body, thus forcing the root into the pharynx. That is, in Kwa and probably in general, if a language has a five or a seven vowel system, the high vowels will be [-covered] /i/ and /u/, and the low vowel will be [+covered] /a/. In a seven vowel system, only the mid vowels will contrast in coveredness, with /e/ and /o/ being [-covered] and /ɛ/ and /ŋ/ [+covered]. In terms of the articulatory properties of high and low vowels discussed above, this is not surprising. Nor, upon consideration, is it surprising that the mid vowels should not be generally predictable for coveredness. Since the tongue body is in neutral position, the root could just as well be retracted as not. That is, the tongue is not being stretched or compressed in such a way as would force the tongue root into one or another position unless counteracted by some strong gesture. The fact that the vowel systems in (18) are all about equally natural and are more natural than those in (20) can thus be explained by our marking convention for coveredness (19) which formalizes the points made above concerning tongue root position.

(18) (i) i u (ii) i u (iii) i u e o ɛ ɔ e ɔ a a ɛ ɔ a

52
(19) \([u \text{ covered}] \rightarrow \left\{ \begin{array}{c}
[+\text{covered}] / [+\text{high}] \\
[-\text{covered}] / [+\text{low}] 
\end{array} \right\} \)

(20) (i) \begin{array}{ccc}
i & u & (ii) i & u \\
I & U & I & U \\
e & ə & ə & ə \\
a & a \\
\end{array}

(iii) I & U & (iv) I & U \\
e & ə & ə & ə \\

Thus we would like to suggest that a language does not generally distinguish systematically between \([+\text{covered}]\) and \([-\text{covered}]\) high or low vowels unless that distinction already exists in the mid vowels.¹

Recent work by Halle and Stevens (1969) suggests a relationship between tenseness and coveredness in that tense vowels tend to have an advanced tongue root and are therefore non-covered. The writers then suggest that possibly tongue root position need not be separately specified in a universal phonetic framework and that the contrast between the harmonic sets in Akan and many other West African languages is, after all, one of tense versus lax. We feel that this is insufficient grounds for collapsing these two features, and we feel there is sufficient evidence available to show that both features are needed. In languages in which there is a clear contrast between tense and lax vowels, such as English, West Scandinavian dialects (Anderson, 1970), and Italian (Wanner,
1970), it is also the case that tense and lax vowels show widely divergent behavior, both synchronic and diachronic. For instance, tense vowels tend to be longer than lax vowels, and they frequently undergo rules of vowel quality change which lax vowels do not undergo or undergo differently. Consider, for instance, the vowel shift and diphthongization rules of English which operate primarily on tense vowels, or the diphthongization rules of West Scandinavian, which again operate mostly on tense vowels. Also, tenseness is frequently involved in accentual phenomena, as in English and Italian, where it is a key factor in determining stress placement. In no language for which a coveredness contrast in vowel harmony sets has been suggested or demonstrated do the advanced, or non-covered, vowels behave distinctly from the retracted vowels except in their conditioning of vowel harmony in affixes, nor do non-covered vowels in these languages have any effect on accentuation. Furthermore, as Stewart (1970) shows, both covered and non-covered vowels in Volta-Conoe tend to undergo the same sorts of diachronic changes. Thus we feel there are compelling reasons to retain both features and, further, to describe West African vowel harmony systems in terms of coveredness, not tenseness.

It is entirely possible that the two features may have different effects on vowel quality, so that in any given language one or the other or both will be needed to describe
the vowel system. This is at present little more than speculation, but it looks like a promising area for research in phonetics. We have, on the basis of Stewart's work and for reasons just discussed, chosen to use the feature [covered], rather than [tense], to describe the difference between /e/ and /ø/ in front and /o/ and /ø/ in back. The coveredness specification of /i/, /u/, and /a/ is accounted for by (17).

2.1.3 High Covered Vowels

İ and Ü are rare in the Ewe lexicon and are clearly of marginal status. In Section 1.3.2 we showed that high vowels may become covered by assimilation to a preceding pharyngeal consonant, as in xixe 'outside' and hIha 'yawn'. Two lexical items have been found in which these vowels occur without such conditioning: ḳprIm 'cannon' and azUdzog 'smoke'. The second of these is a free variant of azudzog and seems to be an isolated case of Ü in an open syllable with no preceding pharyngeal.

The former, ḳprIm, is an example of the more common phenomenon of high vowels becoming covered in closed syllables. This sort of environment arises frequently in two types of verbal construction: verb + first person singular object pronoun, and verb + continuous particle. Both the first singular pronoun and the continuous particle are segmentally m, the former low tone and the latter high tone. The following examples illustrate the centralization of high vowels
in closed syllables.

(21) ɖu  'eat'
     éle nú ɖu ḿ̩ 'He is eating.'

  fu  'leap'
    éle  fu fûḿ̩ 'He is leaping.'

 yi  'go'
   éle  yi yîḿ̩ 'He is going.'

dî  'look for'
    éle nú  dîḿ̩ 'He is looking for something.'
    édîḿ̩ 'He looked for me.'

wu  'kill'
     wóawûḿ̩ 'They will kill me.'

The generalization that high vowels become covered in closed syllables is formulated as (22).

(22) Closed Syllable Vowel Centralization

\[
\begin{bmatrix}
V \\
+\text{high}
\end{bmatrix} \rightarrow \begin{bmatrix} \text{+covered} \end{bmatrix} / \quad C \# \# 
\]

Since the only final consonants permitted in Ewe are nasals, I and U will always be nasalized, with the exception of the U in adzûdzoó.

2.2 Nasalization

2.2.1 Review of Earlier Analyses

All previous analyses of Ewe have assumed that there is a set of nasalized vowels matching all or part of the set of oral vowels, but there is some disagreement as to precisely which vowels occur nasalized phonemically. Westermann (1930: 2) states categorically that 'all vowels both long and
short can be nasalized.' Smith and Ansre, on the other hand, claim that Ewe has five nasalized vowels: ᵊ, ᵋ, 侵犯, 侵犯, and 侵犯. Both Ansre and Westermann agree that all vowels are automatically nasalized after a nasal consonant. Ansre's claim is probably true of Peki, but not necessarily of other Central and Western dialects. Warburton (1968), who seems to have taken her material from Western Ewe informants, gives the following forms which illustrate nasalized /侵犯/ and /侵犯/.

(23) 侵犯 'take from stove'
(24) 侵犯 (compare 侵犯 'love')
侵犯 'hard'
侵犯 'smell'

Since Ansre gives a form 侵犯 'to remove utensil from stove', it seems likely that Peki, a Central dialect, has undergone a change lowering all [-high, -covered, +nasal] vowels to [+covered]. Ansre's monograph contains ample evidence that this change could not have included oral vowels as well. It is noteworthy, though, that nasalized /侵犯/ and /侵犯/ are very much less frequent than nasalized /侵犯/ and /侵犯/, and somehow this fact must be explained.

Westermann (1943) discusses a related problem, and his solution may throw some light on this matter. Westermann notes that CuV sequences are not permitted in Ewe even in loan words. /侵犯/ tends to become /侵犯/, or, if C is /侵犯/ or /侵犯/, Cu will become a double stop of the sort discussed in Section
1.3.1. However, Cwa and Cwo sequences are also blocked in Ewe, but they seem, from Westermann's data, to be resolved in two different ways. Cwo sequences apparently become Co or, if C is /k/ or /g/, they may become kpo or gbo as well. Cwa sequences, on the other hand, seem to become Co as well, or, if C is /k/ or /p/, kpa and gba. Westermann cites no instances of forms which were originally Cwo, but for Cwa he gives the following correspondences between Ewe, Twi, and Guang.

(24)  

<table>
<thead>
<tr>
<th>Ewe</th>
<th>Twi</th>
<th>Guang</th>
</tr>
</thead>
<tbody>
<tr>
<td>ɔgbɔ</td>
<td>ɔgwag</td>
<td>'goat'</td>
</tr>
<tr>
<td>ɔsrɔ</td>
<td>ɔsɔ</td>
<td>'learn'</td>
</tr>
<tr>
<td>ɔkɔŋ</td>
<td>ɔkwəŋ</td>
<td>'sweet'</td>
</tr>
<tr>
<td>ɔkɔ</td>
<td>ɔkwə</td>
<td>'neck'</td>
</tr>
</tbody>
</table>

While these correspondences and others like them are certainly not entirely regular, it is clear that there exists a regular relationship between ua and wa and /ə/. It may, in fact, still exist as a synchronic rule, since in some dialects there are reduplicated forms like ɔblɔɔ 'growler' from bliu 'growl'. The agentive suffix is -a, but since the sequence ua is blocked, the two vowels assimilate to each other, and, as it were, meet in the middle.

The implication to be drawn from this discussion is that, since Co, Cua, and Cwo have merged with Cua and Cwa to become Co, Co will also occur more frequently in cases involving nasalized vowels. In any case, we will adopt Wester-
mann's position that all vowels can be nasalized and assume that the relative lexical infrequency of \( \ddot{a} \) and \( \ddot{o} \) must be accounted for by such synchronic and diachronic processes as described above.

2.2.2 The Derivation of Nasalized Vowels

The entire question of which vowels can be nasalized must be regarded as superficial. The serious question is where the nasalization comes from. This matter is discussed in some detail in Stahlke (1970), but we will expand on that discussion here. Quite regularly throughout the phonology of Ewe, nasalized vowels are restricted to morpheme-final position. That is, there can be no nasalized vowels in initial or medial syllables of single morphemes. A few compound nouns do exist which have internal nasalized vowels, but since they are compounds they do not constitute violations. Diachronically there is no doubt that Ewe developed its nasalized vowels from assimilation to a final nasal consonant, as has been satisfactorily demonstrated by Westermann (1927). The question which we consider important here is whether inspite of the general open syllable condition on Ewe morpheme structure the nasality of vowels is still assimilated from an underlying final nasal segment of some sort which gets deleted in the surface form or whether we must assume that because no such final nasal ever occurs in surface forms, it does not exist in underlying forms either and therefore nasalized vowels must occur as system-
matic phonemic segments. The problem involves the question of how abstract the underlying phonological representation can be and is therefore of considerable theoretical interest.

The first consideration to be raised in approaching a problem of this sort is the matter of economy. If, as we have shown above, the set of nasalized vowels in Ewe differs from the set of oral vowels only in that the one is marked [+nasal] and the other is marked [-nasal], as in (25), then we have a very redundant vowel system, since the nasalized set must repeat all of the information found in the oral set.

(25)  
\[
\begin{array}{cccccccccc}
\text{high} & + & - & - & - & - & + & - & - & - & + \\
\text{low} & - & - & + & - & - & - & - & + & - & - \\
\text{back} & - & - & - & + & + & - & - & - & + & + \\
\text{rounded} & - & - & - & + & + & - & - & - & + & + \\
\text{covered} & - & + & + & - & - & - & + & + & + & - \\
\text{nasal} & - & - & - & - & - & + & + & + & + & + \\
\end{array}
\]

If we consider the distributional restriction on nasalized vowels mentioned above, as well as the matter of economy just raised, we have reason to suspect that an analysis of the Ewe vowel system which posits fourteen vowels is less than optimal.

Further support for this suspicion is available from the phonology. There is a rule which reduplicates the verb root to form gerunds and participles by copying the stem conson-
ant and vowel to the left of the verb root. Thus the re-
duplicated forms of the verb roots in (26i) are as in (26
ii).

(26) (i)  

wu  'kill'  
no  'drink'  
bí  'bend'  
tá  'crawl'  
dzra  'prepare'  
gulọ  'say'  
lẹ  'seize'

(ii)  

wuwu  
nono  
bibí  
tatá  
dzadzra  
bgbgblọ  
lẹlẹ

The form of such a rule is both obvious and simple.

(27) Verb-Root Reduplication

\[
\text{RED} \rightarrow C_1 V_1 / \quad C_1 (L) V_1
\]

There is no change in the vowel—not even in its tone.

On the other hand, when the vowel is nasalized, as in

(26), it gets copied as an oral vowel.

(28) (i)  

bọ  'smell'  
srá  'cover'

(ii)  

bọbọ  
sásrá

In light of this fact we can either complicate (26) by spec-
ifying that the vowel in the copied part must be oral,

(29) RED \rightarrow C_1 \left[ \begin{array}{c} V_1 \\ -\text{nasal} \end{array} \right] / \quad C (L) V

or we can retain the simpler form of the reduplication rule
and derive the nasality of the final vowel from a morpheme-
final nasal consonant. We will specify such a segment in
the lexicon only as [+nasal] and abbreviate it as N. We 
make no claim as to the oral cavity features involved, 
since we have no reason to consider it an /m/, /n/, /ny/, or 
/ŋ/. All that is relevant is that it is a nasal and that 
it is not a vowel. We will consider the implications of 
this analysis in a later chapter, but what it means at this 
point is that all morphemes which contain nasalized vowels 
have the underlying structure of (30i) and (30ii).

(30) (i) + ... C V N + 
(ii) + ... C L V N +

Under the latter analysis the original version of the 
verb root reduplication rule (26) would stand. By ordering 
it before the rule of regressive nasalization presented in 
1.3.3, we ensure that the copied vowel will be oral.2 This 
gives us the following derivation for reduplicated verb 
roots with nasalized vowels.

(31) Underlying form: RED + b̥N
Reduplication: b̥ + b̥N
Regressive nasalization: b̥' + b̥N
Final nasal deletion: b̥' + b̥'

If the two key rules, reduplication and regressive nasal-
ization, are reversed, then clearly the vowel of the re-
duplicated part will also be nasalized.

It could be argued that the former analysis is still 
valid and that there is no need to complicate rule (26) by 
adding [-nasal] to the structural change, as we have in
(29). Rather the morpheme structure condition which restricts nasalized vowels to occurring only in final position can also serve as an output condition blocking any nasalized vowels found in non-final syllables. This proposal has an obvious disadvantage in that it requires a sort of 'cleanup' mechanism which should not be necessary in an optimal grammar. One argument against this analysis is the fact that under certain carefully defined conditions a nasalized vowel can occur non-finally. This is a result of the application of (32).

(32) [+sonorant] \rightarrow [+nasal] / --- [\negonal]

Properly, (32) must be regarded as an iterative rule, since it will continue to apply to a string as long as there is a sonorant before a nasalized segment. Thus the reduplication of the verb 1\acute{u} 'shave', underlying form 1\acute{u}1\acute{u}, will be 1\acute{u}1\acute{u}1\acute{u}1\acute{u}.

This fact, which also supports our ordering of reduplication and regressive nasalization, is difficult to explain if we have an output condition blocking nasalized vowels in non-final syllables. It could be made to work by re-writing the output condition to block such forms only if the unacceptable nasalized vowel is followed by an obstruent, since the regressive nasalization rule will not nasalize across an obstruent. But the addition of such a restriction would only further complicate an analysis which already requires otherwise unmotivated output conditions.

There is another argument in favor of deriving nasalized
vowels from a \textit{Vi}+ sequence which involves the morphology of participle formation. In forming participles the regular rule of reduplication applies and the suffix \textsuperscript{-a} is added. If the vowel of the verb root is oral, \textsuperscript{-a} assimilates obligatorily in everything but tone to the preceding vowel. Thus the participles of \textit{bi} 'bend' and \textit{wo} 'do' are \textit{bibi\textsuperscript{i}} and \textit{w squared}. Their underlying forms are RED + \textit{bi} + \textsuperscript{-a} and RED + \textit{wo} + \textsuperscript{-a}, respectively. If the root vowel is oral, the assimilation of \textsuperscript{-a} to it is obligatory. If the root vowel is nasalized, on the other hand, the assimilation is optional, and furthermore, if \textsuperscript{-a} does not assimilate, its nasalization is also optional. Thus for \textit{be \textsuperscript{Ş}} 'smell' the participle can be \textit{bebe\textsuperscript{Ş}}, \textit{bebe\textsuperscript{e}}, or \textit{bebe\textsuperscript{a}}. If \textsuperscript{Ş} is an underlying segment, there is no obvious reason why an assimilation rule should be optional with it, but obligatory with its oral counterpart. Furthermore, it is strange that an immediately adjacent vowel, which is even in the same syllable, should not be obligatorily nasalized as well. However, both assimilations can be naturally accounted for if we derive vowel nasalization from a final nasal. Nasalization does not normally move forward across morpheme boundaries in Ewe, so it is not surprising that \textsuperscript{-a} could remain oral after /N/. The vowel assimilation rule is restricted to immediately adjacent vowels, and in no case does one vowel assimilate to another if there is an intervening consonant. We therefore adopt the \textit{Vi}+ analysis and analyze the vowel system of Ewe
as containing only oral vowels at the systematic phonemic level.

One criticism which could be raised against our analysis is that Ewe has no morphemes which end in an actual nasal consonant and that therefore positing an underlying final nasal consonant is a gross violation of naturalness and of a very pervasive morpheme structure generalization. We will answer this criticism on two levels: first on what could perhaps be called the methodological level, and second on the very practical level of what the data actually show.

On the so-called 'methodological' level, the question to be asked is what sorts of evidence can be used in determining underlying shapes. It is certainly very significant that Ewe has basically an open syllable structure, but this is a superficial sort of evidence. That is, the forms to which we can point are forms which have undergone all the phonological rules and are available only in their systematic phonetic shape. In order to arrive at an underlying form it is necessary to consider these systematic phonetic shapes in all of their environments to see whether any alternations occur which might be indicative as to what the underlying form might be, if it is indeed different from the surface form. This is what we have attempted to do in our discussion of the phenomena of regressive nasalization, reduplication, and vowel assimilation and nasalization. We feel that the evidence obtainable from alternations of this
sort strongly determines what must be included in an under-
lying form. It appears, then, that more is involved here
then mere methodology. What is involved is a theoretical
principle to the effect that underlying forms should contain
all of the information needed to predict what the surface
forms will be in their various environments with as little
recourse to such devices as rule ordering and structure
building as possible.

Secondly, it is not the case that final nasal consonants
do not occur in Ewe. Westermann (1943) cites the following
forms as evidence.

(33) (from Westermann, 1943)

\[
\begin{align*}
\text{kpàm} & \quad \text{'violently'} \\
\text{kpèm} & \quad \text{'banging'} \\
\text{táŋ} & \quad \text{'completely'} \\
\text{këŋ} & \quad \text{'sweet'}
\end{align*}
\]

In addition to these we have also found the forms këŋ 'com-
pletely', sëŋ 'completely', and àprîm 'cannon'. All of
these, with the exception of the last, are adverbs or ad-
jectives, and what is remarkable about this class of mor-
phemes is that there are no instances of short nasalized
vowels in final position, even though final nasal consonants
do occur. This is precisely the opposite of the surface dis-
tribution in nouns and verbs. With the exception of àprîm
'cannon', which seems to be an ideophone, there are no nouns
or verbs with final nasals, only final short nasalized
vowels. This complementarity is too striking to be a mere accident. It must be accounted for by some generalization, and we argue that the proper generalization is that final nasals are possible in Ewe, but that there is a categorial rule (34) which applies in nouns and verbs and deletes a nasal after it has nasalized the preceding vowel.

(34) Final Nasal Deletion

\[ [+\text{nasal}] \rightarrow \emptyset / \text{\_}_1 \text{\_}_2 \Rightarrow \text{Noun} \]

\[ \text{Verb} \]

Aprim, then, is an exception to rule (34). We find a striking parallel between final nasals and long vowels. In adverbs both final nasals and the full two-mora long vowels are permitted, while elsewhere, final nasals are deleted and long vowels lose a half mora. Precisely how this parallel is to be captured is uncertain, but there does seem to be a sort of conspiracy between a rule shortening long syllables in nouns and a rule deleting final nasals. Since nasals are sonorants and will bear the same tone as the syllabic nucleus (see Schachter and Fromkin, 1968, and Woo, 1969), it is not surprising that VN and VW sequences will behave similarly with respect to length. Neither is it surprising, then, that in adverbs both rules fail to apply. It should be possible to show these parallels in the formal apparatus of the theory, but at present it is not. (For discussion of the problem of conspiracies in phonology, see Kisseberth, 1969 and 1970).
Westermann (1930:107-109, 188) gives a list of adverbs in Ewe which includes the following items. Most are used with the verb ṣo \( \text{`walk'} \).

(35) (i) ɡe博文  \hspace{1cm} 'with nodding head'
     siisii  \hspace{1cm} 'lightly, tripping'
     ñuïbuï  \hspace{1cm} 'quickly'
     tyiï  \hspace{1cm} 'of a cry'
     ñuu  \hspace{1cm} 'of whistling'
     ñewëw  \hspace{1cm} 'of singing'
     ñuï  \hspace{1cm} 'of a bad smell'

(ii) tyëtyë  \hspace{1cm} 'of speaking'
     ñë  \hspace{1cm} 'of whistling'
     ñëå  \hspace{1cm} 'of a fat person'
     tyëtyë  \hspace{1cm} 'stately'

The items in (35i) pose no problem for our analysis, since all we are claiming is that short nasalized vowels are blocked in ideophones. The vowels in these examples are all long. (35ii) does present a problem, however, and we are uncertain as to what to say about these forms. Westermann (1930) is the only reference giving such forms; no such anomalous forms are found in Ansre (1961), Warburton (1968), Henrici (1891), or Westermann (1961). The forms containing a ty sequence are clearly exceptional, since no where else does such a sequence of voiceless stop and glide occur, and so we are uncertain as to what his y is, a glide or a vowel, but ñë and ñëïë remain intractible. They may simply be ex-
ceptions to the generalization stated in (34) in that even though they are ideophones they undergo final nasal deletion.

2.3 The Distribution of /e/ and e

The Kpando vowel system differs in one striking way from all other dialects for which we have found evidence. In most cases, where other dialects have e, Kpando has e, as comparison of the forms in (36) will show.³

(36) 

<table>
<thead>
<tr>
<th>Kpando</th>
<th>Peki</th>
<th>Toro</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>kpé</td>
<td>kpé</td>
<td>kpé</td>
<td>kpé</td>
</tr>
<tr>
<td>mé</td>
<td>me</td>
<td>me</td>
<td>me</td>
</tr>
<tr>
<td>bē</td>
<td>bē</td>
<td>bē</td>
<td>bē</td>
</tr>
<tr>
<td>ṣe</td>
<td>ṣe</td>
<td>ṣe</td>
<td>ṣe</td>
</tr>
<tr>
<td>gbó</td>
<td>gbó</td>
<td>gbó</td>
<td>gbó</td>
</tr>
<tr>
<td>ɲ</td>
<td>ɲ</td>
<td>ɲ</td>
<td>ɲ</td>
</tr>
<tr>
<td>ewó</td>
<td>ewó</td>
<td>ewó</td>
<td>ewó</td>
</tr>
</tbody>
</table>

Since other dialects have a three-way contrast in front non-low vowels, there will also be cases where Kpando e corresponds to /e/ rather than to /e/, as in (37).

(37) 

<table>
<thead>
<tr>
<th>Kpando</th>
<th>Other Ewe</th>
</tr>
</thead>
<tbody>
<tr>
<td>pəʃə</td>
<td>pəʃə (Peki)</td>
</tr>
<tr>
<td>ləʃə</td>
<td>ləʃə (Peki)</td>
</tr>
<tr>
<td>nəʃə</td>
<td>nəʃə (Togo)</td>
</tr>
<tr>
<td>mé</td>
<td>mé (Angle)</td>
</tr>
<tr>
<td>amę</td>
<td>amę (Angle)</td>
</tr>
</tbody>
</table>

The vowel /e/, however, is relatively rare in other dialects, and so such correspondences are much less frequent. There
is also an apparent set of correspondences between Kpando ø and ø in other dialects where ø results from assimilation of /a + e/ to ee (see Chapter Three). Since all such sequences are polymorphemic, we will not consider correspondences between forms containing such derived ee sequences as true correspondences between underlying forms.

While in most cases /e/ has become ø in Kpando, there are certain environments where this has not happened and /e/ is still found. One such environment is when there is a high vowel in an adjacent syllable. It need not be in the same morpheme, but it must be in the same word. Thus we find the following cases of /e/, where /e/ never becomes ø.

(38)    pépi    'harmattan'
asieke  'nine'
anyiehog 'rainbow'
asivigé  'finger'
yevú     'white man'

However, this does not operate in all morpheme classes. The subject pronoun forms in the singular, which are (39) in all other dialects, become (40) in Kpando, regardless of what the vowel of the verb might be.

(39)    me    I
c    you
é    he, she, it

70
Thus we find etsò 'he took', as well as edà 'he searched'. On the other hand, when the /e/ of a pronoun is adjacent to a high vowel which is not in a verb stem, as in the plural pronouns mìe 'we' and mìe 'you', /e/ does not lower.4

The non-high, non-covered vowels /e/ and /o/ also block lowering, but in this case they must be abutting; there can be no intervening consonant, as the examples in (41) suggest.

(41) (i) putsotsoé  'wave'
aditoé  'hole game'
awunugboé  'bottom'

(ii) ọsée  'he took it off'
ọllee  'he bought it'
ọpoe  'he struck it'
ọnoe  'he drank it'

(iii) ṣwó  'ten'
ṣyee  'and'

In (41) /e/-lowering is blocked only if /e/ is immediately adjacent to /e/ or /o/. In (41iii), there is an intervening consonant, and so /e/-lowering applies. As (41ii) shows, when there is no intervening consonant, the stem vowel of the verb may block /e/-lowering.

We can now begin to formulate a general rule of /e/-
lowering for Kpando. The first case is the lowering which occurs with short vowels in monosyllabic stems. In this environment, /e/ always becomes ə.

\[(42)\] Monosyllabic /e/-lowering

\[e \rightarrow ə / \# \# C_1^2 \quad (N) \# \#\]

Thus surface forms in Kpando, such as kupé 'and', me 'place', sê 'hard', and mie 'buy' are underlyingly kupé, me, sêN, and mie, respectively, and no short /e/ will be found in surface forms of Kpando monosyllabic stems. Closely related to the monosyllabic stems are forms consisting of two or more syllables, examples of which are given in \((36)\) and \((37)\). In these, short /e/ becomes ə as long as vowels of adjacent syllables are [-high]. This rule we will tentatively give as \((43)\).

\[(43)\] Mirror-image /e/-lowering

\[e \rightarrow ə / * \quad C_1^2 \left[ \begin{array}{c} V \\ -\text{high} \end{array} \right] \quad X \# \#\]

The asterisk in \((43)\) marks the rule as having a mirror-image environment, so that \((43)\) is an abbreviation of the two rules given in \((44)\).

\[(44)\] (i) \[e \rightarrow ə / \quad C_1^2 \left[ \begin{array}{c} V \\ -\text{high} \end{array} \right] \quad X \# \# \]

(ii) \[e \rightarrow ə / \# \# X \left[ \begin{array}{c} V \\ -\text{high} \end{array} \right] C_1^2 \quad \]

The superscript and subscript numbers on \(C\) means that there can be a maximum of two and a minimum of one consonant intervening between the non-high vowel and /e/. (The possible consonant sequences are discussed in Section 1.2) \((41)\)
will lower /e/ in words like *agbledemo* 'farm tool' and *kekéli* 'light' to *agbledemo* and *kekéli*, but it will not lower /e/ in words like *asívídë* 'finger' and *pépi* 'harm-attan', where the adjacent syllable contains a high vowel.

On the basis of the identity of structural description and structural change, it is in principle possible to collapse (42) and (43) to (45).

(45) \[ e \rightarrow q / \left\{ \begin{array}{c} \# \# C_1^2 \quad (N) \# \# \\ \ast \quad C_1^2 \left[ \frac{V}{-\text{high}} \right] \quad X \# \# \end{array} \right. \]

where \( X \neq V \ldots \)

The similarity of the two environments suggests that further collapsing might be possible, but the fact that the second is a mirror-image environment eliminates this possibility. Upon closer examination, (45) seems awkward as it stands, since the two rules it disjoins are different in character. (42) is simply an unconditioned lowering rule, while (44) is as assimilation rule in at least some of the strings which meet its structural description. That is, when the environmental vowel is a [+covered] vowel /a/ or /q/, /e/ assimilates to it by becoming [+covered]. We feel that collapsing two such dissimilar rules does violence to the notion of rule collapsing. It is even possible that, as Lakoff has pointed out, the brace notation has no place in linguistic theory since it is essentially an admission of failure on the part of the linguist or the theory to find any further valid
generalization.

A third rule of /e/-lowering is syntactically conditioned, although it bears some similarity to (42). This rule lowers /e/ in the subject pronouns in (39) and (40). Since we find no reason to believe that there is a word boundary between the subject pronoun and the verb stem, this vowel cannot be lowered by (42), and, since /e/ will lower even if the vowel of the verb stem is high, (43) cannot be involved. We therefore suggest (46) as the third rule of /e/-lowering.

(46) Pronominal /e/-lowering

\[ e \rightarrow \varphi / \text{Verb} \]

(46) could also be collapsed with (42) and (43) as (47), but once again we feel that little would be gained in generality by such a move.

(47) \[ e \rightarrow \varphi / \left\{ \text{Verb} \right\} \]

\[ \left\{ \begin{array}{c}
\text{[N]} \not= \# \\
\text{[V]} \not= \#
\end{array} \right\} \left(42\right) \]

\[ \left\{ \begin{array}{c}
\text{[-high]} \\
\text{X} \not= \#
\end{array} \right\} \left(43\right) \]

About the only information shared by the three rules in (47) is the fact that /e/ becomes \( \varphi \). Beyond that, there is little formal similarity and so we hesitate to regard these as a single process.

/e/-lowering occurs in one further environment. If /e/ is immediately adjacent to a [+covered] vowel, as in (48), it becomes \( \varphi \). In this case it is a straightforward assimilation, a [-covered] vowel becoming [+covered] when adjacent
to a [+covered] vowel.

(48)  
\[
\begin{align*}
\text{k\texttt{\textae}} & \quad \text{'soap'} & \quad \rightarrow & \quad \text{k\texttt{\textae}} \\
\text{ga\texttt{\textae}} & \quad \text{'small metal, money'} & \quad \rightarrow & \quad \text{g\texttt{\textae}} \\
\text{kp\texttt{\textae}} & \quad \text{'see it'} & \quad \rightarrow & \quad \text{kp\texttt{\textae}} \\
\text{dz\texttt{\textae}} & \quad \text{'split it'} & \quad \rightarrow & \quad \text{dz\texttt{\textae}}
\end{align*}
\]

From the data we have checked, this instance of /e/-lowering applies only when the /e/ follows a [+covered] vowel. Thus no mirror-image environment is involved, and rule (49) cannot be collapsed with (43). This rule, which is the only variety of /e/-lowering to apply across word boundaries, we will formulate as coveredness assimilation (49).

(49) Coveredness assimilation

\[
\left[ \begin{array}{c} V \\ \text{high} \\ \text{back} \\ \text{-covered} \end{array} \right] \quad \rightarrow \quad \text{[+covered]} \quad \text{[+covered]} (##) \]

It should be noted that our description makes /e/-lowering look like a very complex, fragmented process. We suspect that it is in reality quite simple, and that the apparent complexity is an artifact of the formalism. We will return to this problem in Chapter Three. In following chapters we will write the general Ewe forms, using /e/. These will also be the underlying forms for Kpando.

2.4 Summary of the Vowel System

In Section 2.0 we began by presenting six sets of vowels distinguished by three degrees of length and by nasality. In this chapter we have reduced the inventory of vowel seg-

75
ments at the systematic phonemic level to seven short oral vowels: /i/, /e/, /ɛ/, /a/, /ɔ/, /o/, and /u/. In Section 2.3 we showed that except in certain environments /e/ has merged with /ɛ/ in Kpando, with the result that they are now in complementary distribution. In our discussion of /e/-lowering we have showed that there are living alternations between /e/ and ɛ in Kpando, and that they can therefore be considered variants of one underlying segment /e/. Kpando, thus, has a six vowel system: /i/, /e/, /a/, /ɛ/, /o/, and /u/.

In Table VII we give the systematic phonemic vowels of most Ewe dialects and in Table VIII we give the more restricted set for Kpando.

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>e</th>
<th>ɛ</th>
<th>a</th>
<th>ɔ</th>
<th>o</th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonorant</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vocalic</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Consonantal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Continuant</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Nasal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Voiced</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coronal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Low</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Back</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Rounded</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Covered</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table VII: Ewe Systematic Phonemic Vowels.
<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>e</th>
<th>a</th>
<th>ə</th>
<th>o</th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonorant</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vocalic</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Consonantal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Continuant</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Nasal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Voiced</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coronal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Low</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Back</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Rounded</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Covered</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table VIII: Kpando Systematic Phonemic Vowels.

The features [anterior], [strident], [distributed], and [delayed release] are irrelevant to the description of vowels and are therefore omitted from these tables.
NOTES

1. It should be added that systems like those in (20) are not impossible, but simply more complex, since they have either just covered high vowels, involving a relatively awkward articulation, or a coveredness contrast in high vowels without a corresponding contrast in mid vowels. (20ii) does, in fact, occur often in Bantu and is probably the underlying system for Akan. Stewart (1970) argues effectively for (20iv) as the Proto-Volta-Comoe system, but in this case our claim that such a vowel system is more costly is borne out by the fact that all modern Volta-Comoe languages have non-covered high vowels as well.

2. While we hesitate to base any argument on the type of rule involved, the properties of reduplication rules are interesting in this respect. It seems to be the case very often that rules of reduplication copy derived consonants rather than underlying consonants. In Akan (Schachter and Fromkin, 1968) there are no underlying palatals, but coronal and back consonants are palatalized before front vowels. When such a derived palatal occurs as the initial consonant of a verb, the reduplication of that verb copies a palatal consonant. Furthermore, in both Akan and Nupe, nasalized vowels in verb stems are copied in reduplication, even though both languages have the same restriction on nasalized vowel distribution that we observed in Ewe. The implication of this is that the output of a rule of reduplication is strong evidence for the phonological properties of the morphemes the rule has operated on. This is a claim which would be very much worth investigating in depth.

3. The Peiti forms are from Ansre (1961) and (1966) and Smith (1968). The Togo forms are from Westermann (1959), and the Aglo forms are from Henriici (1891). The Togo forms are not necessarily from the Lome dialect, but the Lome forms (Kropp, 1966) would bear out the point.

4. There is some evidence to suggest that the /e/ which occurs in the subject pronoun system is not morphologically a part of the pronoun. Rather is it some sort of linking element between the pronoun and verb.
The subject pronouns for the plural imperative and for the hortative, for example are mi 'you (pl.)' and mi 'we'. Also this e occurs only with the subject pronouns and not with object, possessive, or independent pronouns. We suspect that this vowel may correspond diachronically to the o which is found in subject pronoun forms in Yoruba, Igala, Edô, and Idoma. The presence of some kind of linking vowel in the subject pronoun system is a common feature of many Kwa languages, although its original function, perhaps as some kind of aspect marker, has generally been lost. See Stahlke (1969 and 1970) for examples of such a linking vowel in Yoruba and Yatyê.
Chapter 3
DIPHTHONGS AND VOWEL SEQUENCES

3.0 Introduction

Few areas of Ewe phonology have caused as much confusion as the matter of diphthongs and vowel sequences. Westermann, for example, says that

Almost every vowel can occur with every other as a diphthong. The combination of a semi-vowel with a vowel is also in the nature of a diphthong (e.g. wa, ya, etc.). (1930:3)

Berry (1951:7) makes a similar claim, but neither writer discusses the problem at any length. In this chapter we will consider the possible vowel sequences in Ewe. In Section 3.1 we will examine Ansre's analysis of diphthongs and show that the criteria for defining a diphthong in his description are too loose. In Section 3.2 we will discuss Ansre's /iV/ sequences and give evidence that they must be analyzed as /yV/ sequences instead. In Section 3.3 we will describe the various possible assimilations which take place between abutting vowels. In Section 3.4 we will propose two conditions on possible vowel sequences in the surface phonology of Ewe and in Section 3.5 we will outline a tentative hypothesis for the diachrony of /e/-lowering in Ewe.

3.1 Ansre's Analysis of Diphthongs

Ansre (1961:10) gives a list of diphthongs which we re-
produce below.

(1) (taken from Ansre, 1961:10)

\[
\begin{align*}
/\text{i}e/ & \quad \text{âsiôke} & \quad 'nine' \\
/\text{i}g/ & \quad \text{fîç} & \quad 'teach it' \\
/\text{i}a/ & \quad \text{fià} & \quad 'chief' \\
/\text{i}i/ & \quad \text{ziô} & \quad 'to lean against' \\
/\text{i}o/ & \quad \text{piôpiô} & \quad \text{(noise of flute)} \\
/\text{ea}/ & \quad \text{ne kpéâ} & \quad 'did you meet him?' \\
/\text{eo}/ & \quad \text{mèsè ô [sic]} & \quad 'he did not hear' \\
/\text{ga}/ & \quad \text{êtșà} & \quad 'did he draw it?' \\
/\text{go}/ & \quad \text{mélë ô [sic]} & \quad 'she did not cut it' \\
/\text{ai}/ & \quad \text{âi} & \quad 'Ouch!' (cry of pain) \\
/\text{ae}/ & \quad \text{nûkâe} & \quad 'what is it?' \\
/\text{ao}/ & \quad \text{âò} & \quad (a cry of sorrow) \\
/\text{e}/ & \quad \text{mekpê} & \quad 'I saw him' \\
/\text{e}a/ & \quad \text{eîê} & \quad 'are you well?' \\
/\text{e}i/ & \quad \text{méfê ô [sic]} & \quad 'he has not risen' \\
/\text{e}e/ & \quad \text{miseô} & \quad 'we laughed at her' \\
/\text{oa}/ & \quad \text{ênoâ tsî} & \quad 'he drinks water' \\
/\text{ui}/ & \quad \text{ai'tûi} & \quad 'he will catch up with her' \\
/\text{ue}/ & \quad \text{sûe} & \quad 'small' \\
/\text{ua}/ & \quad \text{ékuâ} & \quad 'is it dead?' \\
/\text{uo}/ & \quad \text{mêkû ô [sic]} & \quad 'it is not dead'
\end{align*}
\]

It is apparent from his examples that Ansre interprets all sequences of vowels, no matter how they arise, as diphthongs. If we were to accept such a criterion in English,
the number of diphthongs would have to include /iə/ as in
preempt, /iə/ as in react and even such polyphthongs as
/ayówyuw/ as in I owe you. Although he is doing a struc-
turalist analysis, Ansre has ignored a generally accepted
criterion for diphthongs in structural phonology: the two
elements may not be separated by a juncture and must there-
fore be members of the same morpheme. Also, most of Ansre's
eamples are polymorphemic and can be analyzed as follows.
(2) (i) Where the second element is /o/, the /o/ is
usually a part of the negative construction me +
V (+NP) + o. (This accounts for /eo/, /go/, /go/ and /uo/.)
(ii) Where the second element is /a/, the /a/ is
usually a particle marking a yes/no question.
(This accounts for /ea/, /ga/, /ga/ and /ua/.)
(iii) In /iə/, /ge/, /oe/, and /ui/, the second element
is the third person singular object pronoun.
(See 3.3.1 for discussion.)
(iv) /ae/ in nükæ: is due to a sequence of ka
'which' and o (thematic particle). (See 3.3.2.)
(v) /a/ in /oa/ is the habitual marker, the full form
of which is na. The verb is no 'to drink'.
(vi) /ai/ and /ao/ as exemplified here occur in ex-
clamations and cannot be considered productive
diphthongs. /ao/ can also arise from (2i).
(vii) /ie/ in Hsíëke contains a word boundary. Westermann
(1930:98) gives asígēteké as an alternate form for 'nine', the first element of both forms being así 'hand'. dé means 'one', so the compound probably means something like 'one short of hand', that is, nine fingers.

(viii) The /e/ in sué 'small' is probably diminutive suffix (Westermann, 1943) and (1930:172)).

(See 3.3.3)

In strictly structural terms, then, none of the sequences discussed in (2) can be considered diphthongs.

3.2 /yV/Sequences

The only diphthongs left in (1), then, are /ia/, /i9/, and /io/, to which we will add /ie/ in ré (a type of monkey). Since these all occur exclusively after consonants, we are led to ask whether the first element is to be interpreted as /i/ or as /y/. We feel that the latter interpretation is correct for several reasons. The first of these involves the rule of verb root reduplication given in Section 2.2. The rule as given there states that it is the consonant and the first vowel of the stem that are copied. If the first element of the diphthongs in (3i) is treated as a vowel, then we would expect the reduplicated forms to be (3ii) when in fact they are (4).
(3) (i) myá 'squeeze' (ii) *mímiá
fye 'boil (intr.)' *fifie
fyá 'teach' *fífiá
byá 'ask' *bíbiá
lyá 'mount' *líliá

(4) myámyá
fyefye
fyáfyá
byábyá
lyályá

These reduplications suggest that in Kpando the first element of Ansre's [UV] sequences be regarded as a part of the initial consonant, rather than as a vowel. Possibly these stem consonants are to be regarded as [+high] in addition to their coronal and anterior articulations.

Within Ansre's Peki the reduplication rule operates in a slightly different way. Rather than copying the glide with the consonant, it copies only the consonant and the vowel (Ansre, 1961:39), just as Kpando does with CLV verbs. The reduplicated forms of the verbs in (3i) in Peki, then, are as in (5)

(5) mamyá
fefye
fáfýá
bábyá
lályá
In Peki also, then, if /y/ were interpreted as /i/ in this environment the incorrect forms of (3ii) would result.

The second reason involves the behavior of these diphthongs in nouns, but to present the evidence we will have to refer to matters in Chapter Four. It will be shown there that the second of two vowels in the final syllable of a noun must have a high tone. The first, subject to certain restrictions which are not important here, can be either high or non-high. In Kpando, if the first segment is non-high, this final high tone is evident only before a non-high tone syllable, as in (6).

(6) \[
\begin{array}{ll}
\text{Underlying form} & \text{Before high tone} \\
\text{poo} & \text{poo} \\
\text{kpl\text{g}g} & \text{kpl\text{g}g} \\
\text{ta\text{a}} & \text{taa} \\
\text{ya\text{a}} & \text{yaa} \\
\end{array}
\]

As (7) shows, this also happens when the two vowels are not identical.

(7) \[
\begin{array}{ll}
\text{Underlying form} & \text{Before high tone} \\
\text{dr\text{g}g} & \text{dr\text{g}g} \\
\text{k\text{g}g} & \text{k\text{g}g} \\
\text{tu\text{i}} & \text{tu\text{i}} \\
\text{ahl\text{g}g} & \text{ahl\text{g}g} \\
\end{array}
\]

But in a noun like fya 'chief' this change does not take place. It remains non-high before another non-high tone.

Some apparent exceptions to the claim that there are no
/iV/ sequences in single morphemes are the subject pronouns më́ 'we' and më́ 'you (pl.)'. In both cases the e can be shown to be independent. It occurs throughout the verb paradigm, except in imperatives, cohortatives, and the third person plural.

(i)

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>meyi</td>
<td>'I went'</td>
</tr>
<tr>
<td>eyi</td>
<td>'you went'</td>
</tr>
<tr>
<td>éyi</td>
<td>'he went'</td>
</tr>
<tr>
<td>më́yi</td>
<td>'we went'</td>
</tr>
<tr>
<td>më́yi</td>
<td>'you went'</td>
</tr>
<tr>
<td>wóyi</td>
<td>'they went'</td>
</tr>
</tbody>
</table>

(ii)

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>yi</td>
<td>'go (sg)'</td>
</tr>
<tr>
<td>miyi</td>
<td>'go (pl)'</td>
</tr>
<tr>
<td>ná më́yi</td>
<td>'let us go'</td>
</tr>
</tbody>
</table>

Thus these sequences are probably polymorphemic. One other apparent exception is the noun fya 'chief' when followed by the definite article and a non-high tone syllable. In that case the form is fíá 'the chief', but the change is not due to a vowel sequence in the noun. It is the result of fya + á 'chief + the' contracting so that the first /a/ is deleted and the glide is vocalized to become i, retaining the original stem tone.

A third argument against the treatment of these sequences as /iV/ involves the process of /e/-lowering which we presented in Section 2.3. The /e/ in fye 'monkey' or fye 'boil' should remain /e/ if it is immediately preceded by
/i/, but, since it becomes ɛ, the preceding segment must be /y/, not /i/. We conclude, then, that the sequence which Ansre represents as /iV/ in those forms which are in fact single morphemes should be interpreted as /yV/.

3.3 Vowel Assimilations

The /e/-lowering process discussed in Section 2.3 was seen to be at least in part assimilatory. /e/-lowering, it turns out, is only one of a number of assimilation rules involving vowel sequences, and in this section we will discuss these other rules.

3.3.1 Word-Level Vowel Assimilations

The various assimilations which occur in word-final position all share the property that the two vowel segments may be separated by a morpheme boundary (\(+\)). The rules involved ignore the presence of such a boundary, but they do not operate across a word boundary.

3.3.1.1 The Third Person Singular Object Pronoun

In most works on Ewe, the third singular clitic pronoun is given as ɛ for the subject and as ɛ for the object. In Kpando, of course, the subject pronoun will always become ɛ, and the object pronoun will do so after /a/ and /ɛ/, but this will not happen in every dialect. However, all dialects for which we have found evidence have certain other assimilation rules as well as a restricted variant of /e/-lowering. We will discuss those rules which are generally found in Ewe first, and then we will examine the assimil-
ations which are specific to Kpando.

In all Ewe dialects, the following forms are found.

(9) | Underlying form | Assimilated form |
    |-----------------|-----------------|
    | (i) fi + e | 'steal it' | fii |
    | (ii) wu + e | 'kill it' | wui |
    | (iii) dze + e | 'spoil it' | dzee or dzii |
    | (iv) po + e | 'beat it' | poe or pui |

The general tendency, then, is for the pronoun to assimilate to a high vowel in a verb stem. Thus in (9) we find sequences of high vowels and sequences of non-high non-covered vowels, but there are no vowel sequences in which we find both high and non-high vowels. The basic rule involved in (9), then, seems to be something like (10).

(10) \[
\begin{array}{c}
V_{-\text{high}} \\
V_{-\text{covered}}
\end{array} \rightarrow \left[ \begin{array}{c}
+\text{high} \\
-\text{high}
\end{array} \right] / \left[ \begin{array}{c}
V_{-\text{high}} \\
V_{-\text{covered}}
\end{array} \right]
\]

That is, /e/ becomes i after a high vowel. The second vowel change attested in (9) is the raising of non-high, non-covered vowel sequences to high vowels, giving dzi + i and pu + i from dze + e and po + e respectively. This could be a change which operates on the two vowels together as in (11),

(11) Structural description: \[
\begin{array}{c}
V_{-\text{high}} \\
V_{-\text{covered}}
\end{array} \]

Structural index: 1 2

Structural change: 1 and 2 become [+high].

but such a statement is forced to repeat all of rule (10) with the result that the raising of /e/ to i after a high
vowel must be stated twice in the phonology. The simplest way to eliminate this redundancy is by ordering an optional rule of stem vowel raising before (10). We will formulate stem vowel raising as in (12).

(12) Stem vowel raising (optional)

\[
\begin{bmatrix}
V \\
-\text{high} \\
-\text{covered}
\end{bmatrix} \rightarrow [+\text{high}] / \quad [-\text{covered}] \quad \# \quad \#
\]

Rule (10) must be modified so as to apply only in word-final position. Otherwise all non-final sequences of non-covered vowels will become high. This is wrong since such sequences as /ie/ in *asieke* 'nine' and *miyej* 'we went' never become *ii*. The final form of (10), then, is (13).

(13) Final vowel assimilation

\[
\begin{bmatrix}
V \\
-\text{back} \\
-\text{covered}
\end{bmatrix} \rightarrow [+\text{high}] / [+\text{V}] \quad \# \quad \#
\]

There is also a sub-type of /e/-lowering which all dialects seem to have. In this restricted version /e/ becomes *ŋ* when following the low vowel /a/. This is coupled with a rule raising /a/ to *ŋ*, so that no Ewe dialect for which we have information has the word-final vowel sequences /ae/ or *æe* in surface forms. /ae/ will be present in underlying forms as the source for *æe* in all dialects. We again have a process which could be treated transformationally (14), changing both vowels at once.
(14) Structural description: 
\[
\begin{bmatrix}
  \text{V}^* \\
  \text{+low} \\
  \text{-high} \\
  \text{-covered}
\end{bmatrix}
\]

Structural index: 1 2

Structural change: 1 becomes [+low],
2 becomes [+covered].

However, as we will show in the next section, only /e/-lowering operates across word boundaries; /a/-raising applies just within a word. Therefore the two rules must be stated separately as (15) and (16).

(15) e \rightarrow [+covered] / [+low] (\#\#) ___
(16) a \rightarrow [-low] / ___ \emptyset

These two rules, then, account for the assimilations in (17), producing forms which are found in all Ewe dialects.

(17) Underlying form Assimilated form
\[
\begin{array}{ll}
  \text{ɖa} + e & 'cook it' \\
  \text{ná} + e & 'give him' \\
  \text{lá} + e & 'cut it'
\end{array}
\]
\[
\begin{array}{ll}
  \text{ɖɔ} & \text{ɖɔ} \\
  \text{nɛ} & \text{nɛ} \\
  \text{lɛ} & \text{lɛ}
\end{array}
\]

The treatment of the third singular object pronoun in Kpando differs from other dialects only in that coveredness assimilation lowers /e/ to \emptyset after /\emptyset/ as well as after /a/.
Thus where other dialects have (18i), in which the underlying form is unchanged in the surface, Kpando has (18ii).

(18) (i) \text{wɔe} 'do it'
\text{tɔe} 'stab it'
\text{dɔe} 'send it'
\text{fɔe} 'find it'
(ii) wəə 'do it'
tıəə 'stab it'
dōəə 'send it'
fıəə 'find it'

These forms give us a clue as to how Kpando developed at least one of its /e/-lowering rules, coveredness assimilation. As we observed above, all dialects change /e/ to ə after /a/, the [+low, +covered] vowel. However, the feature [+low], as used in (14), defines a class of segments whose membership in Ewe is restricted to the vowel /a/. Since /ə/ shares with /a/ the feature [+covered], Kpando has generalized (15) by permitting it to apply after any covered vowel, rather than just after /a/, thereby replacing (15) with coveredness assimilation. Kpando /e/-lowering is then at least in part the result of rule generalization.

The absence of derivations in which the sequence ṣe is the surface realization of /ee/ is explained not only by rules (12) and (13) above, raising /ee/ to ii, but also by the environments in which /e/-lowering applies. We have already considered coveredness assimilation, and we have shown that it assimilates /e/ to a preceding covered vowel even across word boundaries. The only rule which could operate on a verb stem to lower /e/ to ə is monosyllabic /e/-lowering, but the environment for this rule is \#\#C_i^{2} (N) \#.#. The presence of an adjacent non-covered vowel in the same word, as is the case in the construction we are considering
here, is sufficient to block monosyllabic /e/-lowering from applying. Thus in Kpando /e/ will never be found in the same word as and immediately after $\varphi$, and therefore coveredness assimilation will never lower /e/ to $\varphi$ because of an adjacent $\varphi$.

The surface vowel sequence which will be found in Kpando verb + third singular object pronoun constructions are given in (19) with their underlying sources and derivational paths.

\[
\begin{align*}
(19) \quad ii & < ie \quad \text{by (13)} \\
& < ee \quad \text{by (12) and (13)} \\
ee & < ee \\
$\varphi \varphi$ & < ae \quad \text{by coveredness assimilation and (16)} \\
$\varphi \varphi$ & < $\varphi e$ \quad \text{by coveredness assimilation} \\
oe & < oe \\
u$\varphi$ & < oe \quad \text{by (12) and (13)} \\
& < ue \quad \text{by (13)}
\end{align*}
\]

Other dialects may have the additional surface sequences ie, ae, ae, oe, and ue, depending on which assimilation rules they possess. Where /e/ and /$\varphi$/ have not merged, the surface sequence ee may also be possible within word boundaries. In Kpando it occurs only across word boundaries.

3.3.1.2 Noun-Final Vowel Assimilations

If a noun ends in a final vowel sequence, the sequences which are found at the systematic phonetic level in Kpando

92
are as follows:

(20) /ii/  
fi’i  'digging stick'
deti’i  'cotton'

/ɡɡ/  
nɛ’ɛ’  'nut'
kɛ’ɛ’  'root'

/aa/  
ta’a  'head'
tɑ’ɑ’  'pool, body of water'

/ɔɔ/  
atɔɔ’  'nest'
avɔɔ’  'cloth'

/oo/  
gɔò  'gourd'
to’ɔ  'mortar'

/uu/  
uu’u  'mouth'
ku’u  'seed'

/ɡɡ/  
kɔɔ’  'soap'
ahlɔɔ’  'antelope'

/oe/  
asipodoé  'palm of hand'
avunugboé  'button'

/ui/  
tu’i  'broom'
lui’i  'native money'

The nouns in (20) and all other nouns ending in vowel sequences share the property that the final vowel of the sequence must bear a high tone. That is, there are no nouns whose final syllable contains a vowel sequence, the second vowel of which bears a non-high tone. Such a striking morphological property as this should, one would suppose, be a separate morpheme with its own semantic content. Ansre
(1961:26), in fact, sets up a final high tone suffix as part of the structure of the nouns in (21),

(21) 

too' 'mortar'
nuú 'mouth'
dzoó 'horn'
kpe' 'trumpet'
atcë 'nest'
amaá 'greens'
adzeé 'witch'
akpaá 'fish'

but nowhere does he suggest what its meaning might be. A glance at the examples in (20) and (21) reveals no common semantic content beyond the fact that they are all nouns. The possibility that the final high tone is a reflex of some nominalizing particle cannot be dismissed, but it has certainly lost that function synchronically. What, for example, could such nouns as taá 'head', née 'nut', and akpaá 'fish' possibly be nominalizations of? Ansre's analysis does, however, have some support if the compounding process is considered. In his dissertation (1966:197-198) he observes that if two nouns are juxtaposed in a compound, the second of the two has a lengthened final vowel, and the added segment bears a high tone. He illustrates this with the following examples.
(22) (from Ansre, 1966:198)

\[
\begin{align*}
\text{anyi} & \quad \text{'}mud' \} \\
\text{gli} & \quad \text{'}wall' \} \\
\text{gà} & \quad \text{'}metal' \} \\
\text{kpò} & \quad \text{'}fence' \} \\
\text{là} & \quad \text{'}animal' \} \\
\text{glà} & \quad \text{'}jawbone' \} \\
\text{kpò} & \quad \text{'}fence' \}
\end{align*}
\]

\text{anyi-glii} \quad \text{'}mud wall' \\
\text{gà-kpò} \quad \text{'}metal fence' \\
\text{là-glà-kpò} \quad \text{'a fence made of animal jawbones'}

Westermann (1930:31, 33) supports this analysis and the claim that the compounding element \(-\acute{v}\) is, in fact, a suffix of some sort. Noting the fact illustrated above, he adds that in certain compounds which have, through heavy use, become single lexical items, such as those in (25), the compounding element has been dropped. (Westermann does not mark vowel length in nouns.)

(23) (from Westermann, 1930:33)

\[
\begin{align*}
\text{du} & \quad \text{'stranger'}, \text{gbe} \quad \text{'}language' = \text{dugbe}, \text{not dugbè}. \\
\text{ebe} & \quad \text{'Ewe'}, \text{gbe} \quad \text{'}language' = \text{ebegbe}, \text{not ebegbè}. \\
\text{ebu} & \quad \text{'Ewe'}, \text{du} \quad \text{'}town' = \text{ebedu}, \text{not ebédù}.
\end{align*}
\]

In compound nouns, then, there is support for the claim that the final high tone vowel of a vowel sequence is, in fact, a separate morpheme. However, nouns of the form (24) are clearly not compounds, and so the final high tone vowel cannot be the compounding element.

(24) (a) \( C^2_1 \quad V \quad \acute{V} \quad (N) \)

One other source for the final high tone vowel is the
diminutive particle -é, which is suffixed to a noun. Since Westermann (1930 and 1943) and Ansre (1961 and 1966) give much the same treatment of this problem and since we have little new material to add, we will briefly survey the problem as they treat it. It is generally agreed that a particle -é can be added to nouns and reduplicated verb stems to give a diminutive meaning. Ansre (1961:52) gives the following examples.

(25) nólíí 'small and round' from nólí 'round' + é.
    peé 'small sister' from pe 'sister' + é.
    lēé 'small fool' from lē 'fool' + é. (Peki)
    arbaé 'small plate' from arbaá + é.
    alé noé 'small ewe' from alé no 'female sheep' + é.
    rōé 'small gourd' from rōó 'gourd' + é.
    dōóbuí 'narrow hole' from dōóbu 'hole' + é.

From his examples, two things are clear. First, -é is a morpheme and therefore requires the presence of a morpheme boundary (*) between itself and the preceding noun or adjective. Second, the diminutive -é is subject to exactly the same assimilation rules to which the third singular object pronoun is subject. Westermann (1930:172) gives further examples and also suggests the -é can be added to a noun to indicate a similar object or species. He gives the pairs ado 'squirrel (living in the plains)', adóó 'squirrel (living in the forests)' and tsi 'water', tsií < tsié 'soup.' Here again a morpheme boundary is involved, but this last
use of -ě does not seem to be productive in any dialect. The use of diminutive -ě is also not productive in Kpando, although it apparently is in Peki and elsewhere. These particles -ě can account for some instances of ii and ee in Kpando, ii arising from /ie/ and possibly /ee/, and ee arising from /ae/ by rules presented in Section 3.3.1.1, and they may well account for all instances of /ii/, /oe/, and ee, but this still leaves all occurrences of /uu/, /oo/, /œœ/, and /aa/ to be accounted for as well as possibly some instances of /ii/ and ee, where their derivation involving a final diminutive or specifier is not obvious.

As (20) shows, Kpando has no nouns ending in ee. The absence of this vowel sequence can be accounted for synchronically in either of two ways: either rule (12) raising /e/ to i before any [-covered] vowel is obligatory in nouns, even though it is optional in verb and object pronoun sequences; or /ee/ becomes ee by the rules of /e/-lowering discussed in Chapter Two. If the former analysis is adopted, we have a complete synchronic merger of the underlying sequences /ii/, /ie/ and /ee/. Rule (12) will raise the first segment of /ee/ to i, and then (13) will raise any final /e/ which immediately follows /i/. Thus there would be no means of distinguishing the /ii/ sequences which are underlying from those which arise through (12) and (13). This analysis brings with it the additional problem that final /oe/ in nouns, which seems to occur only in compounds, need not be-
come ui. If such an absolute neutralization as we have proposed actually occurs in Kpando, there is no longer any basis for claiming that Kpando has underlying /ee/ or /ie/ sequences in nouns since these sequences will always become ii. The proposal that /ee/ becomes ee seems obviously wrong since /e/ does not lower in a vowel sequence unless the other vowel of the sequence is [+covered]. /ee/, then, is blocked from lowering unless we posit a special rule, applicable only to nouns, to lower /ee/ to ee. Such a rule would be arbitrary since there is no evidence for it beyond the problem it is intended to solve. Further evidence that ee is not derived from /ee/ is the fact that the two do not alternate. We found that /e/ does not lower if the adjacent syllable contains a high vowel, and so we would expect that, if née and keé are underlying née and keé, they will remain so if followed by vi, the diminutive clitic, producing *née+vi 'small nut' and *keé+vi 'small root', instead of the correct forms née+vi and keé+vi. Thus not only does this second analysis require an arbitrary rule, but this rule will apply in an environment where the corresponding rule for short vowels cannot apply.

The problems involved in the second analysis would suggest that underlying /ee/ has merged with /ii/ and that synchronically Kpando no longer has /ee/ as an underlying vowel sequence, were it not for the fact that in nouns Kpando ee usually corresponds to /ee/ in other dialects (26).
(26) Kpando Peke Togo
treə' treē treē' 'calabash'
keə keē keē 'root'
adzeə adzeē adzeē 'witch'
kəə keē keē 'sand'

Diachronically, then, Ewe /ee/ has become Kpando ee, but this is no longer a synchronic process since no alternations between /ee/ and ee are found. Since neither of our synchronic solutions stands up under examination, we are forced to the position that there is no underlying /ee/ in Kpando nouns, where the two vowels are not separated by a morpheme boundary. The next question is where ee comes from. It cannot result from /e/-lowering since there are no alternations and since /ee/ does not lower elsewhere in the synchronic phonology, and yet it would be most unusual for a long ee to be phonemic in a language in which short e is not phonemic. This leaves us with one alternative. After long /ee/ was lowered historically, the resulting vowel sequence ee was reanalysed as /ae/, the only sequence from which ee is derived elsewhere in the grammar. Thus underlying all instances of ee in Kpando nouns is the sequence /ae/.

Ansre's example arbegeh 'small plate', from arbe + ē, lends support to this analysis. Underlying, then, Kpando has only the following vowel sequences.
\[(27) \quad (i) \quad ii \quad uu \quad (ii) \quad ie \quad ue \]
\[
\begin{array}{c c c}
  oo & oe \\
  gg & gg \\
\end{array}
\]

Those in \((27ii)\) are realized as in \((28)\).
\[
(28) \quad ii \quad ui \\
\begin{array}{c c c}
  oo & or & ui \\
  gg & gg \\
\end{array}
\]

Our analysis of \(?g\) as the surface representation of /ae/ enables us to account for an otherwise inexplicable gap in the set of surface vowel sequences. /a/ is the only covered or back vowel which does not appear before a non-low front vowel in the surface phonology, although we would expect the surface sequence \(?g\). However, rule \((16)\), which raises /a/ to \(?g\) before \(?g\), eliminates all surface instances of \(?g\).

Since, as we mentioned above, the diminutive \(\text{-e}\) is non-productive in Kpando, we have not been able to test whether an underlying /ee/ would remain /ee/ or become \(ii\). Other dialects apparently have all seven underlying long vowels, and in some dialects, no assimilations take place, so the surface vowels will be the same as the underlying vowels. Peki, on the other hand, seems to share all assimilations which Kpando has, but it does not have unconditioned /e/-lowering, and so /ee/ and /gg/ are both found. Peki does have the same /e/-lowering rule of coveredness assimilation as Kpando has, but it is restricted to nouns, since Anare
lists the sequence /œ/ as occurring in verb + object pronoun constructions. Peki, then, has /œ/-lowering only after the low vowel, and not elsewhere.

The diachronic lowering of Kpando /ee/ to /œ/ and subsequent reanalysis of /œ/ as /æ/ in conformity with independently motivated rules of Kpando phonology raises an interesting problem of lexical representation. As we mentioned above, the vowel-raising rules make it impossible to distinguish between underlying /ee/ in a single morpheme and underlying /ii/, since the former will in all cases be raised to /ii/ with no tell-tale alternations. The fact that there is a vowel-raising rule implies that there will also be a vowel to be raised, as in the case in verb + object pronoun sequences, but this same rule absolutely neutralizes /ii/ and /ee/ in nouns. To say that Kpando has no /ee/ in its lexicon, therefore, would contradict the implication of vowel-raising. The absence of /ee/ from single morphemes in the lexicon could be captured by a morpheme structure condition, but such a condition would have to duplicate the information which must also be stated in rules (12) and (13). Since (12) and (13) must exist, it seems that the absence of /ee/ from the lexicon is to be accounted for by phonological rules rather than by conditions on morpheme structure. The morpheme structure condition would simply be redundant.
3.3.2 The Thematic Particle

Ewe has a form of emphatic construction very frequently found in Niger-Congo languages. This consists of moving the constituent to be emphasized to the front of the sentence and placing a thematic particle after it. In Ewe this particle shows up as é and is used as in (29).

(29) (i) mèkpè ɗèví    'I saw a child.'
(ii) ɗèví è mèkpsè    'It was a child I saw.'

It is apparent from discussion in Westermann (1950) and examples in Ansre (1966) that in most dialects this thematic particle remains é after all vowels. In Kpando, however, it lowers to è after [+covered] vowels, giving the phonological paradigm (30). The paradigm frame is NP₁ ĝ NP₂ Verb,

where NP₁ is the emphasized or thematic, constituent as in (29ii).

(30) tsi é ... 'It's a ladle ...'
kψ é ... 'It's a stone ...'
qa é ... 'It's metal ...'
mψ é ... 'It's a trap ...'
dzo é ... 'It's fire ...'
mú é ... 'It's a mosquito ...'

The assimilations in (30) differ from those in Section 3.3.1 in four ways. First, the thematic particle does not assimilate to a high vowel, so where (12) would lead us to expect *tsí í and *mú í... we have tsi é... and mú é... Second,
the second vowel does not block /e/-lowering, so where we
would expect kpé é... we have kpé é... Third, /a/ does not
assimilate to œ, and so we do not find gœ... for ga é... in (30). And fourth, /oe/ sequences do not become ui, and /ee/
sequences become ee rather than ii.

A number of possible reasons for these differences sug-
gest themselves. There could be a grammatical feature
blocking the rules discussed above from applying to the
thematic e. Assuming this, we would have to add
(31) / [ -Thematic Particle ]
to (12) and (13). This is probably the weakest of all pos-
sible solutions and the most difficult to prove, so we
would use it only if all other attempts at explanation fail-
ed.

A second solution is that the boundaries between the
verb and its object pronoun differ from those between the
noun and the thematic particle. This is stronger on both
syntactic and phonological grounds. Syntactically the bond
between the verb and its object pronoun is much closer than
it is between a noun and something not dominated by the same
NP, as is the case with thematic é. In fact, throughout much
of Kwa and Benue-Congo there is evidence that all dependent
pronoun forms, including object pronouns, are actually
clitics and will therefore be Chomsky-adjoined to the verb.
This would distinguish the sentences in (32) from each other.
They differ semantically only in that (32) is slightly more
emphatic and formal than (32i).

(32) (i) nye kpọ́ éya. 'I saw him.'

(11) mekpọ́ e. 'I saw him.'

Both (32i) and (32ii) are surface structures, but the latter has undergone certain clitic placement rules which have been blocked in (32i). Since clitics are grammatical, rather than lexical categories, resulting as Givon (1969) shows, from the morphological spelling-out of syntactic feature bundles, the Chomsky–Halle algorithm for defining surface structure words (Chomsky and Halle, 1968:112-114) will specify (32i) as three words and (32ii) as one word. The algorithm works by inserting a boundary # on each side of a lexical category and on each side of any category which dominates a lexical category. Thus a word, as the examples
in (33) show, is defined as any string bounded by $\#\#\ldots\#\#\#$ and containing no instance of two adjacent boundary symbols $\#$.

(33) (i)

(ii)
A thorough syntactic analysis may require some revision of these trees, but the distinction between clitic and word would remain.

(33ii) is the structure involved in the discussion of the third singular object pronoun in the Section 3.3.1.1. The condition placed on a number of the assimilation rules given there, that they do not operate across word boundaries, is reflected by the presence of only a single # between the verb stem and the object pronoun in (33ii). The two elements are in the same word. This cannot be said for a noun and a following thematic element. Whatever the exact underlying structure of (32ii) might turn out to be, thematic é will not be dominated by the same Noun node that dominates the emphasized noun. There will at least be an intervening NP, as in the tentative underlying structure below.

(34)
Thematic 

Therefore, is not in the same word as the preceding noun, and the boundary before it differs from the boundary before the third singular object pronoun. If, as we suggested above, (12) does not operate across word boundaries, we can attribute the failure of thematic 

To be raised to 

To the fact that it is preceded by a word boundary. The fact that thematic 

lowers after /a/ or /ʊ/ even though a word boundary intervenes can be explained by permitting coveredness assimilation to operate across word boundaries. We must then restate coveredness assimilation as (35), inserting an optional word boundary between the [+covered] vowel and the environment bar.

(35) Coveredness assimilation revised.

\[
\begin{array}{c}
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\text{We have shown why thematic 

does not undergo raising and why it can be lowered after a [+covered] vowel. /e/-lowering can apply before thematic 

, giving kpé é... from kpé é 'It was a stone...', since the environment for monosyllabic /e/-lowering, which we repeat here for convenience, specifies that the /e/ to be lowered be followed by a word boundary.

(36) \( e \rightarrow ɛ \quad \# \# C_1^2 \quad (N) \# \# \)

However, the fact that thematic 

does not lower to 

in kpé é requires that coveredness assimilation be ordered before monosyllabic /e/-lowering. Otherwise monosyllabic /e/-
lowering will produce a ĺ̆ sequence, and the structural description for coveredness assimilation will be met, predicting the incorrect form *kpe ɗ. Finally, /a/ is prevented from raising to ĺ̆ before thematic ĺ̆ in two ways. First, rule (16), which raises /a/, is restricted to applying within word boundaries. And second, (16) is stated so that /a/ raises only before a covered vowel, like ĺ̆, and not before a non-covered vowel. Thus no additional rules are needed to account for the behavior of thematic ĺ̆ in Kpando.

There is more to the thematic particle in Kpando, however. If the emphasized noun ends in /u/ or /o/, an alternate form of thematic ĺ̆ optionally occurs, but apparently only Kpando has this form.

(37) (i) Usual form:

mú ĺ̆... 'It's a mosquito...'
dzo ĺ̆... 'It's a fire...'

(ii) Optional form:

mú yé...
dzo yé...

After long vowels, this form occurs only in the speech of small children, who may use (38i) instead of the correct (38ii).

(38) (i) Child speech:

nuú yé... 'It's a mouth...'

ɡoó yé... 'It's a gourd...'

108
(ii) Adult speech:

\[ \text{nuú é} \]
\[ \text{goó é} \]

Therefore either Kpando has an underlying form of the thematic particle beginning with a /y/ which is deleted obligatorily in some environments and optionally in others, or Kpando has an optional rule of glide insertion which applies only after /o/ or /u/.

If the former analysis is chosen, we run into problems of rule ordering and morpheme structure. First of all, the underlying form will have to be \[ ë'ë \], rather than \[ ye \], since consonants, including /y/, do not block /e/-lowering, and /e/-lowering obviously must be blocked in those cases where \( y \) occurs in the surface form. That is, there is no form \( *dzo yë... \) or \( mú yë... \) but only \( dzo ye... \) or \( mú ye... \).

Monosyllabic /e/-lowering applies only to consonant-initial forms and therefore cannot lower /e/ in a vowel-initial form like \( ë'ë \), but a form consisting only of \( VW \) is not found elsewhere in the language and so \( ë'ë \) is a violation of morpheme structure. Even if we accept such a violation, we need a rule of /i/-devocalization (39) in addition to \( y \)-deletion.

\[ (39) \begin{bmatrix} +\text{vocalic} \\ +\text{high} \\ -\text{back} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{vocalic} \end{bmatrix} / \# \# \# \]

Rule (39) changes /i/ to the corresponding glide \( y \) if it is word-initial. Since /i/ will occur word-initially only in the thematic particle, the environment need not specify
that the next segment must be a vowel. There is an independently motivated rule of /i/-devocalization, but this rule applies only if the vowel sequence /ui/ is followed by a third vowel, such as the thematic particle.

(40) tui 'e... 'It's a broom...' → tuyé
    nui 'e... 'It's a thorn...' → nuyé

The environment for this rule (41) is more natural than that of (39), since we expect an intervocalic /i/ to become y anyway, but a word-initial /i/ need not necessarily do so.

(41) i → y / u (##) V

/i/-devocalization will have to be ordered after monosyllabic /e/-lowering rule in order to prevent *(y) in (43).

(42) /e/-lowering:  kpe 'ie  ga i'e
    i → y:  kpe ye'  ga ye'

(43) y-deletion:  kpe e'  ga e'

Of course, if monosyllabic /o/-lowering is ordered after /i/-devocalization, as in (43) the incorrect *ye will be found also in those cases where y is found in surface forms, that is, after /u/ and /o/. The final ordering possibility, that coveredness assimilation applies before y-deletion,
must be eliminated on the grounds that nowhere else in Ewe
does coveredness assimilation apply across a consonant plus
a word-boundary. No matter what rule-ordering is used,
then, there is no way to appeal to a different underlying
form to account for the presence of \( v \) in (37ii). Some in-
correct forms are certain to be predicted.

The /\( y \)/-insertion analysis is by no means a strong al-
ternative. It requires a highly restricted rule of /\( y \)/-
insertion (44),

\[
(44) \quad \emptyset \rightarrow /y/ \rightarrow C^2_1 \left[ \begin{array}{c}
\text{+back} \\
\text{covered}
\end{array} \right] \#\# \rightarrow \left[ \begin{array}{c}
\text{+Thematic}
\end{array} \right]
\]

and it requires that /\( y \)/-insertion be ordered after /\( e \)/-
lowering (42) to prevent \( ve' \) from becoming \( ve^\# \). This is a
type of bleeding order, since the rules are ordered to pre-
vent one member of a class of sequences from undergoing a
rule to which all other members are subject. Kiparsky
(1968) points out that this is a marked ordering relation
and has a tendency to be reversed. Furthermore there is no
apparent reason why a /\( y \)/ should be inserted only after
short /\( o \)/ and /\( u \)/ and not elsewhere, such as after short /\( i \)/
and /\( e \)/ or after all vowels, for that matter. Nonetheless,
the /\( y \)/-insertion analysis avoids the rule ordering para-
doxes of the underlying /\( i \)/ analysis and so is at least
formally superior, even if it is not without problems of its
own.

111
3.4 Surface Conditions on Vowel Sequences

In the preceding sections we have been attempting to express significant generalizations about Ewe in the form of phonological rules and, occasionally, morpheme structure conditions. Such formal devices are designed specifically to give explicit statements of particular types of generalizations. The basic purpose of morpheme structure conditions is to state generalizations about the distribution of underlying segments and to describe the sequence of segments which are possible in underlying forms. The phonological rule, on the other hand, is specifically designed to state generalizations involving assimilations and dissimilations, epentheses and deletions, lengthenings and shortenings, and other such changes for which there exists evidence in the language. Most such rules refer to a single segment and describe what happens to that segment in a given environment. Some processes, however, must refer to more than one segment. Metathesis, for example, reverses or otherwise alters the order of two or more segments. This often produces so-called 'slips of the tongue', such as *calvary for cavalry, *irrevelant for irrelevant, or *perdict for predict. Such generalizations are better treated transformationally, in the following form.

\[(45) \quad X \ A \ B \ Y \quad \rightarrow \quad X \ B \ A \ Y \]
\[\quad 1 \ 2 \ 3 \ 4 \quad \quad \quad \quad \quad \quad 1 \ 3 \ 2 \ 4 \]

But however phonological rules are stated, they have the
function of stating generalizations which relate particular stages of a derivation. The clear implication is that if phonological rules and morpheme structure conditions are the only types of generalization which a grammar must be able to state, then there are no linguistically significant generalizations which involve only conditions on surface forms and which cannot be stated as unified generalizations with phonological rules or morpheme structure conditions. We feel that this is a dubious claim, and in this section we will present two surface constraints on Ewe phonology, one involving tongue height in vowel sequences, and one involving the length of vowel sequences. Both constraints require more than one phonological rule in order to produce the correct forms and therefore cannot be stated either as conditions on morpheme structure or as conventional phonological rules.

3.4.1 The Equal-Height Condition

In the Kpando dialect, only the vowel sequences in (46) are possible in word-final position at the systematic phonetic level.

(46)   ii          (from /ii/, /ie/, or /ee/)
       ee          (only in verb + object pronoun)
       99          (from /ae/)
       aa          (only in nouns and ideophones)
       99          (from /9e/)

113
oo
oe
uu
ui (from /ue/ or /oe/)

There is an obvious generalization involved here, which we give as (47).

(47) The Equal-Height Condition:

In the Kpando dialect all vowel sequences at the systematic phonetic level must consist only of vowels which are identical at least as to tongue height and tongue root position.

It will also be the case, of course, that, if the two vowels are not identical, the first will be back and the second will be front, but this will be ensured by a morpheme structure condition and by the fact that the only vowel suffixes are front vowels.

It should be obvious from the preceding sections that several different rules will be involved in producing surface vowel sequences which conform to (47). To produce ui and ui from /ie/, /ee/, /ue/, and /oe/, two rules are needed. First (12) raises /e/ or /o/ to i if the following vowel is non-covered, and then (13) assimilates a final /e/ to i. Where /ee/ and /oe/ do not undergo this raising, the output form will be the same as the input. To get oo from /ae/, two rules are needed again. First the independently motivated rule of coveredness assimilation assimilates the
coveredness of /e/ to that of /a/, producing ae, and then, within word-boundaries only, /a/ is raised to e by (16). qe arises from underlying /qe/ by /e/-lowering also.

One other vowel assimilation which was mentioned in Chapter Two but has not yet been treated is the complete assimilation of the participial suffix -á to the preceding vowel. This assimilation, as (48) shows, is obligatory unless the preceding vowel is nasalized, in which case the assimilation is optional.

(48) Participle formation

(i) Verbs ending in oral vowels:

\[
\begin{align*}
tsí + tsí + á 'extinguished' & \rightarrow tsítsíí \\
se + se + á 'heard' & \rightarrow sësëá \\
yá + yrá + á 'blessed' & \rightarrow yáyráá  \\
yá + yrá + á 'called' & \rightarrow yáyráá  \\
vo + vo + á 'freed' & \rightarrow voovoó \\
bu + bu + á 'respected' & \rightarrow bubuú
\end{align*}
\]

(ii) Verbs ending in a nasal:

\[
\begin{align*}
li + liN + á 'erect' & \rightarrow ílília, íllila, or íllili \\
xe + xleN + á 'counted' & \rightarrow xëlëá, xëlëá, or xëlëá  \\
lá + láN + á 'flayed' & \rightarrow ñlálaá or ñlálaá \\
só + sróN + á 'learned' & \rightarrow séróá, séróá, or séróá \\
lo+ loN + á 'taken from fire' & \rightarrow ñoóoá, ñoóoá, \\
& \text{or ñoóoó} \\
lü + luN + á 'shaved' & \rightarrow ñuluá, ñuluá, or ñuluú
\end{align*}
\]

115
The generalization to be drawn from these examples is relatively simple and straightforward. A low vowel assimilates completely to the preceding vowel in word final position. This can be stated as (49).

\[(49) \ a \rightarrow \begin{bmatrix} \text{high} \\ \text{low} \\ \text{back} \\ \text{covered} \end{bmatrix} / \begin{bmatrix} \text{high} \\ \text{low} \\ \text{back} \\ \text{covered} \end{bmatrix} \]

Except for the greater degree of assimilation, this rule is analogous to the rules effecting the third singular object pronoun. Both rules have the effect of assimilating a suffixal vowel to a preceding vowel. But (49) will have to differ from the rules effecting /e/ in that if the verb ends in a nasalized vowel the assimilation of /a/ is optional. Otherwise, like /e/, it must assimilate. The simple fact of nasality alone is not normally enough to block a rule like (49), but in Chapter Two we showed that underlyingly nasalized vowels must be interpreted as WN sequences. If, as we suggested at that point, (49) is ordered before nasal deletion, we have a natural way of blocking (49), since N would be an intervening consonant, as natural a factor as any for blocking vowel assimilations.

We still have a problem at this point. The rules of /e/-assimilation must be ordered after nasal deletion since they apply obligatorily, regardless of whether the preceding vowel is oral or nasalized. /a/-assimilation also must be allowed to apply after nasal-deletion in order to make pos-
sible the assimilated variants of \((48i1)\), and because /a/ is not obligatorily nasalized, an optional rule of vowel sequence nasalization in \((50)\) must apply between nasal deletion and \((49)\).

\[(50) \quad V \longrightarrow \left[ +\text{nasal} \right] / \left[ +\text{nasal} \right] \]

Thus we seem to be forced into the position of having to state \((49)\) twice—once before nasal deletion, to account for the unassimilated forms, and once after nasal deletion, to account for the assimilated forms.

The properties of the two orderings involved are of some interest. The order in \((51i)\) is a bleeding order; \((51)\)

(i) /a/-assimilation

nasal deletion

(ii) nasal deletion

/a/-assimilation

that is, the application of /a/-assimilation before nasal deletion prevents assimilation from occurring in just those forms with final nasals, since at this point the VN \(\text{+} V\) sequence fails to meet the structural description for /a/-assimilation. These forms, then, fail to undergo /a/-assimilation, even though at a later point in the derivation they will meet its structural description. The ordering in \((51ii)\), on the other hand, is a so-called 'feeding order', since the application of nasal deletion creates a vowel sequence which meets the structural description for /a/-assimilation. The more normal, or unmarked, ordering is \((51ii)\),

117
since in this case all forms which at any point meet the structural description of /a/-assimilation undergo that rule. (51i), on the other hand, is a marked ordering, since by virtue of the extrinsic ordering alone certain forms are blocked from undergoing /a/-assimilation even though they do at some point meet its structural description.

Independently of such concepts as feeding order and bleeding order, the Equal-Height Condition suggests that (51ii) is the unmarked ordering. The Equal-Height Condition leads us to expect all vowel sequences in word-final position to undergo whatever assimilations are needed to produce surface sequences meeting this condition. The unassimilated forms in (48ii) are exceptions to the Equal-Height Condition and so the rule ordering which produces them is more highly marked. Rather than state the same rule in two different places, then, we will make use of the notions of marked and unmarked rule ordering and suggest that (51i) is an optional ordering, producing the more highly marked unassimilated forms of (48ii), while (51ii) is the normal, or unmarked, ordering, producing the assimilated forms which the Equal-Height Condition predicts. This marked order vs. unmarked order relationship exactly parallels native speaker preferences, the unmarked assimilated forms being the preferred forms. By not appealing to an optional assimilation rule, but rather to an optional rule ordering, we are not forced to explain why only /a/-assimilation can be an optional pro-
cess and not /e/-assimilation, and why /a/-assimilation is optional only after nasalized vowels, but obligatory after oral vowels too.³

The rule of /a/-assimilation and the various rules of /e/-assimilation are functionally similar in that they produce vowel sequences of the sort described by the Equal-Height Condition. While each of the rules involved is independently motivated and makes a valid prediction about Ewe phonology, neither any single rule nor any collapsible combination of these rules can independently capture the generalization which is central to the description of vowel sequences in Kpando. The Equal-Height Condition is a way of formulating the net result of all rules involved, and in this way a valid generalization is captured.

3.4.2 The Two-Vowel Condition

The native speaker of Ewe perceives sequences like $C_1^2 VV \overline{(N)}$ as a single syllable⁴, but whenever more than two vowels are in sequence they must either be reduced in some way to two or the sequence must be resyllabified in such a way that no syllable will contain more than two vowels. We will state this condition as (52).

(52) The Two-Vowel Condition:

No syllable at the systematic phonetic level may contain more than two vowels.

Sequences of three or more vowels may arise in a number of ways. A noun ending in a vowel sequence may be followed
by the definite article ñé, underlyingly lán, or by one of the particles of the form ê. As long as the result is $V_1V_2V_1$, $V_1V_1V_2$, or $V_1V_2V_2$, as in (53), there is no problem. One of the two or more identical vowels will be deleted.

(53)  nég lá 'the nut' --> négá --> néá
taé é 'it's a head' --> taé
taá lá 'the head' --> taáá --> taá
asiçodoéé 'it's a palm' --> asiçodoé

The simplest way of expressing this shortening process would be to delete the second vowel in every case, as in (54), since only the second vowel will always be identical to one of the other two.

(54)  V --> Ø / V₁ _____ (##) V₂,

where $V = V_1$ or $V_2$ and $V_1$ may = $V_2$.

If the three vowels are all different, and if the first two are a word-final vowel sequence, either the first or the second will become a glide, as in (55).

(55) (i) këg lá 'the soap' --> këgá --> kwëgá

adwe é 'it's a squirrel' --> adwe
nyë' é 'it's good' --> nyëíê

(ii) asiçodoé lá 'the palm' --> asiçodoéá --> asiçoduía --> asiçoduýá

kuí lá 'the cowry' --> kuía --> kuýá

kuí é 'it's a cowry' --> kuýé

In (55) if the word-final sequence is covered the first vowel
becomes \( w \). This will always be the case in a word-final vowel sequence consisting of non-identical vowels, since the first will always be back and rounded. If the word-final sequence is non-covered, that is, /oe/ or /ue/, it will become \( ui \) by (12) and (13) and the second vowel will become the glide \( y \). However, as the form in (55i) shows, if the \( ui \) sequence is preceded by a high non-back consonant, like /ny/ or /y/, it is not the \( i \), but the \( u \) which will become a glide. Because of forms like \( nyui'ie \rightarrow nywie \), (12) and (13) must also be ordered before the vowel sequence shortening rules, and (12) will be obligatory whenever the environment specified in the Two-Vowel Condition is met.

\( nyui'ie \) is derived from the underlying phrase \( nyu' \) 'to be good' + \( \dot{e} \) (the semantically problematical nominalizing suffix) + \( \dot{e} \) (the thematic particle). If (54) applies first, the first /e/ will be deleted and (12) and (13) will be blocked, since they do not apply across word boundaries.

The glide-creation rules are formulated and ordered as in (56).

\[
(56) \begin{align*}
(i) & \quad \begin{bmatrix} V_1 \\ +\text{rounded} \\ +\text{high} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{vocalic} \\ +\text{high} \\ -\text{back} \end{bmatrix} \quad V_2 \begin{bmatrix} V_3 \end{bmatrix} \\
& \quad \text{where } V_2 \neq V_3 \\
(ii) & \quad \begin{bmatrix} V_1 \\ +\text{rounded} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{vocalic} \\ -\text{covered} \\ +\text{high} \end{bmatrix} \quad \begin{bmatrix} V_2 \\ -\text{back} \end{bmatrix} \quad V_3 \\
(iii) & \quad \begin{bmatrix} V_2 \\ -\text{covered} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{vocalic} \\ +\text{back} \end{bmatrix} \quad \begin{bmatrix} V_1 \end{bmatrix} \quad V_3
\end{align*}
\]
The first rule changes ũ to ŭ when preceded by a palatal and followed by ɪ. The second changes /ʁ/ to ŭ when followed by ʁ, and the third changes ɪ to ŭ when preceded by a back vowel. There is enough common information in these rules that a degree of collapsing would seem to be indicated. All are glide-creation rules and all include (\(\%\)) \(V_2\) in their environments. But collapsing these three rules would require such notational complexity and such detailed specification of conditions that it would be more of a spurious simplification than a true generalization.

A more complex situation arises when both the definite article in its reduced form and the thematic particle are present. In this case sequences of three (57ii) and four (57ii) different vowels are possible.

(57) (i) to la é 'it's the ear' \(\rightarrow\) toañé
afi la é 'it's the mouse' \(\rightarrow\) afiañé
te la é 'it's the yam' \(\rightarrow\) tgañé

(ii) adöñé la é 'it's the squirrel' \(\rightarrow\) adöñéñé \(\rightarrow\) advññé
asĩpodoñé la é 'it's the palm' \(\rightarrow\) asĩpodoñéñé
\(\rightarrow\) asĩpodoñíñé \(\rightarrow\) asĩpodoñuyñé
abui la é 'it's the needle' \(\rightarrow\) abuiñé \(\rightarrow\) abuyñé

goo la é 'it's a gourd' \(\rightarrow\) goañé \(\rightarrow\) goañéñé

In every case in (57i) the deletion of /l/ has resulted in a three vowel sequence which remains a three vowel sequence.

122
However, these sequences are broken up by a syllable boundary before the final vowel which is evident from the fact that the thematic particle in these phrases receives an extra chest pulse which it does not have in (53) or (55). In (57ii) the rules in (54) and (56) operate to reduce the four-vowel sequences to wVV=V, VyVV, or VV=V sequence, where [=] is a syllable boundary. Since the syllable boundary is found where there was originally a word boundary, that is, before the thematic particle, no rule will be needed to insert it. Rather it will be assumed that when (54) or (56) reduces a non-admissible vowel sequence, any syllable boundary in the environments CV____V and C____V will be deleted by convention.

The rules of vowel sequence reduction (54) and (56), and the convention on syllable boundary deletion together restrict the length of syllable vowel sequences as described in the Two-Vowel Condition. Once again no single rule is able to capture the correct generalization. Rather a surface condition is functioning which requires several rules in order to achieve the correct forms. It seems that the theory should permit some formal way of stating conditions like the Equal-Height Condition and the Two-Vowel Condition in such a way that the generalizations they express will not be costly to the grammar. As presently stated, the Equal-Height Condition requires four rules and the Two-Vowel Condition requires five rules plus a convention for syllable
boundary deletion. This makes the statement of either condition very costly in terms of the sort of feature counting simplicity metric developed in Chomsky and Halle (1968). Probably any such condition would be costly, since it would tend to involve several rules which, for one reason or another, are not collapsible.

Kisseberth (1969) suggests an interesting way of cutting the cost of such surface conditions and conspiracies of other sorts. He points out that where rules involved in conspiracies have certain basic parts of their structural descriptions in common this information need be counted only once, since all relevant rules will contain it. This is clearly the case in the two conditions discussed in this section. In the Equal-Height Condition the structural description, including both the left side of the arrow and the environment, will have a sequence of two vowels. They may be separated by a word boundary, or they will be bounded to the right by a word boundary. It could be added as a meta-condition on grammars that, as suggested by Kisseberth, if several rules share common structural descriptions, whether or not the rules are sequential and collapsible, this common structural description is given as a condition on the grammar, and the inclusion of such information in the structural description of any rule costs nothing. In this way, the Equal-Height Condition will include \(...VViV/\) and the Two-Vowel Condition will contain \(...VVV\). Any such sequence in a
rule will be without cost and will simply show that that rule functions as part of a conspiracy. In this way, it is possible for a grammar to capture the importance of various surface and global conditions which would otherwise appear to be nothing more than unrelated rules, in spite of their obvious functional similarity.

3.5 A Historical Look at /e/-Lowering

In Chapter Two we presented a complex set of rules which have the combined effect of lowering /e/ to ə in Kpando in all but a few environments. In this section we will re-examine the /e/-lowering process, developing a hypothesis as to its diachronic development and suggesting an alternative synchronic treatment. For ease of reference, we will repeat the rules of /e/-lowering here as (58) through (61).

(58) Pronominal /e/-lowering:

\[
\begin{bmatrix}
V \\
-\text{high} \\
-\text{back} \\
-\text{covered}
\end{bmatrix} \rightarrow [+\text{covered}] / [+ \text{Pronoun}] \quad \text{Verb}
\]

(59) Mono-syllabic /e/-lowering:

\[
\begin{bmatrix}
V \\
-\text{high} \\
-\text{back} \\
-\text{covered}
\end{bmatrix} \rightarrow [+\text{covered}] / /^{\#} ^{\#} c_i^{2} \ (N) \ /^{\#} ^{\#}
\]

(60) Mirror-image /e/-lowering:

\[
\begin{bmatrix}
V \\
-\text{high} \\
-\text{back} \\
-\text{covered}
\end{bmatrix} \rightarrow [+\text{covered}] / ^{*} c_i^{2} \begin{bmatrix}
V \\
-\text{high}
\end{bmatrix} \chi ^{\#} ^{\#}
\]
(61) Coveredness assimilation:

\[
\begin{bmatrix}
V \\
-\text{high} \\
-\text{back} \\
-\text{covered}
\end{bmatrix} \quad \rightarrow \quad [+\text{covered}] \quad / \quad [+\text{covered}] \quad (\#\#)
\]

Even though all four rules are identical up to the diagonal, we question whether any valid generalization is to be gained by collapsing them. Their environments differ so radically that any attempt to use the usual notational device for collapsing rules of this sort makes of braces exactly what Lakoff (1969) calls them—an admission of failure on the part of the linguist or on the part of the theory of language to find any generalization about the enclosed material.

However, since Kpando differs from other dialects just in the /e/-lowering process, the implication is that Kpando must have added a single /e/-lowering rule. From a diachronic point of view it is unlikely that any language would add a rule with the environmental complexity of the collapsed version of (58-61). Rather, there must first have been a single, much simpler form of /e/-lowering which was complicated by later changes.

We believe that three of the Kpando /e/-lowering rules, rules (59), (60), and (61), result from three quite natural changes. The first of these was alluded to in Section 3.3, where it was noted that all dialects have a restricted variant of coveredness assimilation which lowers /e/ to \# after /a/. Kpando generalized this rule by changing the structural description in (62i) to that in (62ii).
(62) (i) \([+\text{low}]\) (\#\#) ____
(ii) \([+\text{covered}]\) (\#\#) ____

[+low] defines only one vowel in Ewe, but one of the features shared by /a/ and /e/ is [+covered], which is also the only feature of /e/ which changes in either variant of coveredness assimilation. Since [+covered] refers to the three vowels /æ/, /a/, and /o/, the structural description change from [+low] to [+covered] is a simple and natural case of rule generalization.

This particular type of generalization was also involved in the second change undergone by Kpando. Synchronously Kpando, together with most western and central dialects, has only one noun prefix—the low vowel /a/. By dialect comparison and by reference to Koelle's lists for Ewe dialects it is clear that at one time all dialects must have had two other prefixes: /e/ and /o/. /e/ was by far the more frequent of these, and most consonant-initial nouns in Ewe today originally had the noun prefix /e/. The Lome dialect, as reported by Kropp (1966), has no consonant-initial nouns; rather it has maintained the vowel prefixes of proto-Ewe. The vowels /e/, /o/, and /a/, however, do not form a natural class. They are all [-high] but /æ/ and /o/ are also [-high], and there is no other phonological feature that they might share uniquely. Possibly after the rule generalization which produced the present coveredness assimilation rule, Kpando also generalized the lexical specification of the noun prefix
from (63i), which is the synchronic specification for Lome, to the much simpler (63ii).

(63) (i) \{[-\text{covered}] \}  
\text{(i.e., /e/ and /o/)  

\{[+\text{low}] \}  
\text{(i.e., /a/)  

(ii) \{[+\text{covered}] \}  
\text{(i.e., /æ/, /œ/, and /a/)  

What we gave above as monosyllabic (59) and mirror-image (60) /e/-lowering originally developed as a natural extension of the environment for coveredness assimilation, so that (61) would now apply either across word-boundaries or across a consonant, as in (64). This unified rule of /e/-lowering would have been blocked by an adjacent non-covered vowel or by an adjacent syllable containing a high vowel, just as the modern /e/-lowering rules are.

(64) e \rightarrow œ / [+\text{covered}] \left( \begin{array}{c}
\{[\text{+low}] \}  
\{c_1^2 \}
\end{array} \right)

\text{Condition: does not apply if an immediately following vowel is [-\text{covered}] or if the next syllable contains a high vowel.}

When the non-low noun prefixes were lost, considerable complication was forced into the /e/-lowering process. Normally, when the conditioning factor for a sound change is lost, the sound change ceases to be a part of the synchronic grammar, and thus /e/ should have been lost in favor of œ. But the condition on (64), which will block the application of (64) to verbs before the third singular object pronoun e and to nouns before the diminutives -o and vi, prevented such
a merger, since both /e/ and * could occur, depending on the environment. Thus what had been a single, natural rule became, by the loss of two noun prefixes, a complex set of rules. Nouns which had originally been /#* C\textsuperscript{2} V (N) /#* or /#* C\textsuperscript{2} V (N) /#* now became /#* C\textsuperscript{2} V (N) /#*, and longer nouns also lost the * prefix. To maintain the /e/-lowering, then, it was no longer possible to use (64). Rather, (59), monosyllabic /e/-lowering, became necessary. This was a far-reaching change, because in its new form /e/-lowering in monosyllables ceased to be an assimilation rule. With no conditioning factor needed any longer for /e/-lowering, further generalization became possible, and mirror-image /e/-lowering became at least in part an unconditioned rule by changing its environment from [+covered] to [-high], including the non-covered vowels /e/ and /o/ as part of the environment for /e/-lowering. Because of the loss of the prefix, a high vowel in either syllable adjacent to the vowel subject to lowering could block /e/-lowering, and so (60) became a mirror-image rule. The process of rule generalization reached its extreme point of diachronic development in a category-specific environment. Pronominal /e/-lowering (58) lost all phonological conditioning and became a straightforward categorial rule.

There seems, in fact, to be a general shift from conditioned /e/-lowering to unconditioned /e/-lowering. The most extreme case of this shift is the categorial rule just men-
tioned, in which /e/ becomes ə regardless of what follows. Mirror-image /e/-lowering still maintains a degree of phonological conditioning, since at least two of the non-high vowels will be covered. Finally, coveredness assimilation will prevent /e/ from being lowered unless the adjacent vowel is covered. It seems, then, that what we have is a scale of increasing degree of assimilation potential. The potential for assimilation is highest when no other vowel is contiguous and when no other vowel is found in the same word, or when the following morpheme is a verb. The next potential is when there is an adjacent syllable in the same word. Assimilation will then occur only if the vowel of that syllable is non-high. The lowest degree of potential is when there is an immediately adjacent vowel, whether or not word boundaries intervene. This environment is the only completely phonological environment, and in this environment /e/-lowering is blocked by the greatest number of factors. The simplest statement of /e/-lowering, then, is (65).

(65) /e/ becomes ə in Kpando unless the adjacent vowel is non-covered or the vowel of an adjacent syllable is high and that syllable is not a verb stem.

Rule (65), which is essentially the opposite of (58-61), seems to come closer to stating the correct generalization about /e/-lowering. It is negative in that it tells where /e/-lowering will not occur, rather than where it will occur, and we know of no way to state such a generalization formally.
Unless the theory of language can be modified to state such negative environments, it will remain impossible to properly formulate the sort of rule we are working with here.
NOTES

1. The claim that these and other pronouns are actually clitics and not independent lexical items must, of course, have broad implications. In many Kwa languages, however, it is clear that there is a set of dependent pronouns paralleling the independent pronouns. e and ə in Ewe cannot be used independently and may be morphologically related to the independent third singular pronoun əya. The fact that these are clitics and that a rule of subject-verb agreement very similar to what is needed in Bantu (see Givon, 1969) also exists in Kwa is interesting support for the Niger-Congo hypothesis. See Stahlke (1969) and Schachter and Fromkin (1968) for further discussion of clitic pronouns in some Kwa languages.

2. Arguments to the effect that dependent subject and object pronouns in Bantu are affixal have been raised in nearly every discussion of Bantu concordial agreement. Givon (1969) is especially lucid in his discussion of this topic. For Kwa languages, these arguments are not as obvious, but they have been presented in discussion of a number of languages. See Abraham (1953) for Idoma, Stahlke (1969), Courtenay (1969) and Fresco (1970) for Yoruba, and Schachter and Fromkin (1968) for Akan.

3. I would like to thank Charles Kisseberth for some very helpful comments on this problem.

4. The syllable as a linguistic unit has so far resisted rigorous definition, but native speakers of most languages rarely have any trouble producing particular syllables upon request and can identify what is and what is not a syllable. Without attempting a general definition of syllable, we will simply rely on what native speakers have identified as syllables in Ewe.
Chapter 4
PREVIOUS STUDIES OF TONE IN EWE

4.0 Introduction

The tonal system is probably the best documented area of Ewe phonology in the published literature on the language. In addition to a chapter devoted to tone in Westermann (1930) and an article by Smith, there are two full-length monographs devoted primarily to the analysis and description of Ewe tone. These are Ansre (1961) and Sprigge (1967). Ansre's work is based on his native Peki, a dialect which is very close tonally to Kpando, and many of the basic insights into Ewe tonology which are focused upon in this monograph, as well as in every study since 1961, are due to Ansre's careful and detailed description. Sprigge's monograph is a thorough study of tone in the Adangbe dialect spoken in Togo. The divergence between Adangbe and either Peki or Kpando is considerable and, while many specific differences would be interesting to pursue in a dialectological study, we will not include an examination of Sprigge's work in this chapter since the degree of divergence makes its relevance questionable. Smith's paper is the most recent consideration of Ewe tone and is also the only one to date which is done within a generative model. He presents little that is new in the way
of data, and his analysis seems to be based largely on Ansre's work and on extensive conversations with Ansre, as he remarks in a footnote. Both in outline and in detail his paper is extremely faithful not simply to Ansre's work but also to his analytic intent. In the following chapters we will frequently refer to Smith's description, submitting it to a thorough evaluation. We choose Smith's work, rather than Ansre's earlier study, because of its attempt at explicit statement of generalizations about Ewe tone.

Section 4.1 will be devoted to outlining the basic contributions of Westermann. We will not enter into an extended critique of Westermann's work at this point, since to do so would anticipate much discussion and argumentation which must be presented later. Also we will not attempt a complete summary of his description since his book is readily available and since some of his statements will be referred to in later chapters. In Section 4.2, which is devoted to reviewing Ansre's analysis, we will again forego extensive criticism and complete coverage. The reason is again that many of his claims will be discussed later in this and subsequent chapters. In Section 4.3 we will consider in detail Smith's analysis of the mid/low alternation. We will show that this alternation is neither so closely tied to the consonant system as Ansre claims nor so complex and syntactically conditioned as Smith claims, and we will show that even on the basis of the data Smith gives a simpler analysis is possible.
4.1 Westermann's Analysis

The first serious attempt to describe the tonal system of Ewe was that of Westermann (1907). He later revised this work slightly for translation, and it is the later version (1930) on which we base our remarks in this Section. Westermann described Ewe as having 'three simple tones, high, low, and middle, and two compound tones, rising and falling (1930: 26),' commenting on and illustrating the importance of tone to the lexical and grammatical structure of Ewe. He claims that mid is the least important of the simple tones, citing the high/low opposition as the only one which distinguishes single lexical items in isolation. He does not go so far as to claim an allophonic relationship between low and mid and fails to see the relevance of voiced consonants to the relationship. The instances of mid he gives are either in polysyllabic morphemes or in phrases, that is, where some environmental influence is present. Where low and mid alternate, he regards low as being basic, giving, for example, the rule that 'all low toned syllables of a word combination which follow immediately upon a syllable with middle tone acquire a middle tone (1930:29).' From his examples of the operation of this rule, it seems that by the word 'combination' he means either a gerundive nominalization or a noun + clitic sequence. Most of his examples are of a noun followed by a reduplicated verbal noun, such as xo 'house', mè 'in', nò̀̀gò 'the inhabiting' becoming xoméngòngò 'the inhabiting of a
house', or ọ̀wà 'money', sue 'small', fọ̀ọ̀ 'the picking up' becoming ọwàsuefọ̀ 'the picking up of money'.

Among the other tonal changes Westermann deals with, the most interesting are those involving the rising and falling tones. He apparently feels that these contour tones can have either a mono- or a polymorphemic analysis. For the falling tone he gives five sources. These are the single morpheme,

(1) koklo̱ 'chicken'

bli̱ 'corn'

sequences of high tone verb + consonant-initial high or mid tone noun,

(2) tsọ́ 'take', tún 'gun'; ẹtsọ́dụ́ 'he took a gun'

nyé 'to be', kpḻọ́ 'table'; ọsìià ẹnyé kpḻọ́ 'this is a table'

dzrá 'sell', te 'yams'; wódzrá te 'they sold yams'

the formation of direct questions, which involves the addition of a final low tone,

(3) kpó 'see', ameka ne kpó omo'whom did you see?'

nyé nọ́ 'my mother', ameka kpó nọ́ 'who has seen my mother?'

his so-called 'psychological tone', which consists of adding a low tone at the end of a sentence which is to be emphasized,

(4) atí lá kpó 'the tree is high'

atí lá kpó 'of course the tree is high'

évé 'he has come'

évé 'of course he has come'

and what he calls tone-advancing, where the loss of a high-
tone vowel results in the shift of that high tone to the fol-
lowing low-tone vowel. The only examples he gives of this
are verb + third singular object pronoun sequences in which
the vowel sequence is \( \hat{a} \) or \( \hat{a} \). The former becomes \( \hat{a}v \) and
the latter \( \hat{a}v \).

\[
\begin{align*}
(5) \quad y\hat{a} & \quad 'call him' \quad \rightarrow \quad y\hat{a}v \\
\quad tr\hat{a} & \quad 'turn it' \quad \rightarrow \quad tr\hat{a}v \\
\quad k\hat{a} & \quad 'say it' \quad \rightarrow \quad k\hat{a} \\
\end{align*}
\]

In those cases where the vowel sequence resulting from this
construction consists of two identical vowels a falling tone
will also be found, since the pronoun has a low tone. How-
ever, since Westermann often represents such sequences with
two vowels, he probably would not consider this a valid fall-
ing tone, but rather a tone sequence. Of the four cases he
cites, then, only the first is not the result of derivation
or of morphemic sequences. The number of such words is very
small in both Aŋlo and Kpando, but they are somewhat more
common in Adaŋbe (Sprigge, 1967:46-47). The only other
falling tone in a single morpheme which we have discovered is
in the word \( \hat{a}f\hat{u} \) 'here'. In this case, as in Sprigge's
examples, the fall ends on mid, rather than on low.

On the sources for the rising tone he does not always
make it clear whether he considers the sequence polymorphemic
or not. He cites four sources where the rising tone is
clearly derived, if not the result of a morpheme sequence.
These are the assimilation, or, as he puts it, the elision of
the -é suffix, as in tsi 'water' + é --> tsié, the formation of compound nouns,

(6) te 'yam' + agble 'farm' --> tegbley 'yam farm'
kpo 'oven' + dzo 'fire' --> kpódzó 'oven fire'
za 'money' + yevú 'European' --> yevúyá 'European money'

the sequence of a noun and a demonstrative sia 'this', má 'that', or kóma 'that',

(7) be 'straw', bé sia 'this straw'
amé 'person', amé má 'that person'
hútsu 'man', hútsu kóma 'that man'

and the formation of verbal adjectives, or participles.

(8) ṣu 'eat' → ṣuú 'eating'

In a few cases he claims that rising tone is replaced by mid before a high tone or in final position,

(9) fésre 'window' + gbálá 'breaker' --> fésré gbálá
    'window breaker'

kplọ 'table' + kpalá 'joiner' --> kplọ kpalá

considering mid to be basic. However, just a few lines earlier he points out that the rising tone resulting from compound formation 'in many cases...sounds like a middle tone, but the presence of a rising tone is clearly shown when a further low tone is added (1930:31).' There seems to be little reason for distinguishing the two alternations and regarding one as having a mid tone and the other as having a rising tone, since they have complementary environments, mid before a high tone or a pause, and rising before a low tone.
4.2 Ansre's Analysis

Ansre's masterly study of Ewe tone (1961) is a model of clarity, thoroughness and insight. Most of the tonal phenomena of the Peki dialect of Ewe are reported and accounted for in terms of a relatively small set of generalizations. Ansre shows that in monosyllabic nouns the most important conditioning factor is the class of the stem consonant.¹ He postulates three such classes, Class A containing all and only the voiced obstruents, Class B containing all and only the voiceless obstruents, and Class C containing all and only the sonorants, that is, the liquids, glides, and nasals. If the stem consonant of a noun is of Class A, the following tone will be either low or low-high rising. If the stem consonant is of either Class B or C, the following tone can be mid, high, or mid-high rising, but not low. The tone of the noun prefix, in those nouns which have a prefix, is low before a consonant of Class A or B and mid before a consonant of Class C. The mid tone found after a Class B or C consonant becomes low before a low tone, in isolation, or in final position. The last two environments can be collapsed into one since nouns in isolation will always be in final position. Example (10) from Smith (1968) illustrates this final/non-final alternation.
(10) dà 'snake'  dà lá 'the snake'  
   hà 'pig'  hà lá 'the pig'  
   pù 'sea'  pù lá 'the sea'  
   kpo 'stick'  kpo lá 'the stick'  
   nyì 'cow'  nyì lá 'the cow'  
   gò 'sun'  gò lá 'the sun'

The fact that /g/ is a Class C consonant with respect to tonal behavior supports our claim in Chapter One that it is a sonorant and not an obstruent.

Ansre observes that this cooccurrence of consonant class and tone applies only when the consonant is the initial consonant of a monosyllabic noun stem (1961:31). Most of his examples of simple disyllabic stems all conform as to the first consonant, but there are some problems with the second consonant. The forms ᵐúvi 'laziness' and ᵐtàdá 'pepper' should both, according to Ansre's principles, have low or low-high rising tones on their final syllables and ᵐgbàla 'sneak' should have a mid-high rising tone, rather than low-high rising on its final syllable. His examples of compound stems also reveal certain anomalies, including ᵐbọta 'shoulder', ᵐmidzé 'palm oil', ᵐneví 'bird', and ᵐdehaa 'palm wine', where Class A consonants again appear before mid and high tones. Ansre does not attempt to give an explanation for these forms. He goes on to note that his consonant classification is not related to the tones of verb stems in anything like the pervasive way it is with nouns. Rather, the tone of the verb

140

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stem depends in part on the tone and initial consonant of the following noun. Thus, just as a noun prefix has a mid tone if the following consonant is of Class C, so a non-high verb stem in the same environment will have a mid tone, and before a Class A or B consonant the verb will have a low tone, as illustrated in (11).

(11)  wó wù dzàtá lá  'They killed the lion.'
      wó wù sò lá    'They killed the horse.'
      wó wu nyì lá   'They killed the cow.'
      wó ële dzàtá lá 'They bought the lion.'
      wó ële sò lá    'They bought the horse.'
      wó ële nyì lá   'They bought the cow.'
      wó dà zè lá     'They threw the pot.'
      wó dà sò lá     'They threw the horse.'
      wó da nyì lù    'They threw the cow.'

If a noun which would normally have a mid tone occurs in final position and is, therefore, on a low tone, the verb also has a low tone, regardless of the consonant class of the verb stem consonant.

(12)  wó wù nyì      'They killed a cow.'
      wó ële nyì     'They bought a cow.'
      wó dà nyì      'They threw a cow.'
      wó wù xè      'They killed a bird.'
      wó ële xè     'They bought a bird.'
      wó dà xè      'They threw a bird.'

In Ansrö's analysis, then, the low and mid tones are allo-
tones of single non-high tone(s). He does not posit one or the other as basic but merely shows that they are in complementary distribution and that in some cases they alternate. He claims that the distribution of mid and low is conditioned by the class of the preceding consonant, but this works, as he shows, only in the first $C^2_i$ V syllable of a noun. In some cases the tone of a syllable is conditioned by both the following consonant and the following tone, as (12) shows.

The linking of low tone with voiced obstruents is not as surprising as it may seem at first glance. Ladefoged, in his discussion of Ansre (1962), points out that the voicing quality of voiced obstruents has a lower fundamental frequency than does that of vowels. The transition from a voiced obstruent to a vowel may well reflect this fact in a lowered tone, as in Ewe, or in the replacement of a high tone by a rising tone, as in Nupe (George, 1970). In her recent dissertation, Nancy Woo (1969) gives a further explanation for this relationship. She points out that one of the articulatory correlates of both low tone and voiced obstruents is a lowering of the glottis. In the production of a low tone this lowering is accompanied by a shortening of the vocal folds and a resulting increase in thickness. In the production of a voiced obstruent, the lowering of the glottis is required in order for voicing to occur since the closure in the mouth will cause the supra-glottal pressure to be too high for the normal airflow through the glottis to occur.
The lowering of the glottis raises the subglottal pressure enough to produce a positive air pressure in the trachea and the low-frequency voicing which is characteristic of voiced obstruents. There is, thus, an articulatory similarity between the voicing of an obstruent and the production of a low tone. Woo goes on to describe high tone as involving a raised glottis and longer, tense, and thinner vocal folds. Both of these features, high tone \([+H]\) and low tone \([+L]\), involve some positive gesture—either a raising of the glottis with a tensing and lengthening of the vocal folds or a lowering of the glottis with a shortening and slight relaxation of the vocal folds. The absence of either gesture is the configuration for mid tone. There is, of course, no \([+H, +L]\) segment, since it is impossible to both raise and lower the glottis at the same time. The three pitch heights of Ewe, then, are defined by these two features as follows.

\[
\begin{align*}
\text{High Tone} &= \begin{bmatrix} +H \\ -L \end{bmatrix} \\
\text{Mid Tone} &= \begin{bmatrix} -H \\ -L \end{bmatrix} \\
\text{Low Tone} &= \begin{bmatrix} +H \\ +L \end{bmatrix}
\end{align*}
\]

Woo makes the claim (1969:170) that the unmarked tone for syllabic sonorants is mid. This follows in part from the fact that mid tone is the absence of any glottal gesture other than the closing of the vocal folds to produce voicing. However it also follows from the behavior of tone in many languages. Woo shows that the analysis of Mandarin Chinese
and of Tepehuan is much simplified if mid tone is regarded as basic. Andrzejewski (1964) points out that all non-final unstressed syllables in Somali are mid-tone, becoming low only if they are in final position. In languages having two tones, such as Akan (Schachter and Fromkin, 1968), Efik (Welmers, 1969), Ijig (Williamson, 1969), and Igbo (Welmers, 1969), the contrast can usually be given as high tone vs. non-high tone. An initial non-high tone in these languages usually is around the middle of the pitch range of the normal speaking voice, rather than towards the lower end of it as it would be for an initial low tone in a language with three phonetic pitches, such as Ewe, or three phonemic pitches, such as Yoruba. Although the non-high tone in the two-level languages mentioned gets progressively lower, it does not become a phonemic low tone. This lowering is the result of a downdrift phenomenon which extends over the length of an utterance and is probably common to all languages in one form or another (cf. Welmers, 1959, Stewart 1961, and Courtenay, 1969).

4.3 Smith's Formalization

We mentioned above that Smith's description of tone in Ewe is not so much a new analysis as a generative formulation which remains quite faithful to the intent of Ansre's analysis. There are, however, a few differences between the two which will be noted in the course of this discussion. For example, Ansre (1961:23) posits an abstract non-high toneme
which has the allophones of mid tone and low tone. He is careful not to posit one of these as basic, deriving the other from it. In terms of phonological features, the two tones Ansre posits as phonemic would be \([+H]\) and \([-H]\). \([+H]\) would, of course, be redundantly \([-L]\), but for \([-H]\) low tone would not be specified. Rather, \([+L]\) and \([-L]\) would be filled in by contextual conditions, or, in generative terms, by phonological rules. This is something of an odd state of affairs since, with a very small number of exceptions of a special sort to be discussed later, morphemes enter the phonological rules with all features specified. Quite naturally, then, Smith chooses one of the two non-high pitches as basic, predicting the other by a complex set of phonological rules which is our immediate concern.

On the surface of it, Smith could have chosen either mid or low as basic, but he chooses mid, not giving any reasons. He says simply that 'by convention, the unmarked tone is \([-H, -L]\). Any vowel, whether in the lexicon or introduced by rule, which is not marked otherwise is presumed to have these features' (1968:292). This choice can be motivated from the data of Ewe, beyond the considerations mentioned in the preceding section. As Ansre observed, low tone is found in noun stems only after Class A consonants, that is, voiced obstruents. After Class B and C consonants, voiceless obstruents and sonorants, mid tone is found. Putting this in rule form, low tone can be predicted as in (14i)
or mid tone as in (14i).  

(14) (i)  $\begin{array}{c} V \\ -H \end{array} \rightarrow \begin{array}{c} +L \\ \end{array} / \begin{array}{c} +\text{voiced} \\ -\text{sonorant} \\ +\text{noun} \end{array}$ \hspace{1cm} (CV) 

(ii)  $\begin{array}{c} V \\ +L \end{array} \rightarrow \begin{array}{c} -L \\ \end{array} / \left\{ \begin{array}{c} [+\text{sonorant}] \\ [-\text{voiced}] \end{array} \right\} \hspace{1cm} (CV)$ 

For obvious reasons, Smith chooses (14i); it is simpler in that only a single environment is needed, and a natural one at that, while in (14ii) two quite unrelated environments are involved, and it seems little more than a coincidence that low should become mid after both sonorants and voiceless obstruents. It is (14i) which Smith formulates to account for the tones of the non-final forms in (10).

To account for the tone of the noun prefix $a-$, Smith adds rule (15).

(15)  $\begin{array}{c} V \\ -H \end{array} \rightarrow \begin{array}{c} +L \\ \end{array} / \begin{array}{c} -\text{sonorant} \\ +\text{noun} \end{array} \hspace{1cm} V$

What this rule intends to claim is that before a stem-initial obstruent, voiced or voiceless, the noun prefix will be low.2

The next tonal rule is specifically intended to account for the mid/low alternation as it operates in verbs. Observing that the class of the initial consonant of the verb is irrelevant to tonal behavior, Smith cites two further environments for mid/low alternation. First, when the initial consonant of the item immediately following the verb is an obstruent a mid-tone verb becomes low. He illustrates this with the following examples (1968:293).
(16) mè gbè kútsétsé á wò  
   but me gbé ajutí á wò  
   wò wò kunú
   but mà a ñu nú
   mè fi kpo lá
   but me fi yì lá
   'I plucked the fruits.'
   'I plucked the oranges.'
   'They performed a funeral.'
   'I shall eat (thing).'
   'I stole the stick.'
   'I stole the cutlass.'

He observes, however, that mid does not become low if the following item is an adverb, citing as evidence (17).

(17) é tsi kábá
   me zò híóyíhíóyí
   but mè wù kesé lá
   'He grew fast.'
   'I walked clumsily.'
   'I killed the monkey.'

Finally, he observes that a mid-tone verb becomes low if preceded by a low tone and followed by a verb, citing as evidence (18).

(18) yáwò xà zò vá kpo ame gá lá à
   kofí xà zò vá kpo ame gá lá à
   'Did Yawo come to see the great man?'
   'Did Kofi come to see the great man?'

He collapses these two environments into the following rule.

(19) \[ V \] \[ -H \] \[ +L \] \[ [+verb] + [ -sonorant -adverb ] \]

The fourth rule Smith gives is intended to account for two different types of low tone sequence. First of all, in the singular of the imperative an initial non-high verb becomes low and all consecutive succeeding mids become low. He notes that this low tone sequence will be found only if the first
verb is underlyingly non-high. Otherwise the succeeding
tones will be mid. (20i) illustrates the low tone sequences,
and (20ii) the mid tone sequences.

(20) (i)  wu l'âkle lá
        gbè a'jutí á wó
        nọ  ànyí
   'Kill the leopard!' 'Pluck the oranges!' 'Sit down!'

(ii)  wó wu l'âkle lá
        me gbè a'jutí á wó
        và nọ  anyí
   'They killed the leopard.' 'I plucked the oranges.'
   'Come and sit down.'
   (và is underlyingly và, cf. mevà 'I came'.)

Second, he writes,

'After a small set of items including /fifílàà/
'now', /gè/-verbal emphasizer, and maybe one or
two others, followed by a pronoun subject, the tone
of the vowel of the pronoun and the tone of all suc-
ceeding vowels is low until a high is reached.'

(1968:295)

He illustrates this with the sentences

(21)  gbè mè zọ kpóókporóó  'I did walk quietly.'
    but me zọ kpóókporóó  'I walked quietly.'
   fifílàà mè vá ọ̀  'Just now I arrived.'
    but me vá ọ̀  'I arrived.'
   cf. fifílàà ame vá ọ̀  'Just now a person ar-
   rived.'

Finally, he mentions a set of nouns which have the same ef-
f ect, including ṣàgèè 'many', ọhọọ́ 'widow', ọwọ́ (proper
name), etc. These he illustrates as follows.

148
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We noted in Section 4.1.2 that Ansre mentioned two further environments in which the non-high tone was realized as low. These were in final position and before another low tone, as in the examples in (10) and in the following taken from Smith (1968:292).

(25) \text{me kpò̀ amè} \quad \text{'}I saw a person.'
    (cf. \text{me kpò̀ ame la} \quad \text{'}I saw the person.'
    \text{mè bu wò} \quad \text{'}I respect you.'
    (cf. \text{me bu wò} \quad \text{'}I respect them.'

We gather from the discussion both writers present that this lowering process is a general phonological rule applying without regard to categorial information. This, at least, is how Smith formalizes it, as in (26).

(26) \begin{array}{c}
  \{ \text{V} \} \\
  \text{-H} \\
\end{array} \rightarrow \begin{array}{c}
  \{+L\} \\
  / \\
\end{array} \begin{array}{c}
  \{ \# \} \\
  \text{+L} \\
\end{array}

Smith collapses this with his other mid-lowering rules, and orders it as the last of the whole complex.
Smith discusses some further complications on mid/low
alternation, but his rule as stated in (27) is already com-
plex enough to make one wonder whether he has not missed some
generalization. On the basis of his data and within the
spirit of his analysis a degree of simplification is possible.
Consider, for example, sub-rules (b) and (e). (b) has the
function of lowering mid to low on the noun prefix. As pre-
sently stated, (e), which lowers the mid tone of a verb to
low before a non-sonorant which is not part of an adverb,
does not bear much similarity to (b). However, the surface
syntactic structure of the Ewe sentence is such that the only
items which will ever follow a verb are a noun, an adverb, or
another verb. We leave out clitic pronouns because, as we
showed in Chapter Three, they are dominated by the category
Verb. The rule which will operate on verb sequences is (f), so the lexical class of non-adverbs can only be taken to mean nouns. Thus the two rules, (b) and (e), differ only in that one operates on a vocalic noun prefix, while the other operates on the final vowel of a verb immediately before a consonant-initial noun. All that distinguishes (b) and (e) formally, then, is that (e) operates across a word boundary and (b) operates within a word. They are both conditioned by the initial consonant of a noun stem. We suggest that (b) and (e) be collapsed as (28).

\[
(28) \left[ \begin{array}{c} V \\
-\text{H} \end{array} \right] \rightarrow [+L] / \quad (\#\#) \left[ \begin{array}{c} [-\text{sonorant}] \\
\text{Noun Stem} \end{array} \right] V
\]

In this way (b/e) becomes more of a phonologically conditioned rule, since the categories Verb and Adverb are not needed.

Sub-rules (c), (d), and (f) may also prove to be liable to further simplification. All three have the effect of producing series of low tones, and so we are again led to question whether three such distinct environments are necessary. In order to answer this question we must look briefly at the behavior of tone in imperative verbs. Rule (c) is one of three rules which Smith formalizes specifically to account for the tonal behavior of the imperative. The other two apply to high tone verbs in the following way. To account for the rising tone found in imperative verbs which have voiced initial consonants,
(29) vá 'to come' \(\rightarrow\) váá 'Come!' 
  ná 'to give' \(\rightarrow\) nàá gà kofi 'Give the money to Kofi!'

he uses a rule of vowel-epenthesis.

(30) \(\emptyset \rightarrow \left[ \frac{V}{+L} \right] / \neq \left[ \frac{C}{+\text{voice}} \left[ \frac{V}{+\text{verb}} \right] \frac{V}{+H} \right] (V) +\)

And because high tone verbs with voiced initial consonants have a low tone before another verb,

(31) vá nọ anyí 'Come, sit down!' 
  và lyá àti 'Come, climb the tree!'

he suggests a second rule which changes a high tone to a low in the imperative and before another verb.

(32) \(\left[ \frac{V}{+H} \right] \rightarrow \left[ \frac{+L}{} \right] / \neq \left[ \frac{C}{+\text{voice}} \left[ \frac{+\text{verb}}{+\text{verb}} \right] + \left[ +\text{verb} \right] \right] \)

When these two rules are compared with (c) and with the data in (201), it becomes clear that low tone is characteristic of the imperative and that all three rules have the function of placing a low tone on the initial verb of an imperative sentence. If we treat the change of a mid tone verb to low tone and the change of a high tone verb to a rising tone or a low tone as belonging to a single grammatical function, then we do not need the sentence-initial environment of (c), since the low tone in that environment will be due not to sentence-initial position, but to the imperative. The subsequent low tones of the examples in (201) must be due to a progressive assimilation rule which operates without regard to categorial information. This rule we can formalize as (33).
(33) \[ \frac{V}{-H} \rightarrow [+L] \bigg/ [+L] \]

The complexity of rule (f) is due not to linguistic factors but to an idiosyncrasy of Smith's descriptive style. Throughout the paper he follows the disconcerting practice of explaining the operation of a rule by stating its inverse in prose. Thus in describing (f) he says that 'when the verb is followed by another verb and is not preceded by a low tone, the tone of the first verb remains mid before mid or high' (1963:294), but this neither describes the operation of (f) nor motivates the extended environment. He mentions a following verb in his prose description apparently because a following noun with an initial obstruent would cause the mid tone in question to become low by rule (b). However, the rule predicts the regressive assimilation of low, not the behavior of mid, and so it should not be necessary to mention the lexical category of the following syllable, or even that there is a following syllable. A prose statement of what Smith seems to intend would have to say that a mid tone verb becomes low after a low tone, but this is simply our rule (33). It will make no difference what category is involved because his example \[\text{\texttt{\`a laikle la}}\] 'Kill the leopard!' shows a basically mid tone noun becoming low after a low tone. We infer, then, that (f) is unnecessary, its function being covered by rule (33).

Rule (d) operates on strings which begin with an adverb, like \texttt{\textipa{\textipa{fifila}}} 'just now' or \texttt{\textipa{de}} (verbal emphazizer), or with a
class of nouns which Smith identifies by the feature \([+X]\), the latter including \(\text{re\'d\'e} 'many', \text{\'a\'h\'o\'s\'i} 'widow' and \text{\'a\'v\'o}\) (proper name). All of these will have low tones wherever they occur. Thus \(\text{\'a\'h\'o\'s\'i} 'widow'\) differs from \(\text{ame}\) in a way which is predictable in part by rules (a) and (b). The noun prefix of \(\text{\'a\'h\'o\'s\'i}\) is low because it precedes an obstruent. That of \(\text{ame} 'person'\) is mid when the word is not in final position, because it precedes a sonorant. Sub-rule (a) predicts the tones of the second syllables, and the low tone of the third syllable of \(\text{\'a\'h\'o\'s\'i}\) is due to exactly the type of low tone assimilation we are concerned with here. If the low tone of these \(X\)-class nouns and adverbs is taken as the conditioning factor for the shift from mid to low, we have a perfectly natural assimilation rule and the feature \([+X]\) is not necessary. Some categorial information still seems necessary if Smith's examples in (34) are to be explained,

\[(34)\]

\[
\begin{align*}
\text{f\'i\'i\'l\'a\'a} & \text{ m\'e\'v\'a} \text{ \'g\'o} \quad 'I \text{ just arrived.'} \\
\text{f\'i\'i\'l\'a\'a} & \text{ a\'m\'e} \text{ v\'a} \text{ \'g\'o} \quad 'A \text{ person just arrived.'} \\
\text{\'g\'e} & \text{ m\'e\'z\'o} \text{ k\'p\'o\'k\'p\'o} \quad 'I \text{ did walk quietly.'}
\end{align*}
\]

since it is only a pronoun which gets lowered, and not a noun. We suggest, though, that two partly distinct rules are involved. One of these will lower a verb or anything of the category Verb after a low-tone-final adverb, and the other will lower mid tone after a low tone noun. This follows from the fact that if two nouns occur in sequence, the second will lose its prefix and will come under the domain of the low
tones of the first noun. Thus Peki would have two rules, the first of which lowers a mid tone [+verb] segment after a low-tone-final adverb (35),

\[(35) \left[ \begin{array}{c} \text{V} \\ \text{\text{-H}} \end{array} \right] \rightarrow \left[ \begin{array}{c} \text{\text{+L}} \end{array} \right] / \left[ \begin{array}{c} \text{\text{+L}} \end{array} \right] \left[ \begin{array}{c} \text{\text{Verb}} \\ \text{Adverb} \end{array} \right] \left[ \begin{array}{c} \text{\text{C}^2} \\ \text{\text{C}^1} \end{array} \right] \]

and a second which is our (33). These will be ordered so that (35) applies first and then (33). We can collapse them as the combined rule (36).

\[(36) \left[ \begin{array}{c} \text{V} \\ \text{\text{-H}} \end{array} \right] \rightarrow \left[ \begin{array}{c} \text{\text{+L}} \end{array} \right] / \left[ \begin{array}{c} \text{\text{+L}} \end{array} \right] \left[ \begin{array}{c} \text{\text{Verb}} \end{array} \right] \left[ \begin{array}{c} \text{\text{C}^2} \\ \text{\text{C}^0} \end{array} \right] \left[ \begin{array}{c} \text{\text{Adverb}} \end{array} \right] \left[ \begin{array}{c} \text{\text{Verb}} \end{array} \right] \left[ \begin{array}{c} \text{\text{C}^1} \\ \text{\text{C}^2} \end{array} \right] \]

The operation of (36) can be illustrated as follows.

(37) Underlying form: ge mebuwo
(36) first expansion: ge mebuwo
(36) second expansion: ge mebuwo

'I do respect them.'

Underlying form: ge ame buwo
(36) first expansion: no change
(36) second expansion: no change

'Someone does respect them.'

Underlying form: yawo buwo
(36) first expansion: no change
(36) second expansion: yawo buwo

'Yawo respects them.'

From Smith's own data and without doing violence to his analytic intent, then, we have shown that his complex mid/low alternation rule can be revised and simplified as (36).
The problems and inadequacies still present in (38) will be the subject of the next two chapters.
NOTES

1. It should be noted that the observation that the mid/low alternation is related to and partly predicable by consonant classes is due to Welmers, rather than to Ansre. It is reported in pretty much the same form in Welmers and Ansre (1960).

2. Smith often omits important morpheme structure and boundary information from his rules. Since these omissions rarely affect our discussion, we will not take time to correct them here. Most of the corrections are obvious, and it is not unlikely that the omission of these details on Smith's part was simply an attempt to reduce the formal complexity of his rules—an attempt which is surely laudable.

3. The equivalent Kpando form is ma[dugu] nû.

4. Our Kpando informant rejected these sentences as ungrammatical in his dialect. His objection centered around the use of ma, a particle which apparently is not used in questions in Kpando.

5. In the published version of Smith's paper the V labeling the bracket $[v]$ is set too low, and it looks like a vowel rather than a verb. We are grateful to Nick Clements for pointing out this fact to us, but the correction came too late in the typing to be incorporated into the discussion. Thus our criticism of Smith's mid/low alternation rule would have to be modified slightly. We return to the treatment of the imperative in Section 6.1, where we show that Smith's account of the imperative tone still misses an important generalization.
Chapter 5
THE MID/LOW ALTERNATION

5.0 Introduction
Our revision of Smith's mid/low alternation rule is still unnecessarily complex, and an analysis based on it misses several important generalizations about the tonal and morphological structure of Ewe. In this chapter we will investigate the mid/low alternation in detail. In Section 5.1 we will attempt to extend the Ansre-Smith treatment of the alternation in as natural a way as possible. In Section 5.2 we will discuss examples whose tones cannot be predicted by any extension of Smith's analysis. We will then present a new hypothesis claiming that all nouns, including those that are overtly consonant-initial, have prefixes. In Section 5.3 we will reanalyze the mid/low alternation discussed in Chapter Four, and we will motivate a much simpler and more unified account. In Section 5.4 we will discuss the role of the noun prefix in the derivational morphology of Ewe, again demonstrating that the existence of an underlying noun prefix accounts for some important tonal phenomena. Finally, in Section 5.5 we will discuss the exact form of the noun prefix which is found in derived nouns and in lexical nouns which are overtly consonant-initial. We will argue that
phonologically this prefix must consist only of tonal features, and we will speculate briefly on the theoretical implications of such incompletely specified segments.

5.1 The Tone Insertion Hypothesis

Among the phenomena Ansre illustrates in his chapter on morphophonemics is a very interesting rule of tone insertion (1961:63). He describes it as follows:

'When the [high tone (HS)] verbal is followed by an object which has a high or mid tone, the last syllable of the verbal has a falling tone. This falling tone is from high to low if the object has a consonant of Class B. The falling tone is from high to mid when the object has a consonant of Class C.' (1961:63-64)

Ansre illustrates this rule with examples like the following:

(1) ẹkpọ́'kpé 'He saw a stone.'
metọ́'fiá 'I took an axe.'
wóanọ́'nt' lá 'They will break the bone.'
ẹkpọ́-ọ́ọ́ 'He saw a worm.'
metsọ́-ọ́ọ́ 'I will take white clay.'
menọ́-yí ọ́ọ́ 'I broke a cutlass.'

(from Ansre, 1961:63-64)

Smith formalizes this generalization as an epenthesis rule.

(2) ∅ → V / C \[ \left[ \begin{array}{c} V \\ +H \\ +verb \end{array} \right] + C \left[ \begin{array}{c} V \\ -L \\ +noun \end{array} \right] \]

His rule can be simplified by omitting the feature [+verb].

160

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since it also applies after the conjunction kply 'and'.

(3) \( kpl \) \( kpl \) \( \text{fy} \) 'a stone and an axe'

\[ \text{\textbf{\( \Rightarrow \)}} \quad \text{\( kpl \) \( kpl \) \( \text{fy} \)} \]

\[ \text{\( y \) \( kpl \) \( y \)} \]

\[ \text{\textbf{\( \Rightarrow \)}} \quad \text{\( y \) \( kpl \) \( y \)} \]

Ansre and Westermann both regard kply as a verb, noting its similarity to kpl 'accompany', but we see no reason to accept this analysis. Its function is never that of a verb in any normal sense, and whatever semantic relationship exists between verbs distinguished by the presence or absence of the 'infix' /l/ is, as examples in Westermann (1943) clearly show, irregular and impossible to define. (2), which we will refer to as 'tone-insertion', is ordered before mid/low alternation so that the same rule which accounts for the tone of a non-high vowel in a verb can also predict that this inserted vowel will be low before an obstruent.

As Ansre describes tone-insertion, it does not occur before a Class A consonant, that is, a voiced obstruent. This presumably follows from his claim that after a stem-initial voiced obstruent in a noun there will be no mid or high tone but only low. Since the tone of the syllable after the inserted tone must be either mid or high, it follows that tone-insertion does not apply before voiced obstruents. Smith's formulation (2), on the other hand, makes no claim about the class of the stem-consonant of the noun. Apparently he is considering such nouns as déna 'palm wine',

161
where a mid tone is permitted after a voiced obstruent because of certain tonal rules effecting compound nouns (cf. Chapter Six). If déhaá occurs after a high tone verb, such as kpó 'see', tone-insertion will apply, producing kpó-dehaá. Then mid/low alternation (b) and (e), which we will refer to as 'pre-noun lowering', will lower the inserted tone, since the stem-initial consonant is an obstruent, producing the correct form kpó-dehaá. We repeat pre-noun lowering here for ease of reference, since it will be important to further discussion.

\[
(4) \begin{array}{c} \begin{bmatrix} V \\ -H \end{bmatrix} \rightarrow \begin{bmatrix} +L \end{bmatrix} \end{array} / \quad \begin{array}{c} \begin{bmatrix} \# \end{bmatrix} \begin{bmatrix} \text{-sonorant} \end{bmatrix} \end{array} \begin{bmatrix} \text{Noun Stem} \end{bmatrix} \end{array}
\]

In the discussion below we will make one modification on the Anøre-Smith data—we will discuss the forms as they are before they undergo the last of Smith's mid/low alternation rules, the rule lowering a mid to a low in final position. This will both simplify the exposition without doing any violence to the analysis and render the Kpando and Peki data more similar since the Kpando final lowering rule is restricted to verbs and a few particles, as we will show later.

As described above, pre-noun lowering will have the effect of lowering the tone of a vocalic noun-prefix before an obstruent and of lowering the tone of a non-high verb before a consonant-initial noun when that consonant is an obstruent. Thus the underlying forms in (5i) will become the surface forms in (5ii).
(5) (i) atí lá 'the tree' (ii) atí lá
azikpodoé 'ground pea' azikpodoé
adó 'squirrel' ādó
mëple te 'I bought yams.' mëple te
mebu fya lá 'I respected the chief'
mevu ha 'I killed a pig.' mëwù hà

There is also a rule of low tone assimilation, which Smith has collapsed with final lowering as shown in example (38) of Chapter Four. Low tone assimilation operates on the output of pre-noun lowering, as in the derivations in (6).

(6) Underlying form: mevu adó ūwu āfi
Did/low alternation (a): mevu adó ūwu āfi
Pre-noun lowering: mevu ādó ūvu āfi
Low-tone assimilation: mëwù ādó ūvù āfi
'I killed a squirrel.' 'He killed a mouse.'

Thus when the noun stem begins with an obstruent, everything before it will be low up to the first proceeding high tone.

If we examine the elements to the left of the object nouns in (7) after they have undergone the derivation shown in (6), two interesting facts appear.
(7) **Underlying form** | **Derived form**
--- | ---
(i) mewu da | mèwù dà | 'I killed a snake.'
 | mewu adə | mèwù ədə | 'I killed a squirrel.'
 | èpìle te | èpìlè te | 'He bought a yam.'
 | èpìle akpaà | èpìlè akpaà | 'He bought a fish.'
 | wògbé nú lá | wògbé nú lá | 'They plucked the thing.'
 | wògbé aŋutí | wògbé aŋutí | 'They plucked an orange.'
(ii) mekpô dehaà | mekpô dehaà | 'I saw palm wine.'
 | mekpô abólo | mekpô abólo | 'I saw bread.'
 | èdí te | èdí te | 'He looked for a yam.'
 | èdí akpaà | èdí akpaà | 'He looked for a fish.'
 | wólé nú lá | wólé nú lá | 'They seized the thing.'
 | wólé aŋutí | wólé aŋutí | 'They seized an orange.'

We note first of all that there is always a non-high tone before the stem consonant of an object noun. This non-high tone may be on the vocalic prefix, it may be on the verb stem if that is underlyingly mid, or it may be between the verb and the noun, resulting from tone-insertion. But it will always occur and it will become low by pre-noun lowering or by prefix lowering before a stem-initial obstruent. This brings us to the second observation. In each environ-

164
ment in (7) consonant-initial nouns and vowel-initial nouns have the same derived tonal shape. Thus after a high tone verb a vowel-initial noun with a stem-initial obstruent will have a low tone on its prefix, and an obstruent-initial noun will be preceded by the inserted tone which gets lowered to low. The same parallelism is true of sonorant-initial noun stems, except that neither the prefix nor the inserted tone undergoes lowering. With a non-high tone verb the tone of the verb will be lowered before a low noun prefix or, if the noun is consonant-initial, before an obstruent. In the former case the lowering is by low tone assimilation and in the latter by pre-noun lowering. In either case the final tonal configurations of verb-noun constructions are identical.

One further case of tonal identity between a consonant-initial noun and a vowel-initial noun is mentioned by Westermann and is also found in Kpando. Ansre, who is quite thorough, does not mention this case, and so we suspect that it is absent from Peki or that its manifestations are radically different from what Westermann gives and what we have observed in Kpando. This involves the one class of nouns not yet treated—nouns whose stem-consonants are voiced obstruents and which have a low tone on the first vowel of the stem. Westermann (1930:33) mentions that in some nouns the prefix has a high tone after a high tone verb. He does not see the correlation with consonant class, although all of
his examples (8) are of nouns whose stem consonants are voiced obstruents.

(8)  ló àzì → ló àzì  'pick up eggs'
     ló àgàgà → ló àgàgà  'pick up shells'
     tú àgbà → tú àgbà  'tie up a load'
     tó àgbéli → tó àgbéli  'pound cassava'
     kpó àgbéló → kpó àgbéló  'see a book'

It is just before the corresponding consonant-initial nouns that tone-insertion does not apply. The result of its failure to apply, of course, will be the same sort of tonal identity as described above, except that now the tone immediately before the stem consonant of the noun will be high instead of non-high, as in (9).

(9)  é kpó bò  'He saw a cricket.'
     é kpó ábò  'He saw an arm.'
     wó dí gà  'They looked for money.'
     wó dí ágbà  'They looked for a load.'

In light of these data it is clear that a rule of prefix-raising is needed. For the moment we will formulate it as follows.

(10) \[ \begin{bmatrix} +V \\ -H \end{bmatrix} \rightarrow \begin{bmatrix} +H \end{bmatrix} / \begin{bmatrix} 0 \\ \text{Noun} \end{bmatrix} \rightarrow \begin{bmatrix} c^2 \\ +L \end{bmatrix} \]

In kpando the parallelism of tonal patterns between vowel-initial and consonant-initial nouns is equally evident, but some of the details are changed. Tone-insertion applies only before a voiceless obstruent, rather than before any non-low tone as in Peki. Thus kpando forms contrast with

166
Peki forms as in (11). The underlying forms for the two dialects are the same.

(11) Underlying | Kpando | Peki
---|---|---
kpɔ́ tɔ́ | kpɔ́ tɔ́ | kpɔ́ tɔ́  'see an ear'
kpɔ́ te | kpɔ́ te | kpɔ́ te  'see a yam'
kpɔ́ nú | kpɔ́ nú | kpɔ́ nú  'see a thing'
kpɔ́ mɔ́ | kpɔ́ mɔ́ | kpɔ́ mɔ́  'see a trap'
kpɔ́ déhɔ́d | kpɔ́ déhɔ́d | kpɔ́ déhɔ́d  'see palm wine'
kpɔ́ ga | kpɔ́ ga | kpɔ́ ga  'see metal'

The Kpando/Peki contrast carries over consistently with vowel-initial nouns too, as (12) shows.

(12) Underlying | Kpando | Peki
---|---|---
kpɔ́ ati | kpɔ́ ati | kpɔ́ ati  'see a tree'
kpɔ́ akpaá | kpɔ́ akpaá | kpɔ́ akpaá  'see a fish'
kpɔ́ ayyíi | kpɔ́ ayyíi | kpɔ́ ayyíi  'see beans'
kpɔ́ ame | kpɔ́ ame | kpɔ́ ame  'see a person'
kpɔ́ aŋaŋa | kpɔ́ aŋaŋa | kpɔ́ aŋaŋa  'see a scorpion'
kpɔ́ adɔ | kpɔ́ adɔ | kpɔ́ adɔ  'see a squirrel'

It is evident, of course, that Peki does not have a rule of prefix-raising. If the columns for Kpando are compared, the parallelism of the tonal patterns is immediately evident, since prefix-raising applies only before voiced consonants.

Continuing with the analysis as we have developed it so far, we will have to revise prefix-raising (10) as below, in order to account for the facts of Kpando accurately.
(13) Prefix-raising (Kpando):
\[
\begin{array}{c}
\left[ V \right] \\
\text{-H}
\end{array} \longrightarrow \begin{array}{c}
\left[ +H \right] \\
\text{+/H}
\end{array} \begin{array}{c}
\text{Noun} \\
\text{[-voiced]}
\end{array} \begin{array}{c}
\left[ C \right] \\
\text{+voiced}
\end{array}
\]

As now stated, prefix-raising will change the noun prefix to high before any voiced consonant, whether obstruent or sonorant. This form of the rule correctly predicts the tone patterns of (12). We will also have to revise tone insertion to conform to the facts of Kpando. As the examples in (11) show, tone insertion seems to apply in Kpando only before a voiceless consonant. Thus we will give (14) as our first approximation of Kpando tone insertion.

(14) \[
\begin{array}{c}
\emptyset \\
\end{array} \longrightarrow \begin{array}{c}
\left[ V \right] \\
\text{+/H}
\end{array} \begin{array}{c}
\text{Noun Stem} \\
\text{[-voiced]}
\end{array}
\]

It is apparent that the structural descriptions of prefix-raising and tone insertion are very nearly complementary.

Except for certain details to be considered in Chapter Six, we have accounted for the tonal shape of verb + object noun sequences in Kpando. We might add that in doing so we have succeeded in making a relatively simple situation look impressively complex, so let us now consider some of the claims made by what we will refer to as the 'tone-insertion' hypothesis. Returning to what happens tonally when an object noun is preceded by a mid tone verb we showed that three rules are needed. If the noun is vowel-initial, a rule is needed to lower the underlying mid of the prefix vowel to a low when the stem-consonant is an obstruent. If the noun is consonant-initial, another rule is needed to lower the mid
tone of the verb to low in the same environment. These two rules proved to be collapsible as the rule of pre-noun lowering. However, after pre-noun lowering applies to a noun prefix, another rule is needed to lower any preceding mid tone to low. Thus by regarding the class of the initial consonant of the noun as the conditioning factor, as the Ansre-Smith analysis claims, we are forced to treat the lowering of a mid tone verb before a vowel-initial noun and before a consonant-initial noun as two separate, unrelated processes.

When the object noun is preceded by a high-tone verb, the situation is at least as complex. If the noun is consonant-initial, a rule is needed to insert a non-high tone between the verb and a noun whose initial consonant is a voiceless obstruent. If the noun is vowel-initial, another rule is needed to raise the non-high of the prefix to high before a voiced stem-consonant. In both cases a third rule is needed to lower mid to low before an obstruent-initial noun stem. Thus to account for the fact that a voiceless obstruent stem-consonant will be preceded by a low tone we again need two unrelated rules—one which inserts a tone and another which lowers both the inserted tone and the tone of the prefix. And to account for the fact that after a high-tone verb no non-high tone will be present if the stem-consonant of the noun is voiced, we again needed two rules—the one mentioned above which inserts a tone only before a

169
voiceless consonant and another which raises the prefix tone to high before a voiced consonant. Tone insertion and prefix-raising are formally distinct rules, even though they have the same function.

To compound an already complex situation, these unrelated rules—pre-noun lowering, prefix lowering, low-tone assimilation, tone-insertion and prefix-raising—are required just to account for the surface fact that when lexical tones are the same verb + object-noun sequences in which the noun is consonant-initial will have the same surface tonal shape as verb + object-noun sequences in which the noun is vowel-initial. However, at least a little simplification is possible. We noted above that there was a complementarity between the environments of tone-insertion and prefix-raising, tone insertion applying only before a voiceless consonant and prefix-raising only before a voiced consonant. Greater generality is possible if we order tone-insertion before prefix-raising and revise it to insert a mid tone before any consonant-initial noun, as in (15).

\[
(15) \quad \emptyset \quad \rightarrow \quad \left[ \text{-H} \right] \quad \cup \quad \left[ \text{+H} \right] \quad \text{C} \quad \text{Noun Stem}
\]

With this change, all nouns will be preceded by a non-high tone after a high tone verb, and in the course of a derivation all inserted tones as well as all prefixes will be raised if the noun stem begins with a voiced consonant. This accounts naturally for the fact that in Kpando surface
sequences of high tone verb + noun a low tone is found only when the noun stem begins with a voiceless consonant, as shown in examples (11) and (12). However, what happens after a mid-tone verb still seems to be unrelated to what happens after a high-tone verb. As a result of the generalization of tone-insertion, pre-noun lowering never affects the tone of the verb. It is either the inserted tone or the noun-prefix which is lowered. Naturally if the verb is high, the structural description of low-tone assimilation will not be net. When a mid-tone verb is involved, however, both pre-noun lowering and low-tone assimilation will apply. Pre-noun lowering will lower the tone immediately preceding a stem-initial obstruent whether it is on the verb or on the noun prefix. Low-tone assimilation will then lower all preceding mids in the verb up to the first high tone which is encountered.

The unnatural claim made by this analysis is that a low tone on a verb is due to two unrelated factors, pre-noun lowering, which is conditioned by consonant class, and low-tone assimilation, which is conditioned by a low-tone vowel. This problem can be eliminated if we further generalize tone-insertion to apply not just after a high tone, but after any vowel, as in (16).

\[(16) \emptyset \rightarrow [\text{\small -H}] / \quad \text{V} \# \# \quad \left\{ \begin{array}{c} C \hline \text{Noun Stem} \end{array} \right\} \]

Now the conditioning factor for the tone of the verb will be
a low-tone in all cases, and pre-noun lowering will not apply to verbs, but only to the inserted tone and the tone of the noun-prefix, just as after a high-tone verb.

It is implied in the foregoing discussion and in our final form of the tone-insertion rule (16) that the inserted tone is a part of the noun, not a part of the verb as Smith (1968:298), Ansre (1961:63-64) and Westermann (1930:29) have claimed. Our claim follows from several facts presented in this and previous sections. First, the inserted tone is found only before a noun, not before an adverb or another verb as we showed from Smith's examples in Chapter Four. Second, the role of the inserted tone is to render the surface tonal shape of verb + object constructions with consonant-initial nouns identical to that of constructions with vowel-initial nouns, and so the inserted tone plays a role identical to that of the vocalic prefix. And third, if the inserted tone were a part of the verb, it would be necessary to complicate all rules which affect the level of the inserted tone by permitting them to operate across word boundaries. The rule lowering a mid tone verb would have to be similarly restricted.

The tone-insertion hypothesis, then, accounts for the tonal behavior of verb + object-noun sequences by inserting a tone before a consonant-initial noun which in all respects exactly parallels the noun prefix a-. It undergoes the same rules as the vocalic prefix, and it has the same influence

172
on its environment. By inserting a prefixal tone prior to the application of any other tone rules we are able to show that the immediate influence of the stem vowel is restricted to the phonological word and that the tonal sandhi of a preceding mid tone verb is a single process of low tone assimilation, rather than two separate processes as is claimed by the Ansre-Smith hypothesis.

5.2 The Prefix Hypothesis

The tone-insertion hypothesis still contains certain problems which render it unacceptable. The first problem involves the function of the tone-insertion rule itself. While superficially it is a straightforward phonological rule, its function is morphological. The sole purpose for positing such a rule is to capture the fact that the tonal behavior of nouns without overt prefixes is identical to that of those having the _a_ prefix. It is, therefore, a morphological adjustment rule, and like most such rules it must apply before any phonological rule. We question whether such morphological rules belong strictly to the phonological component and are not rather a part of the lexicon, in this case a part of the lexical definition of the category Noun in Ewe. The second problem involves the justification for a rule of tone-insertion. This rule is essentially _ad hoc_, in that the only motivation for it is the surface parallelism between the two types of noun; the insertion of a tone at the beginning of a derivation is little more than a technically
workable mechanism for producing the desired surface result. The rule—its nature, form, and ordering—has no motivation beyond the fact that it seems to work.

In addition to this problem, the tone-insertion hypothesis predicts the incorrect tonal behavior for compound nouns which either contain two or more nouns or end in a noun, and no natural extension of the hypothesis will be able to account for the correct shapes. One class of these compounds results from the transformational derivation of instrumental nominalizations. In forming the nominalizations of the instrumental phrases in (17i) the instrument (the second noun) and the object (the third noun) are switched, the verb remaining between them, producing the nominalized forms in (17ii).

(17) (i) etsê 'trê no 'tsi  'He used a calabash to drink water.'
       etsê 'tu wu alã  'He used a gun to kill an animal.'
       etsê 'kaá blâ te  'He used a rope to bind yams.'
       etsê 'kpé ñe 'tu  'He used a stone to break a gun.'

(ii) tinontrê  'calabash for drinking water'
       alãwutê  'gun for killing animals'
       teblakãá  'rope for binding yams'
       tûñâkpé  'stone for breaking guns'

Obviously tone-insertion does not apply before the head noun of an instrumental nominalization. Its failure to do so is
paralleled by the deletion of the vocalic prefix in exactly the same environment, as in (18).

(18) (i) étsé amaatsiil wog doph 'He cured an illness with medicine.'
      étsé aṭi wu alā 'He killed an animal with a stick.'
(ii) dowlmaatsiil 'medicine for curing illness'
      alowutil 'stick for killing animals'

As Ansre (1961:62) shows, the deletion of the prefix is a syntactic rule, not a phonological rule. Using the compound nouns in (19), he claims that 'the vocalic prefix drops from all nominals but the first when nominals are compounded with other nominals.'

(19) gbē 'goat' + ṭsu 'male' --> gbētsu 'he-goat'
      ṣdē 'hunt' + anyahu 'dog' --> STDOUT 'hunting dog'
      gbē 'bush' + aṭi 'mouse' --> gbēfii 'fieldmouse'
      aqutii 'orange' + aṭi 'tree' --> aqutiti 'orange tree'

If prefix deletion were some sort of phonological vowel sequence shortening rule, then the vowel sequences in the verb + object constructions of (7) and (12) would also have to shorten, but they do not.

If the tone-insertion hypothesis is correct, we are forced to predict the lack of alternation on the verb in an instrumental nominalization by somehow preventing tone insertion from applying to the head noun of a nominalization. To modify the rule in this way would require the specifi-
cation of a great deal of syntactic information, including the fact that NP movement has occurred. At the same time we must have a syntactic prefix-deletion rule which will account for (18ii) and (19). The important generalization in both cases is that the conditioning factor for tonal sandhi in the verb is absent, and so tonal sandhi is absent. To explain this phonologically with one class of nouns and syntactically with another misses the point. Rather, we propose that all nouns in the lexicon have a prefix. When this prefix is not overtly the vowel /a/ with a mid tone, we will assume that is has the same tonal features as the a- prefix. We will ignore whatever other content it may have for the moment and discuss only its tonal implications. For convenience we will refer to the a- prefix as the vocalic prefix and to the other prefix as the tonal prefix. Whichever form it has, the prefix will be deleted by the syntactic rules of nominalization, with the result that both prefixes will be absent from the final noun stems of compound nouns. The tonal prefix will always merge completely, except for its tone, with the preceding vowel. Where no vowel precedes it, as in sentence-initial position, the tonal prefix will be realized as segmentally zero, although it will, under conditions to be discussed below, have an effect on the following syllable. The prefix hypothesis differs from the tone-insertion hypothesis of Ansre and Smith and from our revision of it in Section 5.1 primarily in that there is no
rule of tone insertion. Rather the tone is already there in the underlying form, and it is from this tone that the tones of the verb are predicted. It is the tonal prefix that accounts for the falling tone found when a high tone verb precedes a noun object.

As a heuristic device, the formation of compound nouns and nominalizations sheds light on an other tonal alternation. There is, for instance, the rule lowering the stem vowel of a noun after a voiced obstruent which Smith formalizes as mid/low alternation (a).

\[(20) \left[ \begin{array}{c} V \\ -H \end{array} \right] \rightarrow \left[ \begin{array}{c} +L \\ +\text{voiced} \\ -\text{sonorant} \end{array} \right] \quad \text{(CV)}\]

According to (20) the tone of *na 'money', or of any other noun with a stem-initial voiced obstruent, will be realized as low, as in the sentence *dtsa *na ne 'He bought something with money.' If (20) is correct in claiming that the conditioning factor for this lowering is the class of the initial consonant, then we would expect that in a nominalization in which *na is the head noun its tone will remain low. However, the nominalized form will be *na *le 'money for buying things', not *nal *le or *na *le. The fact that the stem tone does not lower if the prefix has been deleted can only be taken to mean that whatever conditions the lowering in (20) is not present in the nominalized form. What Smith states as mid/low alternation (a), then, is a rule of progressive assimilation from the low tone of the prefix, and when the conditioning low tone is absent, as in an in-
strumental nominalization or a noun compound, the stem tone does not lower. With the syntactic deletion of the noun prefix, the underlying tone of the stem remains unchanged in the phonetic output.

5.3 Low Tone Assimilation

In the foregoing discussion it became clear that, in addition to the rule of prefix lowering, two rules of low tone assimilation are required. One of these is a rule of regressive low tone assimilation (henceforth RLA) which accounts for the lowering of mid tones before a low tone noun prefix. It is also clear that Smith's mid/low alternation (a), effecting noun stems, was a subcase of a more general rule of progressive low tone assimilation (PLA). We will now attempt to show that these two rules are actually a single mirror-image rule of low tone assimilation (MLA) which has the form

\[(21) \begin{array}{c} [-H] \rightarrow [+L] \\ \end{array} \quad / \quad \begin{array}{c} \ast \end{array} \quad C^2 \quad [+L] \]

and which makes the claim that a mid tone on either side of a low tone will be lowered. (21) will apply iteratively, operating until its environment fails to be met.

In Kpando we can illustrate the operation of this rule with the following sentences.

\[(22) \begin{array}{c} (i) \text{ame fi } \ddot{a}z\ddot{i} \ \text{l\`a} \quad \rightarrow \quad \ddot{a}n\ddot{e} \ \ddot{f}i \ \ddot{a}z\ddot{i} \ \ddot{l}\ddot{a} \quad 'A \text{ person stole the egg.'} \\
(ii) \text{f\ddot{a}g fi al\ddot{a} \ \ddot{l}\ddot{a} } \quad \rightarrow \quad \text{f\ddot{a}g fi al\ddot{a} \ \ddot{l}\ddot{a}} \quad 'A \text{ squirrel stole the meat}' \\
\end{array} \]

In (22i) the low tone of the noun prefix on \text{\ddot{a}z\ddot{i}} 'egg',

178
which is the result of prefix lowering, conditions both NLA, lowering all preceding mids, and PLA, lowering all succeeding mids. In (22ii) only the progressive interpretation of NLA is required, the low tone of the prefix of adg 'squirrel' conditioning the assimilation of all succeeding mids. Obviously there will also be cases, as in (23),

(23)  adg fi åzi lá → adg fi åzi lá 'A squirrel stole the egg.'

where the lowering of certain segments, in this case ...dg fi..., could have been either regressive, from the prefix of åzi 'egg', or progressive, from the prefix of adg 'squirrel'. With the mirror image interpretation it is not necessary to specify the direction in which the rule applied since the lowering is not cumulative.

There is one morphophonological class in Kpando for which NLA is blocked—the class of noun stems beginning with a voiceless obstruent (24).

(24)  ãfi fi åzi lá → ãfi fi åzi lá 'A mouse stole the egg.'

ame wu ãfi lá → ãme wu ãfi lá 'A person killed the mouse.'

It should be noted that NLA is not blocked simply by a voiceless obstruent, but just by a voiceless obstruent which is in stem-initial position in a noun. As (24) shows, a voiceless consonant in a verb, as in fi 'steal', will not block NLA. This requires that the grammar contain a readjustment rule (25) marking all such noun stems as exceptions to NLA.
(25) \[ [\text{-voiced}] \quad \text{Noun Stem} \quad \text{X} \quad \rightarrow \quad [\text{-MLA}] \]

An alternative analysis would be to state an environment for MLA something like

(26) \[ / * [\text{+L}] [\text{C} [\text{<voiced}>] \text{(C)} ] \quad \text{Noun Stem} \]

However this somewhat unwieldy environment makes a claim about Ewe phonology which we consider questionable. This is the claim that the environment in which MLA is blocked is a primarily phonological one. If the progressive interpretation is considered, the voiceless consonant is not an unlikely phonological block for a low tone assimilation rule, but under the regressive interpretation, there is nothing natural about the fact that MLA is blocked by a voiceless consonant to the left of the vowel to be lowered, as in (27).

(27) 'afi ěve \rightarrow 'afi ěvé 'two mice'

(*'afi ěvé)

Rather, the blocking is morphological in nature, since it is a particular class of morphemes which is only in part definable phonologically which blocks MLA. This is exactly the claim made by our readjustment rule (25), a claim which has the added virtue of permitting a much simpler statement of MLA.

The environment as stated in (26) has an additional problem inherent in it, and that is that MLA so stated will still not produce the correct results. Under the usual in-
terpretation of angle brackets the rule will first apply to noun stems which begin with voiced consonants and then to everything else. That is, the second expansion of the rule will apply to all non-low tones which are adjacent to low tones, including those that are in noun stems beginning with voiceless obstruents. Thus there seems to be no alternative to the use of a readjustment rule in this case.

In addition to the lowered noun prefix, there are a number of other low tones which can condition MLA, as the examples in (28) show.

(28) (i) mebuwo --> mebuwô --> mèbûwò 'I respected you (sg.).'

(ii) mieyi --> mieyî --> miéyî 'You (pl.) left.'

(iii) ebuea --> ebueâ --> êbûeà 'Do you respect him?'

(iv) ame zã hloyihloyi --> ame zã hloyihloyi --> àmè zã hloyihloyi 'A person walked clumsily.'

In (28i) the final object pronoun -wo 'you (sg.)' is lowered and then conditions MLA to lower the preceding mids. In (28ii) the same process applies to the verb stem yi 'go'.

In (28iii) the yes/no question particle a is lowered and conditions MLA, just as with the final vowels of the first two examples. In (28iv) the final mid tone of the ideophone is lowered and, as in the other examples, conditions MLA.

The first step in this lowering process is expressed by Smith's sentence final lowering rule, which we repeat here.

181
(29) Final lowering (FL)
\[
[\ -H\ ] \rightarrow [\ +L\ ] / \ #
\]
where \# is a sentence boundary
Rule (29) is motivated by the fact that the examples in (28) will not be lowered if a high tone follows the vowel which is to be lowered by (29), as in (30).

(30) (i) mebuwo etsq'  'I respected you yesterday.'
(ii) nieyi etsq'  'You left yesterday.'
(iii) ame zq' hloiyhloyi etsq'  'A person walked clumsily yesterday.'

(There is no equivalent for (28iii) since the question particle is always final.) However, (29) will have to be modified somewhat to account for the fact that final noun stems, as shown in (31), are not lowered.

(31) (i) mekpq' áme  'I saw a person.'
     (*mekpq' ámè)
     ådɔ' wù àfì  'A squirrel killed a mouse.'
     (*ådɔ' wù àfì)
(ii) då wù ámè  'A snake killed a person.'
     ámè wù ådɔ'  'A person killed a squirrel.'

In (31i) the final mid tones of the noun stems are not lowered, but in (31ii) this condition is overridden by MLA. In other words, a final mid on a noun stem can be lowered by assimilation, but not simply by virtue of being final. To account for this fact we could do either of two things. We could modify (29) by specifying all of the categories to which it applies, or, since it applies to all but one cate-
gory—noun stems, we could couple (29) with the following readjustment rule (32), which claims simply that noun stems do not undergo final lowering.

\[(32) \quad \left[ \begin{array}{c} C^2V \\ \text{Noun Stem} \end{array} \right] \rightarrow \left[ \begin{array}{c} \text{Final lowering} \end{array} \right] \]

We feel that the latter description is preferable, since it makes the more natural claim that noun stems are in some way exceptional, rather than the claim that (29) applies only to a set of categories which have nothing in common but the fact that they are not noun stems. Furthermore, since we have already seen that noun stems are exceptional in one respect, namely that those with initial voiceless consonants fail to undergo MLA, the claim that they are exceptional to a functionally similar rule—that is, to another lowering rule—is not at all surprising.

Our use of readjustment rules in the description of noun stem tone enables us to see more clear how Kyando and Peki differ with respect to MLA and final lowering. In Peki (32) is absent, and so any final mid tone gets lowered. Thus the Peki variants of the sentences in (31i) would be (33).

\[(33) \quad \text{mekpø `ámè} \]
\[\quad \text{`àdø `ú àří} \]

Also MLA is not blocked by noun stems which have initial voiceless obstruents, although PLA is blocked by such a morpheme. Thus we find the following sentences:
(34)  ̀af̀i Ꙇ ꙇ Ꙇ ꙇ ꙇ ꙇ 'A mouse stole an egg.'
dà wù ̀af̀i lá Ꙇ ꙇ ꙇ ꙇ Ꙇ 'A snake killed the mouse.'

(*dà wù ̀af̀i lá)

In describing Peki, then, we would say that MLA is given as two separate rules, PLA (35i) and RLA (35ii).

(35) (i) PLA

\[
\begin{array}{ccc}
[-H] & \rightarrow & [+L] / [+L] \quad C_0^2 & \quad \_
\end{array}
\]

(ii) RLA

\[
\begin{array}{ccc}
[-H] & \rightarrow & [+L] / \quad \_
& C_0^2 & [+L]
\end{array}
\]

Even though PLA and RLA have mirror-image environments, it is impossible to collapse them, since there is a readjustment rule (36) which applies only to PLA input forms,

(36) \([-\text{voiced}]\) \text{ (C) V}

\[\quad \rightarrow \quad [-\text{PLA}]\]

and not to RLA input forms.

The difference between dialects, then, can be viewed in terms of the degree to which noun stems undergo lowering. This can be stated more clearly in terms of readjustment rules marking certain classes of morphemes as exceptions, rather than by building into lowering rules the complex notation needed to state the logical complement of the information carried by readjustment rules. However, we cannot tell at this time which dialect underwent a change. If Kpando changed by adding the restrictions on noun stems, then it could be argued that Kpando has simplified the lowering process by permitting a mirror-image statement of assimi-
latory lowering. On the other hand, it could be argued that Pekí has simplified its grammar by permitting the lowering rules to apply to more forms. We lean toward the latter interpretation, even though the formal statement of the lowering rules is more complicated. We feel that the extension of the lowering process to covering all final mids and the modification of HLA so that it is blocked only by certain intervening voiceless consonants results in a more natural grammar, even though it is notationally more complex. The added complexity is, in our opinion, an artifact of the theoretical formalism, and we feel that this problem brings to light an area in which generally accepted views on simplicity, ordering, and abbreviatory conventions must be reconsidered.

5.4 The Role of the Noun Prefix in Derived Nominals

The tonal prefix, for which we argued in Section 5.2, is important to the description of certain nominalization processes. In this section we will illustrate its role in the derivation of gerunds, gerundive nominalizations, certain noun compounds, and ideophonic nouns.

5.4.1 Gerunds and Gerundive Nominalizations

The Ewe gerund is formed by the reduplication rule discussed in earlier chapters. It differs from the participle, which is also formed from the verb stem by reduplication, in two ways: first, the gerund has a final short vowel, while the participle has a final long vowel resulting from the
assimilation of the suffix -á, and second, the first syllable of a participle has the same tone as the verb stem. 

Ansre (1961:39) illustrates this difference with, among others, the following examples. His examples are valid for Kpando as well.

<table>
<thead>
<tr>
<th>Stem</th>
<th>Gerund</th>
<th>Participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>bú 'to lose'</td>
<td>búbú 'loss'</td>
<td>búbúú 'lost'</td>
</tr>
<tr>
<td>bu 'to respect'</td>
<td>búbú 'respect'</td>
<td>búbúú 'respected'</td>
</tr>
<tr>
<td>tú 'to shut'</td>
<td>tútu 'shutting'</td>
<td>tútuú 'shut'</td>
</tr>
<tr>
<td>tu 'to grind'</td>
<td>tútú 'grinding'</td>
<td>tútuú 'ground'</td>
</tr>
<tr>
<td>nje 'to break'</td>
<td>njeje 'breaking'</td>
<td>njeje 'broken'</td>
</tr>
<tr>
<td>je 'to groan'</td>
<td>jēje 'a groan'</td>
<td>jējējē 'groaning'</td>
</tr>
</tbody>
</table>

Since the gerund is syntactically a noun, the natural explanation for the low tone on the first syllable is that in the syntactic nominalization process the verb stem is assigned a noun prefix. The noun prefix then merges with the first syllable of the reduplicated stem, and changes its tone to low. This hypothesis is confirmed by the behavior of gerunds as head nominals of nominalizations. As we showed in Section 5.2, when a noun becomes the head of a nominalization its prefix is deleted and the tonal alternations it conditions are absent. As the gerundive nominalizations in (38) illustrate, prefix deletion occurs in gerunds also.
(38) ɓu ɓa 'to lose money'  -->  qa bubu 'losing money'
       tụ ɓę 'to close a door'  -->  ɓę tutu 'closing a door'
       ɗé ɗé 'to break a leg'  -->  ɗé ɗé 'breaking a leg'
       bu ɗutsu 'to respect a man'  -->  ɗutsu bubu 'respecting a man'
       tu ayii 'to grind beans'  -->  ayii tutu 'grinding beans'

The gerundive nominalizations in (38) are distinguished from participial constructions by the absence of the vowel length and final high tone which result from assimilation of the participial suffix. Corresponding participial constructions are as in (39).

(39) qa bubu 'lost money'  ɗutsu bubu 'a respected man'
       ɓę tutu 'a closed door'  ayii tutu 'ground up beans'
       ɗé ɗé 'a broken leg'  ame ɗé 'a groaning person'

In Peki, according to Ansre's examples (1961:47), gerundive nominalizations and nouns with participial modifiers are identical, as the following examples show.

(40) ɗà wùwù 'snake killing'
       dɔ saisi 'lightning'
       vɔ dàdà 'mistake'
       hà dɔdzii 'song'

We suspect that the underlying phonological distinction between these and their participial counterparts is that in (40) the final high tone is the result of the assimilation
of the compounding element, while in participles it is the result of the assimilation of the participial suffix -á.

The tone patterns of the gerunds in (37) reveal one difference between the prefixal tones of lexical and derived nouns. The prefix lowering rule applies to nouns to lower the prefix if it is before an obstruent, but not if it is before a sonorant. The sonorant-initial verb stems ye 'break' and ne 'groan' suggest that the correct formulation of the rule is (41).

(41) Prefix lowering (PL)

\[ [-H] \rightarrow [+L] / \left[ \begin{array}{l}
+\text{noun prefix}
\end{array} \right] \]

This much simpler form will have to be modified by a readjustment rule blocking it from applying to lexical nouns with stem-initial sonorants. This we give as (42).

(42) Noun Prefix \(\rightarrow\) [-PL] / ____ \left[ \begin{array}{l}
+\text{sonorant}
\end{array} \right] \]

An alternative formulation of the lowering rule which includes the blocking environment as part of its structural description is illustrated in (43).

(43) \[ [-H] \rightarrow [+L] / \left\{ \begin{array}{l}
\quad \left[ \begin{array}{l}
\text{Noun Stem}
\end{array} \right] \\
\quad \left[ \begin{array}{l}
\text{Verb Stem}
\end{array} \right]
\end{array} \right\} \]

However, we object to this formulation on two grounds. First, (43) makes the claim that prefix lowering is two processes which simply happen to have some common information. Secondly, as we will show in Chapter Six, prefix lowering is
just one of a number of mid/low alternation rules to which certain classes of nouns are exceptional. The generalization seems to be more adequately captured by a grammar in which the exceptionality of nouns to certain functionally similar rules is stated as a set of conditions on the application of those rules than in a grammar where all mid/low alternation rules have disjunctively ordered environments so as to block certain classes of nouns from undergoing them. We will return to this problem in more detail in the next chapter.

The rule of low tone assimilation (HLA) presented in Section 5.3 applies to gerundive nominalizations in just the way the form of the rule predicts. Thus the gerunds of the non-high tone verbs in (37) have low tone on both syllables. Thus gerunds are distinct from lexical nouns in this respect also, since in lexical nouns HLA is blocked from applying to any noun stem which has an initial voiceless obstruent. The following sample derivations will illustrate this difference between derived and lexical nouns.

<table>
<thead>
<tr>
<th>(44)</th>
<th>Input</th>
<th>PL</th>
<th>HLA</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tutu 'grinding'</td>
<td>t̃t̃u</td>
<td>t̃t̃u</td>
<td>t̃t̃u</td>
</tr>
<tr>
<td></td>
<td>afo 'leg'</td>
<td>afo</td>
<td>blocked</td>
<td>afo</td>
</tr>
<tr>
<td></td>
<td>bubu 'respect'</td>
<td>bubu</td>
<td>bubu</td>
<td>bubu</td>
</tr>
<tr>
<td></td>
<td>adg 'squirrel'</td>
<td>adg</td>
<td>adg</td>
<td>adg</td>
</tr>
<tr>
<td></td>
<td>nene 'a groan'</td>
<td>ññe</td>
<td>ññe</td>
<td>ññe</td>
</tr>
<tr>
<td></td>
<td>ame 'person'</td>
<td>blocked</td>
<td>inapplicable</td>
<td>ame</td>
</tr>
</tbody>
</table>
In certain environments, MLA will have the effect of making the gerund of a non-high verb low even though its noun prefix has been deleted in the process of nominalization. Examples of this are given in (45).

(45)  hà dzidzi 'singing a song' \[\rightarrow\] hà dzidzi
    dà wuwu 'killing a snake' \[\rightarrow\] dà wuwú
    ʔa bæbæ 'opening a door' \[\rightarrow\] ʔa bæbæ
    ʔa xexło 'counting money' \[\rightarrow\] ʔa xexło

It should be pointed out that in cases like (45) MLA operates across voiceless consonants of derived nouns. This is not counter-evidence to our claim in the preceding section that MLA is blocked from applying to nouns which begin with voiceless obstruents, since that condition is restricted to lexical nouns. Derived nouns like xexło in (45) are lexically verbs and therefore are subject to MLA regardless of the class of the stem consonant.

5.4.2 Nouns Derived from Other Sources

Two other types of nominalization involve low tones which seem to indicate the presence of a noun prefix. These are compound nouns which begin with non-high tone verbs and nouns which are derived from ideophones.

Compound nouns of the type mentioned are illustrated by Ancre (1961:67) with the following two examples.
(46) (i) ɡuâmèdžihlû: ɡû 'bite', ʔâmè 'person', dzî́ 'sky', hlû 'roar', -ɪ (diminutive); 'centi-pede'

(ii) ɡuâmètsató: ɡû 'bite', ʔâmè 'person', tsà 'wander', tó 'tell'; 'tarantula'

Ansre attempts to account for the low tones of (46ii) as follows:

'First, we note /gu/ 'to bite' is a verbal of non-high tone. /âmè/ is a Class C nominal, and therefore can have either low or mid allotone, depending on what the following tone is. /tsà/ 'to wander about' is a verbal of non-high tone just as /gu/, and can have either low or mid allotone. But since /tó/ 'to tell', which has high tone, is not a nominal and is not of Class C, the tone of /tsà/ remains low. Since the tone of /tsà/ is low, the tone of /âmè/ is also low; and since the tone of /âmè/ is low, the tone of /gu/ is also low.' (1961:68)

This explanation breaks down when he tries to account for the tone of tsà. In stating that tsà 'remains low' since tó is neither a nominal nor of Class C, Ansre injects a claim which he implicitly rejects throughout his monograph, that is, that low tone is the basic realization of the non-high toneme. Not only does he nowhere give any evidence for this, but, as we have shown, mid tone is underlying, not low. Since tsà is followed by a verb, its low tone is a problem, since there is no source for low tone in the word. That is, there is no noun beginning with an obstruent in the compound, and thus there is no apparent low tone for the mid tones to assimilate to. Smith (1963:296) comments on the problem, writing that 'a compound whose first element is a non-high
tone verb has a low tone throughout until a high tone is reached. He illustrates this claim with the same two nouns we have taken from Ansre in (46). Smith suggests that this lowering is analogous to the lowering of non-high verbs in imperative sentences, but he gives no evidence for this claim.

We feel that only (46i1) presents a problem. In (46i), the noun dzii, which becomes mid by a rule which we will discuss in the next chapter, has a tonal prefix, which, since the stem is obstruent-initial, will become low tone. The low tones found on the preceding three vowels can be explained by assimilation to this low tone, that is, our MIA. The only reasonable explanation we can suggest for the tones of (46i1) is that compound nouns, like 3erunds, are assigned a noun prefix syntactically, and MIA then spreads the low tone of the prefix to all succeeding non-high tone syllables. If this is the case, then (46i) would also have a low tone prefix, and that would be an additional source for the initial low tone sequence.

Nouns derived from ideophones can be illustrated by the forms cited in Westermann (1930:122). He notes there that nouns can be formed 'from adjectives, adverbs, or picture words by change of sound or tone.' All of his examples are of picture words, or ideophones, and so we refer to these as ideophonic nominalizations. He gives the following examples.

192
(47) *lebélébélé*: 'a long object', from *lebèlebe* 'long, stretched out'.

*làxàlàxà*: 'a saw', from *laxalaxa* (sound made by sawing).

*fudzefudziː*: 'hard parts protruding from yarn or web', from *fudzefudze* 'woolly, hairy'.

*alàlèː*: (the name of a slowly flowing stream), from *lalala* 'slow, still-flowing'.

*totototo*: 'a swing', from *todotodo* 'hanging down, dangling'.

The initial low tone of each ideophonic noun in (47) suggests that ideophones too are assigned a prefix in the nominalization process. The fact that in four of the five examples the root is reduplicated with a low-high tone sequence on both the stem and the reduplicated part suggests that *lA* might operate before reduplication in these forms, but the evidence is so scanty that anything more than speculation is impossible.

Although it is dangerous to draw conclusions from only one compound noun and five ideophonic nouns, the fact that all of them contain otherwise unexplainable low tones suggests that the noun prefix may be a much more pervasive part of Ewe syntax and morphology than has previously been thought. We feel that a study of the syntax of nominalization in Ewe could provide some very interesting results, but such a study is beyond the scope of this monograph.

5.5 Some Implications of the Prefix Hypothesis

In the preceding sections we showed that many alter-
nations in Ewe can be accounted for in a simple way by positing a tonal prefix on all those nouns which do not have the overt vocalic prefix and also on all derived nominals. Implementing this proposal runs into the problem of what the underlying form of this tonal prefix might be. There seem to be two choices: it could be one of the other vowels in the Ewe vowel system, or it could consist solely of tonal features. We will consider first the proposal that it is some other vowel.

The vowel systems of Kpando and Peki are given in (48).

(48) (i) Peki vowels

<table>
<thead>
<tr>
<th></th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>ø</td>
<td>ø</td>
</tr>
</tbody>
</table>

(ii) Kpando vowels

<table>
<thead>
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<tbody>
<tr>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>ø</td>
<td>ø</td>
</tr>
</tbody>
</table>

The chief distinction between the two systems lies in the fact that ø and ø have merged in Kpando, leaving behind the complex process of ø-lowering discussed in Chapters Two and Three. To review this process briefly, we note that Kpando has such words as dëvë 'child', yövë 'European', ásivédë 'finger', eòa 'one', emë 'person', and modëme 'stomach', but no words of the form CëCa, CëCa, (C)ëCa, or (C)ëCu. Similarly the third person singular object pronoun becomes ø after a verb stem ending in ø or ø, but remains ø after a non-covered vowel.

In Kpando, then, the vowel of the tonal prefix could be
any one of five, a being excluded since it is already found as a prefix vowel. Of these five, the high vowels are immediately excluded from consideration since there are no noun stems in which o fails to lower to o. If the vowel of the tonal prefix were i or u, then we would expect some surface consonant-initial stems with the stem vowel o to fail to lower, since the lowering would be blocked by an adjacent high vowel. Thus positing a high vowel as the other prefix vowel would require predicting a specific alternation between o and o which does not occur. The only case in which o fails to lower in a noun stem is when a suffix is added which has a high vowel, such as -vi 'small'.

(49) xŋ lā 'the bird', but xovi lā 'the little bird'
    té lā 'the yam', but tevi lā 'the small yam'
    ɗí 'a certain...', but ɗevi 'little one, child'

The tonal prefix, then, cannot be an underlying high vowel.

The possibility exists yet that the tonal prefix could be any one of the three mid vowels. However, the non-covered mid vowels o and o must also be excluded, as the formation of gerunds shows. Let us consider the derivation of a gerund from a verb whose stem vowel is o or o. The noun prefix, a non-covered vowel, will be attached, reduplication will apply, and then if the stem vowel is o it will lower to o, but this lowering will not take place in the reduplicated part, since there it will be blocked by the non-covered prefix vowel. We will illustrate this in (50) with the verb ɗpè
'cough'.

(50) Stem: kpe

Prefix attachment: $\begin{array}{c}
\text{[+tense]} \\
\text{[-H]} \\
\text{[-L]} \\
\text{[+HPref]}
\end{array}$ $\begin{array}{c}
\text{[+tense]} \\
\text{[-H]} \\
\text{[-L]} \\
\text{[+HPref]}
\end{array}$ kpe

Reduplication: kpe $\begin{array}{c}
\text{[+tense]} \\
\text{[-H]} \\
\text{[-L]} \\
\text{[+HPref]}
\end{array}$ kpe

a-lowering: kpe $\begin{array}{c}
\text{[+tense]} \\
\text{[-H]} \\
\text{[-L]} \\
\text{[+HPref]}
\end{array}$ kpe

Output: *kpe:kpe

The output of (50) is incorrect, since a-lowering will, in fact, apply to both the copied vowel and the stem vowel, giving the correct form kpe:kpe 'a cough'. Thus the tonal prefix cannot be non-covered.

It could be argued that the prefix is deleted phonologically after the tone rules it conditions have applied but before a-lowering, and so the correct forms would be produced. While this alternative would certainly be feasible, it would imply an ordering for which there is no other evidence. Throughout the language, there seems to be no interaction between tone rules and vowel rules. Rather, the two blocks of rules, each of which has internal orderings of its own, are unordered with respect to each other. Allowing a rule of prefix deletion as described would force an ordering which is not needed and not motivated by anything else in the grammar. Thus if a phonological rule of prefix deletion
is posited, it must be ordered between the tone rules and vowel rules in order to allow e-lowering to apply properly. But the only motivation for the ordering is the rule of prefix deletion, which itself has no other motivation. Both prefix deletion and the ordering it requires, then, are arbitrary devices and must be rejected as not reflecting the facts of the language.

Since the prefix cannot be a non-covered vowel, we are left with only one choice, that the vowel of the tonal prefix is ə. The only reason for choosing this vowel is a process of elimination by which ə comes out as the only vowel which would not have unfortunate side effects. However, ə too is somewhat problematical, beyond the telling fact that there is no phonological motivation for choosing it. In closely related dialects in which all nouns have overt vowel prefixes, that prefix is normally ə or o. In only a small set of nouns, about five in number, is ə found as a prefix. For the tonal prefix in Kpando to be ə, then, we would have to posit a historical development for which there is no independent evidence. That is, there would have to have been a merger of ə and o, but only in prefix position, and only in those dialects which were later to lose all prefix vowels except ə. This change would be required only in those dialects with tonal prefixes, since in all others o is all but nonexistent as a noun prefix. Thus ə too is an arbitrary choice and must be rejected, since it does not reflect the facts of
The second possibility is to treat the tonal prefix as simply a tone, that is, as consisting of only the features \([-H]\) and \([-L]\). Since it influences nothing except tone, this is not an unreasonable choice. This prefix, like the prefix, will be deleted by the syntactic rules of nominalization, with the result that the head nouns of nominalizations will show no tonal alternations and will condition none, as, in fact, the data presented above indicates. The tonal prefix will always merge completely, except for its tone, with the preceding vowel. Where no vowel precedes it, as in sentence initial position, the tonal prefix will be realized as segmentally zero, although it will have an effect on the following syllable because of MLA. Also, no phonological rule of prefix deletion in gerunds will be needed, since there will be no non-covered vowel present to block a-lowering.

In proposing that there be incompletely specified segments at the underlying level of phonological structure, we are implying a change in the function of marking conventions as described in Chapter Nine of Chomsky and Halle (1968). There the theory of markedness has in part the function of filling in all redundant feature specifications in the lexicon, and of evaluating the relative cost of segments in some universal perspective. If we allow the marking conventions proposed for vowels to apply to the tonal noun prefix, the
result will be the vowel a-, since that is the least marked vowel. The result would be that all nouns would enter the phonology with the a- prefix and an independent prefix deletion rule would be needed to remove just the non-tonal features of this prefix from just those nouns which are superficially consonant-initial, and those nouns would have to be specifically marked by an utterly arbitrary rule feature in order for prefix deletion to apply to them. This problem is avoidable in a very simple way. We suggest that the universal marking conventions have only the role of evaluating the relative cost of segments, morphemes and rules, and that they not be used to fill in segmentally or sequentially redundant features. In this way the tonal prefix will remain simply tonal, and its behavior, which we have discussed above, will require no arbitrary rules or features. The fact that it influences nothing but tone will follow from the fact that it is itself nothing but a tone.

One problem encountered by our analysis of verb + noun sequences is the fact that there is a difference in vowel length between cases such as (51i), where the noun has a vocalic prefix, and (51ii), where the noun has a tonal prefix.

(51) (i) mokpó ātì
    ñu ané
    ña amá
'I saw a tree.'
'He killed a man.'
'He cooked greens.'
(ii) me kpó 'te
élè̀ dà
élía-ná
'I saw a yam.'
'He killed a snake.'
'He cooked something.'

In Kpando the vowel sequences and falling tone sequence of (51i) are two mora in length. In (51ii) only one mora is found. This length contrast is analogous to the superficial absence of the tonal prefix from utterance-initial nouns. It seems that if the theory is to permit incompletely specified segments, then there will also have to be a condition on grammars like (52).

(52) Incompletely specified segments have no influence on the length of adjacent segments.

In Chapter Two we suggested that the nasalization of vowels is also due to an incompletely specified segment, in this case a morpheme final [+nasal] segment. This segment also conforms to (52), since there are both one mora and one and one half mora nouns with nasalized vowels, but no two mora nouns with nasalized vowels.

Clearly such a proposal as this requires further work and testing. Especially there must be some restriction on what can be a possible incompletely specified segment. Thus it does not seem likely that just any combination of features could be such a segment. It seems most unlikely, for instance, that such a segment could consist only of the features [distributed], [delayed release], or [suction].

A brief investigation of the question in the available lit-
erature reveals a number of potential incompletely specified segments, including the associative tones of Yoruba (Courtenay, 1969) and Efik (Ritter, to appear), the final nasals of Yoruba (Stahlke, 1971), the pervasive nasality found in Arawakan languages, where it distinguishes person in the verb (Bendor-Samuel, 1960 and 1962), and the tonally distinguished tenses of the Akan verb (Schachter and Fromkin, 1966).

In all cases these phenomena share the property that they are either independent morphemes in their own right, or that they are spread over a morphologically definable unit, such as morpheme or word. Thus we might tentatively propose that features or feature complexes may occur as incompletely specified segments only if those specific features or complexes may have morphological implications, being spread over a morphological unit or functioning as morphemes in their own right. Such an entity bears a striking similarity to some of the phenomena discussed by Firthian phonologists under the notion of prosody. Obviously tone and nasality are two such phonological phenomena. It would be interesting to find whether in some language the features involved in distinguishing vowel harmony sets, such as coveredness, tenseness, backness, or roundness, could exist as incompletely specified segments, so that in such a language certain vowel harmony alternations might occur which could be explained only by the presence of some morpheme which consists solely of an incompletely specified segment with just

201
those features that are involved in distinguishing the harmonic classes of that language. This concluding discussion is, of course, extremely speculative and is intended only to suggest promising areas of further investigation.
Chapter 6
OTHER TONAL PHENOMENA

6.0 Introduction

The only major area of the Fwe tonal system remaining is the complex behavior of high tones and rising tones. In Section 6.1 we will discuss Ansre's 'high tone suffix', and we will show that in many instances in nouns and in all instances in verbs the rising tone is derived from an underlying short high tone by a rule of low tone insertion. In Section 6.2 we will describe and motivate a number of other rules which govern high tone alternations, and in Section 6.3 we will discuss a set of exceptions to rules which create low tones.

6.1 The 'High Tone Suffix'

'High tone suffix' is a morphological term coined by Ansre (1961:26) in his discussion of the structure of the nominal. According to his analysis, all nouns ending in one and one half mora vowels end on a high tone, and it is this morphological feature which he calls the high tone suffix. Whether this high tone has any semantic correlate is a question which cannot be answered at this time beyond the remarks made in Chapter Three. In this chapter we will review Ansre's and Smith's analyses, and we will propose a new
analysis which will account for both their data and some additional phenomena.

Ancre does little with the high tone suffix beyond noting its existence, giving a number of examples of it, and noting an unpredictable variation in the tonal behavior of otherwise apparently identical noun stems with high tone suffixes. The high tone suffix is one source of one and one half mora vowels, but all of the examples he gives have either a mid-high tone sequence or a low high tone sequence, as in (1) (1961:24, 26, 60, and 62). (We have used our transcription in which one and one half mora vowels are derived from two mora vowels (see Chapter Two).)

(1) ɓāɖ 'mud' ɖpə 'chisel' ʂ 如 'hole' ʈọ 'mortar'
 ʐi 'dirt' ʐọ 'bridge'
 ʐowə 'plate' ʐəpə 'fish'
 ʂoɔ 'horn' ʂɔ 'greens'
 ʐu 'drum' ʂoø 'guinea corn'
 ʐunə 'dog' ʂu 'mouth'
 vəi 'child' ʃi 'digging stick'
 ʂwə 'large pot' ʂa 'air'
 ʐədə 'witch' ʐpə 'trumpet'
 ʂəo 'goat' ʂəo 'nest'
 ʂəə 'bush' ʂə 'head'

A brief examination of Ancre's examples reveals the interesting fact that the high tone suffix occurs only after a non-
high tone. In fact, Anre gives no nouns ending in one and one half mora high tone vowels, and we assume from this that there are none in Pedi. High tone one and one half mora vowels do occur in participles (1961:39), so we suspect that Pedi may have a rule which shortens one and one half mora vowels to one mora in nouns only. This suspicion is strengthened by the fact that Kpando has quite a number of long vowel noun stems with high tones only, including the following:

(2)  
ayii  'skin'
fyáá  'axe'
ťáť  'fur'
táá  'pond'
ple  'palm nut'
héé  'sand'

It is clear that at least in Kpando the high tone suffix occurs after both high and non-high, and it is possible that this is true of Pedi also.

Anre uses some of the examples in (1) to illustrate the two rising tones, mid-high and low-high. The distribution of these exactly parallels the distribution of mid and low in noun stems and so we feel that the grammar is simplified by treating the rising tones as underlying sequences of mid and high and by accounting for the low by the rule of mid/low alternation discussed in the preceding section. This analysis also follows from Anre’s decision to treat the final

205
high tone as a suffix, a description which is difficult if the tone, which characterizes the suffix, is not given independent status but is rather considered a part of a single rising toneme.

Nouns which Anscro describes as having the high tone suffix do not behave uniformly with respect to all tonal phenomena. This fact, which will be illustrated below, sheds light on an interesting asymmetry in the distribution of high tone in noun stems. Anscro (1961:27) states that 'no Nominal which has High Tone Stem has a consonant of Class A.' He gives numerous examples of a high tone after a voiced obstruent in verbs and adverbs, but his claim seems to be correct at least superficially in nouns. A stem-initial voiced obstruent can be followed either by a low tone or by a low-high rising tone, but not by a high. Anscro (1961:26) analyzes all final rising tones in nouns as consisting of a stem tone and a high-tone suffix. In most cases this analysis proves correct, as, for instance, in the compound noun \textit{xevítogó} 'bird nest'. According to Anscro (1961:61), this is composed of the nouns \textit{xeví} 'bird' and \textit{átogó} 'nest'. However, if the stem consonant is a voiced obstruent, the form after deletion of the noun prefix will have a high tone for some stems (3ii) and a mid-high rising tone for others (3ii).
(3) (i) núdazé 'pot for cooking food'
cf. éda -nú 'zéme 'He cooked food in a pot.'
kɔsígá 'Sunday'
(kɔsi (day name) + ɡá 'date')
alaláhé 'knife for cutting meat'
cf. étsɑ̀ 'heè la alã 'He cut meat with a knife.'
(ii) gámdó 'oil drum'
(ɡá 'metal' + ɡdó 'gourd')
tsinodzoó 'horn for drinking water'
cf. étsɑ̀ 'dzó nɔ 'tsi 'He drank water with a horn.'

The alternation between high tone and low-high rising tone requires a rule of tone-insertion which, together with other rules, will operate on underlying stems of the form (4i) to produce the surface forms shown in (4ii).

(4) (i) \[
\begin{array}{c}
[ -H ] \\
[ -L ] \\
\text{Horn} \\
[ -sonorant ] \\
[ +voiced ] \\
[ +H ]
\end{array}
\]
(11) Underlying form   Surface form
  aça 'sugar cane'      aça
  adzé 'witch'          adzé
  abá 'mat'             abá
  abé 'arm'             abé
  avé 'forest'          avé
  avú 'dog'             avú
  òdè 'oil palm'        òdè
  òvé 'throat'          òvé
  òdó 'work'            òdó
  òdzi 'cry'            òdzi
  òzé 'pot'             òzè
  òsó 'coat'            òsó

Progressive low tone assimilation will apply to nouns of the shape (5i), accounting for the surface forms shown in (5ii).

(5) (i) \[
[ \text{[-H]} ] \quad [ \text{[-sonorant]} ] \quad [ \text{[-L]} ] \quad [ \text{[+H]} ]
\]
Noun

(ii) Underlying form   Surface form
  adzé 'tsetse fly'     adzé
  avó 'cloth'           avó
  adé 'saliva'          adé
  abó 'garden'          abó
  òdó 'native land'     òdó
  òdzo 'horn'           òdzo
  òsó 'gourd'           òsó

From the fact that two distinct tonal classes of noun appear
when the prefix has been deleted it must follow that the class of nouns having the surface form

\[(+L) \quad [-\text{sonorant}] \quad (+L) \quad [+H] \]

\[\text{Noun} \]

actually results from the phonologically predictable merger of the two underlying tonal shapes shown in (7).

\[(7) \quad (i) \quad \begin{array}{c}
[-H] \\
[-L]
\end{array} \quad [-\text{sonorant}] \quad \begin{array}{c}
[-H] \\
[-L]
\end{array} \quad [+H] \\
\text{Noun}
\]

\[(7) \quad (ii) \quad \begin{array}{c}
[-H] \\
[-L]
\end{array} \quad [-\text{sonorant}] \quad [+H] \\
\text{Noun}
\]

The tonal shape of (7ii), of course, is the same one which Ansero claims does not exist. It is reported that Pedi has a length contrast between derived and underlying rising tones, derived rising tones being shorter (Nick Clements, personal communication). Neither Smith nor Ansero notes this contrast and it is not found in Kpando either.

There are two possible derivations for the low component of the derived rising tone, but neither is immediately attractive. The first possibility is that a rule inserts a mid tone copy of the stem vowel between a voiced obstruent stem-consonant and a high tone stem-vowel. Then prefix lowering applies, and finally mirror-image low tone assimilation lowers any mid after a sequence of a low tone, in this case the prefix, and a voiced obstruent (8).
(8) Underlying form: avq' adzé ẽɔo ẽbɔ̀
Vowel insertion: adzɛ̞ ẽbɔ̀̀
Prefix lowering: a′vq' adzɛ́ ẽoɔ ẽbɔ́
Low-tone assim: a′v̩q̩ adzɛ̃ ẽɔ̃ ẽbɔ́

This analysis works and has a degree of built-in economy, since a single independently motivated rule is able to account for the low tones of all stem-vowels in nouns. The problem is the arbitrariness of the mid tone insertion rule. This rule is motivated only by the need for a vowel for mirror-image low tone assimilation to lower, not a very strong motivation. The alternative is to have a rule which applies after prefix lowering to insert a low tone copy of the stem vowel between a stem-initial voiced obstruent and a high tone stem vowel (9).

(9) Underlying form: avq' adzé ẽɔɔ ẽbɔ̀
Prefix lowering: a′vq a′dze ẽ oo ẽbɔ́
Low-tone assim: a′v̩q̩ ẽ ɔ̃
Low-tone insertion: a′dżɛ̀ ẽbɔ́̀

This, too, will work, and phonetically it is better motivated, but it will require two separate rules to account for the obligatory presence of a low tone after a stem-initial voiced obstruent. The two rules are mirror-image low tone assimilation and our proposed low tone insertion rule. Unfortunately, there is no way to collapse these two rules since they differ both in their structural descriptions and in their structural changes. We feel that the phonetically-
motivated second analysis is better, even though the present simplicity metric would suggest that the earlier, phonetically weaker analysis is preferable. We will motivate our choice phonologically in Section 6.2. Accepting the phonetically motivated solution, our rule of low tone insertion will be tentatively stated as (10).

(10) Low tone insertion (tentative)

\[ \emptyset \rightarrow \left[ \begin{array}{c} +L \\ \end{array} \right] / \left[ \begin{array}{c} +L \\ \end{array} \right] \left[ \begin{array}{c} -\text{sonorant} \\ +\text{voiced} \end{array} \right] \rightarrow \left[ \begin{array}{c} +L \\ \end{array} \right] \]

Noun Stem

In the singular of the imperative we find a tone pattern which shows a high degree of similarity to that of nouns. A mid tone verb becomes low, as in (11).

(11) nɛ̀ nyì́  'Sit down!'  

\[ \text{cf. } \text{éŋə nyì́} \]  'He sat down.'

ไกล่ nyì́ lá́  'Buy the cow!'  

\[ \text{cf. } \text{élé nyì́ lá́} \]  'He bought the cow.'

dà nugułú  'Cook food!'  

\[ \text{cf. } \text{éà nugułú} \]  'He cooked food.'

A high tone imperative verb will have low-high rising tone after a voiced consonant, but it will remain high after a voiceless consonant.
(12) và́ 'Come!'

cf. évá 'He came.'

ñá gà kofí 'Give Kofi money!'

cf. éná gà kofí 'He gave Kofi money.'

tó 'fufú' 'Pound fufu'

cf. étó 'fufú' 'He pounded yam.'

Smith (1968:295, 301) notes that high tone verbs become low, rather than rising, if they are followed by another verb, as in (13).

(13) và nọ anyí 'Come sit down!'

cf. évá nọ anyí 'He came and sat down.'

và lyá àtí 'Come climb a tree!'

cf. évá lyá àtí 'He came and climbed a tree.'

To account for the tones of the imperative, Smith suggests three rules. The lowering of mid tone sequences is effected by mid/low alternation (c).

\[
(14) \begin{array}{l}
[\text{Verb}] \\
[-H] \rightarrow [+L] \\
\end{array}
\]

To account for the rising tone illustrated in (12), he formulates the following rule.

\[
(15) \emptyset \rightarrow \begin{array}{l}
[\text{Verb}] \\
[+L] \\
\end{array}
\]

This rule inserts a low tone copy of the stem vowel after the stem consonant. Finally, to account for the change from high to low in (13), he formulates (16).

\[
(16) \begin{array}{l}
[\text{Verb}] \\
[+H] \rightarrow [+L] \\
\end{array}
\]

212
In both (15) and (16), the symbol # is used to indicate a sentence boundary, rather than a word boundary.

We question the need for two separate rules for high tone verbs which differ only in that one (16) applies just before another verb and the other (15) elsewhere. We feel that the implied claim that these are two separate processes is false and suggest that (15) applies to all imperative high tone verbs which begin with voiced consonants. This will produce the intermediate forms,

\[(17) \quad \text{vàá ng anyí} \quad \text{'Come sit down!'}\]
\[\quad \text{vá’ iyá’ átí} \quad \text{'Come climb a tree!'}\]

the first of which is correct surface form for Kwando. Then a rule applies in Peki to delete the high tone of the verb if another verb follows. We suggest the following high-deletion rule.

\[(18) \quad \left[ \begin{array}{c} V \\ +H \end{array} \right] \rightarrow \emptyset / \left[ \begin{array}{c} +L \\ +\text{verb} \end{array} \right] + \left[ +\text{verb} \right]\]

Kwando lacks (18) but has a similar rule which deletes a high tone before another high tone. This accounts for the correctness of the first example of (17) in Kwando (see Section 6.2).

If we consider only what happens to the verb stem and not the sequence of mid tones which may follow it, we find that we need the following two rules.
(19) (i) \( \left[ \overline{V} \right] \rightarrow \left[ +L \right] / \# C \quad \underline{\text{Verb}} \)

(ii) \( \emptyset \rightarrow \left[ +V \right] / \# \left[ +\text{voiced} \right] \rightarrow \left[ +H \right] \quad \underline{\text{Verb}} \)

These rules bear a remarkable similarity to the rules of low tone insertion and mirror-image low tone assimilation (19i) is identical to prefixal tone assimilation except for the fact that the latter is conditioned by a low tone before the stem. (19ii) differs from low tone insertion in this way and also in that it applies to stems beginning with any voiced consonant, rather than just those beginning with voiced obstruents. We showed in our discussion of nouns that the conditioning factor for prefixal tone assimilation, which is itself a subcase of MLA, was not the consonant, but rather a preceding low tone, and that the reason why a mid tone, sonorant-initial noun stem is not lowered is that the prefix is lowered only before an obstruent and so the requisite low tone is absent. We suggest that the singular imperative is marked morphologically by a prefix which consists at least of the features \([-H]\) and \([+L]\), and that it is this low tone which conditions both rules in (19). In the plural, where the mid tone subject pronoun is found, the tonal alternations are absent.

214
(20)  \( \text{minæ anyí} \) \( \rightarrow \) 'You (pl) sit down!'
\( \text{mɪŋle nyí lá} \) \( \rightarrow \) 'You (pl) buy the cow!'
\( \text{miga nùgùguù} \) \( \rightarrow \) 'You (pl) cook food!'
\( \text{miwá} \) \( \rightarrow \) 'You (pl) come!'
\( \text{miná ə̀ kofí} \) \( \rightarrow \) 'You (pl) give Kofi money!'
\( \text{mitó 'fùfu'} \) \( \rightarrow \) 'You (pl) pound fufu!'

By positing this prefix and the tonal noun prefix we can account for the derived rising tones of noun and verb stems by a single rule of low tone insertion requiring no categorial information.

(21) Low tone insertion (LTI)
\[ \emptyset \rightarrow [+L] / \#\# [+L] [+voiced] \]

The claim made by (21) is that a high tone after a word-initial low tone will become a raising tone if the intervening \( C_1^2 \) is voiced. The structures subject to this rule are imperative verbs with voiced stem consonants and nouns with stem-initial voiced obstruents. LTI must, however, be blocked from applying to nouns with sonorant-initial stems where these nouns also meet the structural description for NLA. If not, high tone nouns with sonorant-initial stems will also have rising tones, as in (22).

(22)  \( \text{òda vu alé} \) \( \rightarrow \) 'A snake killed a sheep.'

PL: \( \text{òda vu alé} \)
NLA: \( \text{òdà vu alé} \)
LTI: \( \text{òdà vu *ałé} \)

To prevent incorrect derivations like (22), we propose a re-
adjustment rule specifying sonorant-initial noun stems as exceptions to LTI. This we formulate as (23).

(23) Readjustment rule

\[ [+\text{sonorant}] \rightarrow [-\text{LTI}] \]

Noun Stem

The rule of low tone insertion raises a very interesting question. Note that there are no underlying or surface nouns having an initial voiced obstruent plus a long high tone vowel. The absence of such stems at the systematic phonetic level is predicted by LTI and the Two Vowel Condition. LTI would insert a vowel before the first high tone and then the Two Vowel Condition would shorten the derived three-vowel sequence to two by deleting the second vowel. The absence of such nouns in the lexicon is not so easily accounted for or described. One would expect that in nominalizations in which nouns of this shape lose their prefixes and so fail to undergo LTI such long high tone stems with initial voiced obstruents would appear, but they do not.

The lexical absence of such forms could be described by a morpheme structure condition specifying the first vowel of a long vowel noun stem as non-high just if the stem consonant is a voiced obstruent. This restriction would, however, duplicate the information carried by LTI and the Two Vowel Condition and would therefore complicate the grammar unnecessarily. This then appears to be another case, very similar to that of the ee sequences discussed in Chapter.
Three, where the absence of certain shapes or sequences from the lexicon is to be captured by phonological rules, rather than by morpheme structure conditions.

6.2 High Tone Alternations

As we have shown, not all nouns with a surface low-high tone sequence have long vowels underlyingly. Rather, some are derived by low tone insertion from underlying short high tones. While Ansre misses this point, a failure which is more likely due to the theory he was working within than to his own considerable abilities as a linguist, he does note that not all rising tone nouns with initial voiced obstruents behave alike. He comments,

"When certain Class A Nominals with the suffix of high tone follow the possessive..., the tone of the stem is high. If the nominal has a vocalic prefix, the tone of the prefix is also high." (1961:50)

He illustrates this with the following examples.

(24) (i) ɓɓɓɓ 'goat' → nyę ɓɓɓɓ 'my goat'
       ɗɗɗɗ 'gourd' → nyę ɗɗɗɗ 'my gourd'

(ii) deé 'palmnut' → ẹẹ de 'his palmnut'
     dɗɗ 'hole' → ẹẹ dɗɗ 'his hole'

(iii) aaaa 'arm' → wó ábó 'your arm'
      áááá 'sugarcane' → wó áááá 'your sugarcane'

(iv) zéé 'pot' → miáá zé 'our pot'
     àááá 'peanut' → miáá áááá 'our peanut'

The rising tone in nyę ɗɗɗɗ is due to an independent phenomenon which Ansre discusses (1961:59-60), and which we will
discuss below.

Smith's analysis of long vowels in nouns and of the high tone suffix is basically the same as Ansre's, differing largely on notational grounds. Smith claims, for example, that the second of two vowels in the final syllable of a noun need not be marked for tone since it will be redundantly specified as high tone. Needless to say, this interpretation requires that long vowels be regarded as vowel sequences. Smith sets apart the class of nouns which change from a low-high sequence to a short high tone by the feature [+noun] and then formalizes the alternation with the following rule (1969:300).

\[(25) \quad V \rightarrow \emptyset / \text{Possessive} + (V) \left[ {\begin{array}{c} \text{+son} \\ \text{+voice} \\ \text{+noun} \\ \text{+H} \end{array} \right] V \right] \]

In his analysis it is, of course, the fact that there is a preceding possessive before the noun that accounts for the alternation. We will show below that the alternation is conditioned not syntactically but phonologically.

Smith notes another alternation involving long vowel nouns. Whereas after a voiced obstruent mid becomes low, he cites the following example where mid remains mid (1968:296).

\[(26) \quad \text{é lè dọ wọ m} \quad \text{'He is working.'}
\]
\[\text{cf. \ é lè dà wù m} \quad \text{'He is killing a snake.'}\]

Since the underlying form Smith posits for the noun 'work' is dọ, with the final tone redundantly high, he needs two rules to account for the short mid tone vowel in (26). The
first of these is a rule deleting the final high tone before another high (see also Ansre, 1961:62), before any verb, as also in (26), and in all compounds, as in his examples (1968:296):

(27) dëg 'palm' + åna 'wine' --> dehaa 'palmwine'
    ñgùì 'goat' + åtsu 'male' --> goetsu 'he goat'

(Dritch gives the latter contraction as abetsu, which must be an error, since Ansre has ebetsu (1968:62).)

Smith formalizes these environments in the following rule.

(28) V --> Ø / C V
    \[ \left\{ \begin{array}{l}
    +\text{noun} \\
    +\text{DEM}
    \end{array} \right\} \left\{ \begin{array}{l}
    (C) \left[ \begin{array}{l}
    V \\
    +\text{H}
    \end{array} \right] \\
    +\text{Y} \text{ Z} \\
    \left( \text{i.e., in} \right. \\
    \left. \text{compounds} \right) \\
    \left[ +\text{verb} \right] \text{ VP}
    \end{array} \right\} \]

Since, as he remarks, (28) will only have the effect of equating dëg and deyb, he posits a readjustment rule to mark all long vowel nouns as exceptions to mid/low alternation (his Rule VI) when they are followed by verbs.

(29) Readjustment Rule

V --> \([-\text{Rule VI}] / C \left[ \begin{array}{l}
    +\text{noun} \\
    \end{array} \right] V + \left[ +\text{verb} \right] \text{ VP} \]

He then illustrates the tonal derivations of the sentences in (26) as follows.
(30)  ē le da wu ʼ m  ē le dō w̠ w ʼ m

(28)  ē le da wu ʼ m
MLA(a)  ē le da wu ʼ m
MLA(i)  ē le da wu ʼ m  ē le dō w̠ w ʼ m
MLA(g)  ē lè da wə w ʼ m

Apart from the feature [+DEN], which is not explained anywhere, we are led to ask whether any valid generalization is to be captured by such a diverse collection of environments as found in (28). There are, in fact, some very strong reasons for rejecting (28), along with the readjustment rule he proposes. For example, one environment in (28) claims that the high tone suffix is deleted before a verb. This is not correct, since if a noun with a final high tone occurs as subject of a sentence or otherwise occurs before a verb, as in a serial verb construction, the high tone is deleted only if the verb is also high tone. Compare the sentences in (31).

(31)  (i)  zə̀ e m ʼ l ʼ 'A pot fell.'
    metsə̀ zə̀ e yi xə̀ me  'I took a pot (and) went home.'
    dzə̀ o m ʼ l ʼ 'A horn fell.'
    metsə̀ dzə̀ o yi xə̀ me  'I took a pot (and) went home.'

(ii)  zə̀ yə̀  'The pot is full.'
    metsə̀ zə̀ va ʼ də̀ fə̀ mə̀  'I took a pot (and) came here.'
    dzə̀ o yə̀  'The horn is full.'
    metsə̀ dzə̀ o va ʼ də̀ fə̀ mə̀  'I took a horn (and) came here.'

In (31i) the nouns zə̀ e and dzə̀ o occur immediately before
verbs, in the first sentence of each pair as subject and in the second as object in a serial construction. In both cases the following verb is non-high, and so the final high tone appears, just as expected. In (31i), on the other hand, the following verb is high, and the final high of zed is deleted while that of dade becomes low. The resulting difference in length is not noted by either Ansre or Smith and may be dialectal, but the fact that the high tone is lost only before another high tone, and not just before any verb, is strong counter-evidence to Smith's generalization.

Smith's claim that the final high is deleted in all compounds is also incorrect, at least in part, as the following examples show.

(32) (i) nu'isangσ 'harmonica'
    nu' 'mouth + sango 'concertina'
    ta'dquameσ 'headache'
    ta'a 'head' + du 'bite' + ame 'person'

(ii) taapσ 'skull'
    ta'a 'head' + ad 'bone'
    âxaapati 'rib'
    âxad 'side' + ad 'bone' + âti 'stick'

In these examples the behavior of the final high tone is the same as we found before verbs in (31), the final high lowering before a high. Thus the second environment is also wrong in claiming that the final high tone is always deleted in a compound. It is worth noting that the second part of
Smith's rule also fails to account for the tonal behavior of the two examples of compound nouns which he gives (see (27)). We would expect the high tone to either delete or be lowered in ṭọọ + ātsú, since, as Anse points out, the prefix of ātsú will be deleted, leaving the final high of ṭọọ before a high tone. If the high tone deletion were conditioned by compounding, then we would expect the first noun of dẹ + āhā to become dẹ, rather than dẹ. Mid/low alternation is blocked in Smith's analysis only before verbs, so the compound dehād 'palmwine' is an anomaly and seems to require a different derivational history from ṭọọtsú. These criticisms do not as yet suggest a visible alternative, but they do show that Smith's readjustment rule (29) is simply wrong and that of the three environments he gives in (26) only the first, the phonological environment of a following high tone, is even partially correct. In the remainder of this section we will present an analysis of the final high tone which avoids most of the problems Smith gets into and which requires very little syntactic information.

The behavior of the high tone suffix in Krando differs from Peki primarily in that in utterance-final position the high tone assimilates to the tone of the noun stem. Thus the nouns in (33) have long mid tones in final position.
(33) **Underlying form** | **Final position**
--- | ---
peq' | pqq
too' | too
leq' | leq
akpa'd | akpa'a
baa' | baa
dzoo' | dzoo

We would expect the last two forms to undergo MLA and show up with low tones since they are preceded by the low tone noun prefix, but this is not the case. The fact that they do not lower cannot be explained by rule ordering. That is, if the rule which lowers an utterance final high tone suffix, which we will call Final High Tone Lowering (FHL), is ordered before MLA, both mids will be lowered by assimilation, producing the final forms *b'aa' and *dzoo', but if MLA applies before FHL, the output will be the incorrect forms *b'aa and *dzoo. Thus either ordering will result in incorrect forms. We propose, then, that the fact that voiced obstruent-initial nouns in final position retain mid tone is due to another readjustment rule blocking lowering in noun stems. This can be stated very generally for long vowel nouns since sonorant-initial long vowel nouns also fail to undergo MLA in final position, as (34) shows.
(34) adə fi amaá 'A squirrel stole greens.'

PL:  adə fi amaá
MLA:  ada’i amaá
FHL:  ada’i amaá

We formulate FHL as (35), using a single double-cross, as above, to indicate utterance final position.

(35) [+H] $\rightarrow$ [-H] / [-H] ___ #

This rule simply lowers a word-final high tone to a mid in a stem if it is preceded by a mid and is utterance final. The readjustment rule blocking MLA from applying to long vowel nouns in final position has the following form.

(36) Readjustment rule

\[
C_1^2 \ V \ V \ \rightarrow \ [-MLA] \ / \ \_
\]

FHL is another rule with respect to which the two classes of surface rising tone noun differ. Those which we claim are derived from underlying high tone short vowel stems with initial voiced obstruents do not undergo FHL, and so the nouns which Ansre gives as examples of the low-high rising tone and of the high tone suffix fall into two classes, as follows.

(37) Peki        Kpando (final)        Kpando (underlying)
(i) baá           baa               baá    'mud'
doo              doo               doó    'hole'
dzoo             dzoo              dzoo' 'horn'

224

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<table>
<thead>
<tr>
<th>Peki</th>
<th>Kpando (final)</th>
<th>Kpando (underlying)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) ə́l</td>
<td>ə́l</td>
<td>ə́l</td>
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<td>ágbáá</td>
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<td>ə̀lú</td>
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<tr>
<td>ə́vúú</td>
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<td>vii</td>
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<tr>
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Presumably all of the nouns which Smith marks as [+noun_\text{P}] are of the underlying high tone type and would not undergo FHL. LTI, the rule which inserts the low tone in high tone stems, must be ordered after FHL. Otherwise the final high tones of the derived low-high rising tones would be lowered, producing the incorrect tonal shape *CVV in final position.

As we observed in our discussion of Smith's rule (28) above, Peki changes a rising tone to a mid or low before a high tone. Due to insufficient data we cannot further specify what happens to the high tone suffix in Peki, and so we will henceforth restrict our remarks to Kpando. In Kpando underlying long vowel nouns undergo a rule which lowers a final high tone before another high tone if the stem tone of the noun is non-high. Thus we have the following alternations, using the full form of the definite article lá as the conditioning high tone.
(38) Underlying | Before high tone
---|---
pəŋ | pəŋ lá
too | too lá
ləŋ | ləŋ lá
amaa | amaa lá
baa | bāa lá
dzoő | dzōő lá

Thus a rule is needed which will lower the high tone suffix to mid after a mid and to low after a low, the low tone of the stem resulting from MLA.

Before formalizing such a rule, however, there is more data to be considered. This particular lowering process, which we shall call High Tone Dissimilation (HDis), is not restricted to noun stems. Whenever a sequence of two or more vowels, only the last of which has a high tone, is followed by a high tone, the final high tone of the vowel sequence will dissipilate from the following high and assimilate to the preceding tone. Among the polymorphic sequences which are relevant are the following:

(39) (i) Noun + definite article ḡ
mekpō bū' a ḡa 'I looked at the drum.'

→ mekpō būa ḡa
mekpō dzōő a ḡa 'I looked at the horn.'

→ mekpō dzōa ḡa
mekpō too a ḡa 'I looked at the mortar.'

→ mekpō tooa ḡa

226
(ii) Noun + thematic ə

\[ \text{e؛u ə wók pó} \quad \text{"It's a drum they saw."} \]
\[ \rightarrow \quad \text{e؛lə wók pó} \]

\[ \text{dzóō ə wók pó} \quad \text{"It's a horn they saw."} \]
\[ \rightarrow \quad \text{dzóōə wók pó} \]

\[ \text{toō ə wók pó} \quad \text{"It's a mortar they saw."} \]
\[ \rightarrow \quad \text{toe wók pó} \]

(iii) Noun + á + ə

\[ \text{e؛u á ə wók pó} \quad \text{"It's the drum they saw."} \]
\[ \rightarrow \quad \text{e؛uæ wók pó} \]

\[ \text{dzóō á ə wók pó} \quad \text{"It's the horn they saw."} \]
\[ \rightarrow \quad \text{dzóōə wók pó} \]

\[ \text{toō á ə wók pó} \quad \text{"It's the mortar they saw."} \]
\[ \rightarrow \quad \text{toæ wók pó} \]

(iv) Subject pronoun + future particle á

\[ \text{me + á + k pé} \quad \text{"I will see."} \]
\[ \rightarrow \quad \text{maak pó} \]

\[ \text{e + á + k pé} \quad \text{"You (sg) will see."} \]
\[ \rightarrow \quad \text{aak pó} \]

\[ \text{mi + á + k pé} \quad \text{"You (pl) will see."} \]
\[ \rightarrow \quad \text{miak pó} \]

In (39iii) the shortening observed in the noun stem is due to the Two Vowel Condition discussed in Chapter Three. The lowering of the remaining high tones is due to HDis, and, since any number of consecutive high tone vowels in the environment \([-\text{H}] \ldots \text{C}^2 \text{O} \ [+\text{H}] \) will be lowered, HDis must be
iterative, and must apply either within or across word boundaries. We formulate this as (40).

(40) High tone dissimilation (HDis)

\[
\begin{align*}
(+H) & \rightarrow \left[ \begin{array}{c}
-H \\
\alpha_L
\end{array} \right] / \left[ \begin{array}{c}
-H \\
\alpha_L
\end{array} \right] (\#\#) \quad (\#\#) \quad C_0 \quad (+H)
\end{align*}
\]

The high tones which are lowered by HDis will, of course, be present before a non-high or, if a word boundary precedes a final high, in utterance final position, as the examples in (41) show.

(41) mekpö bua

mekpö dzoa
mekpö toa
bu'a mekpö
dzo'ë mekpö
toa mekpö
bu'a mekpö
dzo'ë mekpö
toa mekpö
maayi
aayi
miayi

'I saw the drum.'
'I saw the horn.'
'I saw the mortar.'
'It's a drum I saw.'
'It's a horn I saw.'
'It's a mortar I saw.'
'It's the drum I saw.'
'It's the horn I saw.'
'It's the mortar I saw.'
'I will go.'
'You (sg) will go.'
'You (pl) will go.'

A functionally very similar rule applies to low-high sequences which come from underlying voiced obstruent + high tone noun stems, like
(42) āvũ' < avũ 'dog'
    ḫũ' < ḫũ 'drum'
    vii < vi 'child'
    ḏo < ḏo 'pot'
    etc.

As shown in (39iii), if the following high tone is on a contiguous vowel, a three-vowel sequence results and this is reduced by the independently motivated Two-Vowel Condition, whether the noun stem is underlying long or short. If, however, the following high tone vowel is separated from the stem by a consonant, such as in the full form of the definite article la or the plural marker wo, the final high tone of an underlyingly short-vowel stem will be deleted, not lowered as in an underlyingly long vowel stem. Thus we have the following forms.

(43) āvũ la 'the dog' → āvũ la
    ḫũ la 'the drum' → ḫũ la
    vi la 'the child' → vi la
    ḏo la 'the pot' → ḏo la

It is clear that an additional rule is needed to account for the facts of (43), a rule which we will formulate as (44).

(44) High tone deletion (HDel)

\[
\begin{bmatrix}
V \\
+H
\end{bmatrix} \rightarrow \emptyset / [+L] \quad \# \# \circ_{1}^{2} [+H]
\]

HDel must be ordered after LTI, since LTI inserts the low tone which creates the environment for HDel. Furthermore both HDel and LTI must be ordered after MLA and HDis, since
otherwise both HDel and HDis will operate on morphemes of
the shape ...CVV, and there will be no way of distinguishing
those which underlyingly have short vowels, and so undergo
HDel, from those which underlyingly have long vowels and so
undergo HDis. We then propose that these four rules be
ordered as in (45).

(45) Mirror-Image Low Tone Assimilation
    High Tone Dissimilation
    Low Tone Insertion
    High Tone Deletion

This ordering will produce the derivations in (46).

(46) Underlying   ví là 'the child'   dzoö lá 'the

      HLA          dzoö lá

      HDis         dzoö lá

      LTI          ví lá

      HDel         ví lá

The ordering in (45) is motivated by another phenomenon
which shows the contrast between underlying short and long
vowel nouns, involving the possessive construction. The
possessive pronoun forms exhibit a final high tone which
causes the noun prefix to assimilate to it. This raising is
not blocked by a voiceless-initial stem as it is after a high
tone verb. Rather, it occurs regardless of the consonant
class of the stem. Furthermore, after the noun prefix is
raised, the rising tone of the first singular and second
singular and plural pronoun disappears, leaving only a short
low tone vowel, just as with underlying short vowel nouns which have undergone LTI and then HDel. The forms of the possessive pronouns before high tone nouns and before non-high tone nouns, then, are as in (47). Only the pronouns which are underlyingly non-high are exemplified, since in the others HDel will not apply, although the noun prefix will be raised.

(47) Before [+H] Before [-H]
nyè átí'       nyè ámaá
'my tree'
wo tẹ̀        wool x̌̃̄
'your (sg) pond'
mi nù        mi äni
'your (pl) thing'
'your (pl) oil'

What is clearly needed, then, is a rule of the following form, which we will call Possessive High Tone Raising (PHR).

(48) Noun Prefix  →  [+H]  /  [+H]  
Possessive

The contrast between underlying short and long vowel nouns is very clear in this environment, as the following examples show.

(49) (i)  nyèè + vi'       'my child'
         →  nyè vi
woó + ágbá       'your plate'
         →  wool ágbá

231
(ii) nyèé + dzoò 'my horn'
    --> nyèé dzoò / ____ [ -H ]
    --> nyèé dzoò / ____ ♯
    --> nyèé dzoò / ____ [ +H ]

wòò + ávòò 'your cloth'
    --> wò ávòò / ____ [ -H ]
    --> wò ávòò / ____ ♯
    --> wò ávòò / ____ [ +H ]

To account for the contrast between (49i) and (49ii), PHR must be ordered both before LTI, since a low tone noun prefix is the condition for LTI, and after HDis, since PHR does not affect low tone assimilation, which is also conditioned by a preceding low tone. The examples in (49) are the result of the following derivations.
(50) \[ \text{PL: } \text{wo}_1 + \text{agbá} \quad \text{wo}_1 + \text{avog} / \_ \_ [-H] \]
\[ \text{PHL: } \text{wo}_2 + \text{agbá} \quad \text{wo}_2 + \text{avog} \]
\[ \text{MLA: } \text{wo}_1 + \text{avog} \]
\[ \text{HDIs: } \text{wo}_1 + \text{avog} \]
\[ \text{PHR: } \text{wo}_1 + \text{agbá} \quad \text{wo}_1 + \text{avog} \]
\[ \text{LTI: } \text{wo}_2 + \text{agbá} \quad \text{wo}_2 + \text{avog} \]
\[ \text{HDel: } \text{wo}_1 + \text{agbá} \quad \text{wo}_1 + \text{avog} / \_ \_ [-H] \quad \text{wo}_1 + \text{avog} / \_ \_ [+H] \]

The behavior of these two types of noun is the same after the other three possessive pronouns as well, the only difference being, as the examples in (51) show, the fact that the pronouns all have high tones. For CVV stems we give only the final form, the others being as in (50).

(51) (i) \[ \text{bú} + \text{á} \ 'his pot' \quad \rightarrow \quad \text{bú} + \text{á} \]
\[ \text{miá} + \text{á} \ 'our dog' \quad \rightarrow \quad \text{miá} + \text{á} \]
\[ \text{wo} + \text{agbá} \ 'their plate' \quad \rightarrow \quad \text{wo} + \text{agbá} \]
(ii) éphé + goč 'his gourd' --> éphé goč
míaepé + avog 'your cloth' --> míaepé avog
wòdóepé + dooc 'their hole' --> wòdóepé dooc

We would now like to return to an inconsistency which we noted above in Smith's treatment of the high tone suffix. We noted there that in deleting all final highs in compound nouns Smith left a tonal contrast unexplained—the fact that in the compound deha' 'palmwine' < dé 'palmtree' + ãha 'wine' the tone of the first noun becomes mid while in the compound rôta' 'he goat' < rô' 'goat' + atsù 'male', the first noun has a low tone. The tones of rôta' are easily accounted for by rules already presented. Since the noun prefix of atsù has been deleted in the syntactic derivation of the compound, the high tone of the derived rising tone on rô' is immediately before another high tone, and so the final high of rô' is deleted by HDel. In deha', on the other hand, there is no following high tone to condition HDel, and so at some point in the derivation we find the form dehã, which is, in fact, an acceptable output form in Kpando. However, Kpando also has the form which Smith quotes for Peki. In Kpando the two are in free variation, and so Kpando must have an optional rule (52), apparently obligatory in Peki, which will change a short high tone to a mid tone in a compound noun if the following tone is non-high and if the stem consonant of the high tone noun is a voiced obstruent.
(52) Compound high tone lowering (CHL)

\[
[+H] \longrightarrow [-H] / \left[ X \right. \begin{array}{c}
\text{sonorant} \\
\text{voiced}
\end{array} \left. \right] \begin{array}{c}
\text{Noun}
\end{array} \ (C) \ # \ # \ c_1^2 \begin{array}{c}
\text{Noun}
\end{array} [-H] X
\]

This rule must be ordered before LTI, since if LTI applied first, all compounds of the dehead type would contain rising tones identical to those derived from underlying long vowels, and CHL, appropriately revised to apply to rising tones would have the effect of reducing all rising tones to mid tones in compound nouns. However, compounds like avọmẹlẹ 'cloth-buying', in which the rising tone is derived from an underlying long vowel, never have variants like *avọmẹlẹ, and so an ordering in which LTI preceded CHL would predict incorrect tone patterns. If the optional CHL applies, of course, the high tone stem vowel which conditions LTI will have been changed to mid, preventing the structural description of LTI from being met. Also, CHL must be ordered after iWA to prevent the mid tone which it creates from being lowered.

CHL has some interesting morphological and syntactic implications for the description of Ewe. In the examples cited by Smith and repeated here, the noun do 'work' has (53) élè dà wọ n 'He is killing a snake.'
élè dọ wọ n 'He is doing work.'
undergone CHL, and so the phrase dọ wọ must be syntactically a noun. If so, it seems to be a type of gerundive nominalization, a hypothesis which is supported by two other facts.

235
The first of these is that in Kpando the particle m' is optional in this progressive construction. If it is absent, the vowel of the verb stem turns out to be long and ends on a high tone. It can be argued, then, that this high tone is lost by HDel before m'. Morphologically, the high tone which has been deleted in (53) may be identifiable as the compounding element discussed in Chapter Three. The second supporting fact is that if the main verb of the progressive is intransitive, it appears in the more usual reduplicated gerund form, with a low tone on the reduplicated portion, as in (54).

(54) \[ \text{élé yyl \( m' \)} \quad \text{'He is going.'} \]
\[ \text{élé vàvá \( m' \)} \quad \text{'He is coming.'} \]
\[ \text{élé kùkù \( m' \)} \quad \text{'He is dying.'} \]

Thus the form of the object + main verb found in (53) is the transitive version of the nominalization found in (54). This also accounts for the inversion of the normal VO word order, since, as was seen in Chapter Five, gerundive nominalizations involve an inversion of verb and object.

The last phenomenon to be discussed involving the high tone suffix is one which has not previously been noted in the literature, and so we suspect that it may be restricted to the Kpando dialect. This phenomenon is the change of certain underlying non-high tone + high tone long vowels to high tone + high tone. This rule applies only before a non-high tone and then only if either of two other conditions
obtains: a) the two preceding consonants within the same noun, compound or otherwise, are both voiced, b) or the stem consonant of a non-compound, monosyllabic noun is a sonorant. Thus we find the following tone patterns.

<table>
<thead>
<tr>
<th>Underlying</th>
<th>Finally</th>
<th>Before [-H]</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>daleen</td>
<td>dalee</td>
<td>dalee</td>
</tr>
<tr>
<td>gamgo</td>
<td>gamgo</td>
<td>gamgo</td>
</tr>
<tr>
<td>vudoo</td>
<td>vudoo</td>
<td>vudoo</td>
</tr>
<tr>
<td>amade</td>
<td>amaa</td>
<td>amda</td>
</tr>
</tbody>
</table>
| ayii       | ayii    | ayii        | 'lizard'
| 'traps'    |         |             |
| 'well'     |         |             |
| 'vegetables' |       |             |
| 'bean'     |         |             |
| (ii)       |         |             |
| pampreod   | pampreod | pampreod   |
| popui      | popui   | popui       |
| podoo      | podoo   | podoo       |
| treygq    | treygq  | treygq      |
| sakaad    | sakaad  | sakaad      |
| lamklee   | lamklee | lamklee     |

Any other combination of consonant classes will, as (55ii) shows, result in a simple rising tone. There is no obvious reason why such a rule as this should develop. Rather it seems to be simply one of those weird, apparently unmotivated subregularities that natural languages delight in developing, to the consternation of the linguist. The rule which we formulate, under protest, to account for this alternation is the following.
(56) Stem tone raising (STR)

\[ \begin{align*}
[-H] & \rightarrow [+H] \\
\text{Noun} \{ [+\text{son}] \} (C) \quad [+\text{vcd}] (C) \quad V^2 (\#\#) \quad [+\text{vcd}] \} (C) \quad [-H] \text{ Noun}
\end{align*} \]

STR will be ordered after HDis since those nouns which will not undergo HDis will, if they meet the structural description, undergo STR. The alternative would be to allow STR to apply before HDis. This, however, would require that STR be further specified to apply only before a non-high syllable, a complication which is not necessary if the former ordering is chosen.

6.3 Exceptions to Lowering Rules

In our discussion of the Ewe tonal system in both this and the preceding chapters we observed that for each of the four rules producing low tones there had to be a readjustment rule marking certain classes of nouns as exceptions to that particular lowering rule. We will review the details of this matter briefly. In Section 5.4 we showed that the rule of prefix lowering failed to apply just if the stem was lexically a noun and had an initial sonorant. In Section 5.3 we showed that MLA was blocked by a lexical noun stem with an initial voiceless obstruent. Also in Section 5.3 we noted that in Ipando final lowering applied to all final mid tones except those which were in lexical nouns. In Section 6.2 we showed that MLA also failed to apply to an utterance final long vowel in a lexical noun, and also in Section 6.2 we
noted that LTT had to be blocked from applying to lexical
nouns in just those cases where the stem began with a sono-
rant.

These five readjustment rules have two factors in com-
mon. Each one marks a certain phonologically definable
class of nouns as being exceptional in some respect, and
each one states a condition on the applicability of some
rule which has the effect of producing a low tone, whether
by lowering a mid or by inserting a low. Since a different
class of nouns is exceptional to each lowering rule it is
not possible to collapse the five readjustment rules in any
way, and it therefore appears to be an accidental quirk that
it is only a certain type of rule which has these systematic
exceptions and that it is only lexical nouns that are ex-
ceptions to these rules. One might wonder why, for instance,
none of the high tone alternation rules are subject to such
systematic conditions, or why it is only nouns that are ex-
ceptional.

It should be possible in some way to show that excep-
tions, such as these, which are restricted to just a func-
tionally similar set of rules and to just a single lexical
class are less costly than, let us say, a class of morphemes
which would be exceptional just with respect to prefix
lowering and high tone dissimilation. We do not know pre-
cisely how this is to be done, but it appears that the mo-
tion of functional unity must be extended to readjustment
rules. This would enable us to make these classes of exceptions less costly because they are all nouns.

A phenomenon like this raises many interesting questions about the development of Kpando. Is Kpando more conservative than dialects in which the lowering rules have fewer or less unified classes of exceptions? Or is this an independent development in Kpando? Such questions cannot be answered without much more data from other dialects, and so we must leave the matter in this rather uncertain state. It is a problem deserving of considerable attention and we hope to be able to return to it in the future.
Chapter 7
CONCLUSIONS

In this monograph we have examined a number of major areas of Ewe phonology, in some cases proposing analyses which differ sharply from those of Westermann (1930), Ansre (1961), and Smith (1968). Much of our attention has been devoted to the Kpando dialect, a dialect which has received little attention in the literature in the past but which shows some interesting divergences from other dialects.

In Chapter One we discussed the consonant system and argued that the systematic phonemic consonants of Ewe are the following.

(1) Voiceless obstruents: p, t, k, kp, ts, f, s, x

Voiced obstruents: b, d, g, gb, dz, b, v, z, h

Sonorants: m, n, ny, nj, l, r, y, g, w

The analysis of the consonant system is quite straight-forward but we differ from previous writers on a number of points. Perhaps the most important of these is our claim that q is a predictable variant of /r/, and that /r/ and /l/, while in partial complementary distribution, are both underlying segments. Their complementarity is captured by a morpheme structure condition. Previous writers have suggested that the segment /p/ occurs only in borrowed words and so may not
be a phoneme. We countered that the absence of any anomalous behavior involving /p/, the antiquity of many of the borrowings containing /p/, and the failure of modern borrowings to undergo a change from /p/ to /kp/ indicate that /p/ is now an underlying segment in the language. A third point on which we differ from other writers is the treatment of /x/ and /h/. Anser and Westermann regard these, together with /z/, as velar fricatives. We claim, on the basis of auditory evidence as well as because of the assimilation of high vowels to them, that these must be pharyngeal segments, rather than velar. Since we have not heard other dialects spoken, we do not know whether /x/ and /h/ are pharyngeal in all dialects or just in Kpando and a few neighboring dialects. A final matter to which we give some attention is the restricted distribution of velars and palatals with respect to high vowels. Previous writers seem to have missed the fact that palatals may not be followed immediately by an underlying /u/ or velars by an underlying /i/. This constraint also seems to cover pharyngeals, since the only two instances of pharyngeal plus /i/ found seem to be reduplicated. Labial-velars, however, may be exceptions to this restriction, at least in Kpando and Amfo.

In Chapter Two we examine the vowel system and posit the following underlying vowels for most Ewe dialects (21) and for Kpando (21i).

242
(2) (i) i, e, ə, a, ə, o, u

(ii) i, e, a, ə, o, u

The surface vowel system of Kpando is much more complex, exhibiting the seven oral vowels shown in (2i), as well as their nasal counterparts, seven one and one half mora oral and nasal vowels, seven oral and nasal two-mora vowels, and the short nasal vowels ð and ñ. We show that the one and one half mora vowels are derived by a shortening rule which deletes one half mora from a two mora vowel, i.e., a vowel sequence, in nouns and verbs. Nasalized vowels are derived from their oral counterparts by a rule which nasalizes any sequence of liquids and/or glides if there is a morpheme-final nasal. In nouns and verbs, where the first nasal is itself always deleted, we argue that the final nasal is an incompletely specified segment, a theoretical construct to which we return in Chapter Five. The centralized high nasal vowels are derived by a vowel reduction rule which applies to a short high vowel in a closed syllable. We argue also that /e/ and /ə/, as found in other dialects, have merged in Kpando, leaving only /e/ as an underlying vowel segment. A set of e-lowering rules produce ə in a number of environments. e-lowering is blocked phonologically by either an abutting non-covered vowel or by a high vowel in an adjacent syllable. The result of this blocking is that there exists a living alternation between /e/ and ə, an alternation which is general only in Kpando.
In Chapter Three we approached the complex problem of vowel sequences. We argued first that Ansre's criteria for diphthongs are far too loose, since he classified as diphthongs all vowel sequences of whatever pedigree, with the result that sixteen of his twenty-one diphthongs are polymorphemic and two arise only in exclamations of pain and sorrow. Adding one more vowel sequence to his list, we found that all monomorphemic diphthongs were /i/-initial. We then showed that what Ansre considered an /iV/ sequence is in fact a /yV/ sequence. Turning to the behavior of vowels in sequences in Kpando, we showed that all word-level vowel sequences are subject to a surface condition on vowel sequences stating that, whatever the underlying form of a vowel sequence, at the systematic phonetic level both vowels must have the same tongue height and tongue root position specifications. This constraint, which involves the working of several distinct phonological rules, we referred to as the Equal Height Condition. A second constraint applies to all vowel sequences, including those which contain word boundaries. In this case certain rules of vowel deletion, resyllabification, and glide creation operate to guarantee that no syllable in the surface phonetic output will contain more than two vowels in sequence. Finally we discussed the development of e-lowering in Kpando from a historical viewpoint and suggested that it may have development by generalizing an existing rule of coveredness assimilation. It became clear,
however, that as the e-lowering process came to affect a larger number of cases, and thus became more general, its statement became increasingly more complicated.

In Chapter Four we examined the analyses of Ewe tone as presented by Westermann (1930), Ansre (1961), and Smith (1968), concentrating especially on the alternations between mid and low tone. We showed that each analysis was inadequate in certain respects and that Smith's treatment, while perhaps the most formal and complete, was far more complex than necessary. We then showed how, without changing any of his basic assumptions about the tonal system, it was possible to very much simplify his rule of mid/low alternation and make it more phonologically and less syntactically conditioned.

In Chapter Five we presented a new analysis of the mid/low alternation. We showed first that even a much extended and simplified version of the Ansre/Smith analyses, which we called the tone insertion hypothesis, was incapable of accounting for the absence of certain tonal alternations in nominalizations. Then, showing that the tonal influence of vowel and consonant-initial nouns was identical and that this influence was lost when a noun underwent certain syntactic nominalization rules, we argued that all nouns have prefixes which are subject to certain syntactic deletion rules. We then illustrated the power of the so-called prefix hypothesis in accounting for the tonal behavior of several types of de-
derived noun. The prefix found on superficially consonant-initial nouns is, we argued, made up only of tonal features and has no other phonetic content.

In Chapter Six we examined a variety of alternations involving high tone. We argued first that the nouns which in Ansre's analysis are given a high tone suffix actually break down into two classes, those which underlyingly have a short high tone vowel and those which are underlyingly long vowel stems ending in high vowels. We showed from a number of alternations with respect to which the two classes of nouns differ that there must be a rule of low tone insertion which changes a short, voiced-initial high tone stem to a one and one half mora rising tone. This rule is blocked in sonorant-initial nouns. We then discussed several rules operating on high tone suffixes in various environments and showed that the two classes of rising tone stem also differ with respect to these nouns. We also showed that at least in Kpando the high tone suffix is found with both high and non-high noun stems, although Ansre gives examples of it only with non-high stems.

Several theoretical questions arose in the course of our discussion of particular phonological problems. The question of lexical representation and redundancy came up in two ways. One was with respect to two phonological shapes which were found to be absent from the lexicon. These are morphemes with the vowel sequence ee and noun stems of the shape (e).
(5) $\begin{bmatrix} -\text{sonorant} \end{bmatrix} [\begin{bmatrix} +H \end{bmatrix} [\begin{bmatrix} +H \end{bmatrix}]$ +

In the former case, the rules operating on vowel sequences to raise $\text{ee}$ to $\text{ii}$ and $\text{ae}$ to $\text{ee}$ neutralize any contrast that might otherwise occur between underlying vowel sequences like $\text{ii}$ and $\text{ae}$ and between $\text{ae}$ and $\text{ee}$. Since $\text{e}$-lowering does not apply if there is an adjacent non-covered vowel, $\text{ae}$, not $\text{ee}$ must be the source of surface $\text{ee}$ sequences. Since the contrast between underlying $\text{ii}$ and $\text{oo}$ is neutralized, there is no longer any way of distinguishing such an underlying contrast, and we can conclude that $\text{oo}$ sequences have been lost from the lexicon. However, their lexical absence is captured by the interaction of certain independently motivated phonological rules, and to state the same fact as a morpheme structure condition, the conventional means of capturing underlying phonotactic restrictions, would mean adding redundancy to the grammar. In the latter case it was shown that by the rule of low-tone insertion and the Two Vowel Condition, nouns of the shape shown in (5) undergo the derivation $\text{CVV} \rightarrow \text{CVV} \rightarrow \text{CVV}$. That is, they become identical in form to underlying rising to stems. There seem to be no surface $\text{CVV}$ nouns which become $\text{CVV}$ after prefix deletion, and so we suspect that once again an expected underlying contrast has undergone absolute neutralization as a result of independently needed rules. Thus the fact that there are no underlying $\text{CVV}$ noun stems whose initial consonants are voiced obstruents is another underlying phonotactic re-
striction which is captured by independently motivated phonological rules and need not be stated separately as a morpheme structure condition. The consequences of such neutralizations as these deserve further examination, but one thing which seems clear is that the conventional treatments of morpheme structure must be modified at least so that they do not reiterate generalizations captured by the phonological component.

A second problem relating to lexical representation is the question of incompletely specified segments. We argued that the noun prefix of superficially consonant-initial nouns must consist only of the phonological features for tone. We argued also that nasalized vowels are derived by assimilation to a final nasal segment which in nouns and verbs must be specified only for nasality. We suggested that the existence of such segments in language requires that marking conventions in the Chomsky-Halle theory of markedness have the function of evaluating the relative cost of segments, sequences, and rules but not of filling in unspecified segments in the lexicon. This restriction follows directly from the fact that if marking conventions do have the role of fully specifying all segments, then the tonal prefix will have to be a-, but this claim will require that those prefixes which do not show up as a- would have to be specially marked to undergo deletion. Similarly, if the final nasal of nouns and verbs were to be fully specified, it would end up as /n/, but

248
this nasal never occurs finally in adverbs or ideophones, though /m/ and /ŋ/ do. Thus in both cases the claim that marking conventions produce fully specified segments leads to unnatural claims about Ewe phonology.

In Chapter Three we discussed two surface conditions on Ewe phonology. The first of these, the Equal Height Condition, states that all word-level surface vowel sequences may consist only of vowels of the same tongue height and tongue root position. This condition must be given as a surface constraint since the sequences involved often have the underlying forms [V + a] or [V + e] and undergo a number of rules of assimilation. The second surface condition, the Two Vowel Condition required that no surface syllable contain more than two vowels in sequence. This condition requires a number of rules adjusting segmental and boundary features whenever more than two vowels are found in sequence. In both cases there is a generalization to be captured which cannot be expressed by a single rule, but rather represents the results of several rules operating on the same string. We claimed that phonological theory must contain such generalizations and that surface conditions do not add to the cost of a grammar but rather reduce the cost of individual rules which operate to produce the results required by the condition.

There remains one matter worth referring to, the status of low tone in the lexicon. In our investigation we did not find Anre's claim that low and mid are allotones of one non-
high tone to be consistently true. This follows in part from the fact that there is no direct analog in generative phonology to the structuralist concept of allophone. That is, a single phone can be derived by neutralization of several distinct underlying segments, as, for example, the neutralization of word-level \textit{ue} and \textit{oe} sequences to \textit{ui} and of \textit{ie} and \textit{oe} sequences to \textit{ii}. In the latter case there are also underlying \textit{ii} sequences, so the neutralization is three-way. In the case of low tone, we find that there are several possible sources for it. Low-tone insertion, for example, must insert a low tone, not a mid, since if a mid is inserted and later lowered, derived long vowel stems will be identical to underlying long vowel stems, and it will be impossible to predict which forms behave like short vowel stems and which like long vowel stems. Secondly, we see no reason to posit the singular imperative prefix as under-lyingly mid, since it always appears as a low tone and never alternates with mid. Thirdly, we cannot consistently predict the behavior of the initial vowels of the numbers two through ten:

\begin{align*}
(1.) & \quad \text{'two'} & \quad \text{'six'} \\
& \quad \text{etô} & \quad \text{adôfô} \\
& \quad \text{one} & \quad \text{enyî} \\
& \quad \text{atô} & \quad \text{asieke} \\
& \quad \text{'five'} & \quad \text{'nine'} \\
& & \quad \text{ewô} \quad \text{'ten'}
\end{align*}

If these are treated as nouns, as asieke 'nine' certainly
must be, containing the noun ḍéd ‘hand’, then we cannot ac-
count for the mid tones on the initial vowels of adé ‘six’
and adéqé ‘seven’. It is possible that our rule scheme could
be extended in such a way as to account for (4), but this
would still leave certain anomalies. First of all, there is
no reason to believe that the number words are listed lexi-
cally as nouns, since their grammatical behavior is as ad-
jectives and quantifiers. Secondly, adé and adéqé would still
have to be marked in the lexicon as exceptions to prefix
lowering. Finally, the numbers would be the only nouns in
Central Ewe, including both Peki and Kpando, not to undergo
loss of the noun prefix e-, an inconsistency which does not
crop up if the number words are not treated as nouns, their
initial vowels thus not being equated with the noun prefix.
It appears, then, that some low tones will have to be marked
in the lexicon. Naturally forms for which low tone is speci-
fied in the lexicon will be slightly more costly to the
grammar since in most cases only high tone need be specified.
To this extent, then it is true that low tone need not be
specified lexically. But where it is, the exceptionality of
such cases is shown by their added cost.
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256