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A typology of vowel coalescence Roderic F. Casali

1 Introduction

Many languages disprefer vowel hiatus. Among the common strategies for eliminating hiatus are Elision of one of the vowels, and Coalescence, in which the two vowels merge to form a new vowel sharing features of both the originals. These processes are schematized in (1), and illustrated in (2) with data from Etsako and Kamba.

(1) a. Vowel Elision: $CV_1+V_2 > .CV_2(:)$. or $.CV_1(:)$.

b. Coalescence: $CV_1+V_2 > .CV_3(:)$.

(2) a. Vowel Elision (Etsako, Elimelech 1976)

 $d\varepsilon$ akpa \rightarrow .da.kpa.

b. Coalescence (Kamba, Roberts-Kohno 1994, 1995)

ko-ma-ek-a \rightarrow .ko.mee.ka. 'pay them'

Both of these processes resolve hiatus by deleting phonological material, a characteristic that distinguishes them from other hiatus resolution strategies such as Glide Formation or Epenthesis. This paper addresses the question of how the similarities and differences between these two processes are to be characterized within phonological theory. My analysis is based on an approach to Faithfulness that differs somewhat from the standard version of Correspondence Theory developed in McCarthy & Prince (1995).

2 Feature-mediated Faithfulness

Following Kirchner (1993), I assume that all loss of phonological material is reckoned in terms of feature rather than segment deletion. Under this view, both Elision and Coalescence are penalized as violating a constraint Preserve(F), given in (3), which requires preservation of features.

(3) Preserve(F) A feature present in the input must also be present in the output.

I propose, moreover, that there is no separate constraint equivalent to MAX that is violated by segmental deletion. Instead, loss of an entire segment is simply the cumulative effect of the loss of each of its features. In other words, this approach to Faithfulness is feature-mediated rather than segment-mediated.

Although all loss of phonological material is penalized, under this view, in terms of featural loss, this need not deny that segments exist or that languages seek to avoid their disruption. There must presumably be some additional cost to the merger of underlying segments that occurs under Coalescence. Within Correspondence Theory, this

cost is exacted by the constraint Uniformity. Under the feature-mediated approach advocated here, it is likely that a somewhat different technical implementation of this constraint is required. Since the precise statement of this constraint is not of primary interest to us, however, I retain the label Uniformity. For our purposes, this is simply equivalent to "no Coalescence." Coalescence also generally involves loss of one or more input features, violating Preserve(F) in addition to Uniformity. Vowel Elision, on the other hand, satisfies Uniformity, violating only Preserve(F).

Under the view I develop below, the essential difference between Elision and Coalescence is that Elision involves a preference for preserving features in a particular position, while Coalescence involves a preference for preserving particular feature values. We shall also see that there are other, "hybrid" processes that may be viewed as compromises between Elision and Coalescence in that they involve both positional and featural preferences.

3 Vowel Elision

I now consider in more detail the mechanism that gives rise to Elision. I assume that languages make a greater effort to preserve features (and, by extension, segments) in certain prominent positions (Steriade 1993). Corresponding to these positions is a family of position-sensitive Faithfulness constraints that require preservation of features occurring in these positions.¹ Examples of these constraints are listed in (4); note that the constraint that will be most relevant to our purposes is the constraint Preserve-[w in (4a), which requires preservation of word-initial features or segments.

Position-Sensitive Preserve(F) constraints: (4)

> a. Preserve(F)-[w Preserve word-initial features.

b. Preserve-[m Preserve morpheme-initial features.

c. Preserve-lex

Preserve features in lexical positions (i.e., in root morphemes and contents words).

In addition to these position-sensitive Preserve constraints, I assume that there are Preserve constraints that target specific feature values, irrespective of the positions they occur in. For vowel features, we will have the Preserve constraints in (5).

(5) Feature-Sensitive Preserve constraints for vowel features

> a. Preserve(low) d. Preserve(round)

b. Preserve(-high) e. Preserve(front)

c. Preserve(+high) f. Preserve(ATR)

¹ Position-sensitive Faithfulness constraints have been posited elsewhere for a variety of positions, including roots (McCarthy & Prince 1995, Casali 1994, Rosenthall & Mous 1995), word-initial position (Casali 1994, Hsu 1995, McCarthy & Prince 1995), and root-initial syllables (Beckman 1995).

In the case of Elision, the preferences for preserving particular feature values are entirely subjugated to positional preferences. In other words, we will have the ranking in (6), assuming that we are dealing with context involving the boundary between two content words.

(6) Preserve(F)-[w >> { Preserve(lo), Preserve(-high), Preserve(+high), Preserve(front), Preserve(round) }

Given this ranking, loss of a vowel in word-initial position (i.e., V_2), will violate both Preserve-[$_w$ and at least some of the feature-sensitive Preserve constraints, while loss of a word-final vowel, (i.e., V_1), will violate only the latter, 2 as shown in (7), using a hypothetical input sequence /a+i/ as an example.

(7)	/a##i/	Pres(F)-[w	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(frt)	Pres(rnd)
	a	**			*	*	
\Rightarrow	i		*				
	e		*		*		

An interesting consequence of the analysis is that, in the absence of a competing constraint favoring preservation of word-final features, there is simply no ranking that will yield a language that systematically targets V_2 for Elision in hiatus contexts arising at the juncture of two content words. This prediction appears to be correct: a survey of hiatus resolution in 91 languages (Casali 1996) has uncovered 42 languages with productive V_1 Elision at word boundaries and not a single case of regular V_2 Elision in this same context.

I emphasize that while only V_1 Elision is possible at the boundary between two content words, there are other contexts in which either V_1 or V_2 may be elided, the choice being determined on a language-specific basis. These latter contexts, of which one example is a root-plus-suffix boundary, are those in which both V_1 and V_2 occur in positions targeted by some position-sensitive Preserve constraint. A discussion and analysis of the Elision possibilities that obtain at each type of juncture in which hiatus may arise is given in Casali (1996).

Throughout the remainder of this paper, I assume for concreteness that we are dealing with a hiatus context involving a full word boundary. Extension to other contexts is in general straightforward.

4 Symmetric Coalescence

While Elision involves a preference for preserving features in a particular position, Coalescence involves a preference for preserving particular feature <u>values</u>. In its

² Here I ignore the constraint Preserve-lex, which is violated equally by Elision of either vowel and hence can play no role in determining which vowel is elided.

prototypical form, Coalescence is symmetric: a given pair of vowels yields the same phonetic output in either input order:

(8) Symmetric Coalescence:

phonetic output of
$$V_a+V_b/=$$
 phonetic output of $V_b+V_a/$

I propose that this type of Coalescence results from (1) a hierarchical ranking of feature-sensitive Preserve constraints, encoding a preference for preserving certain feature values at the expense of others, and (2) subjugation of the position-sensitive constraint Preserve(F)-[w to the feature-sensitive constraints. The resulting overall ranking is schematized in (9).

(9) Preserve(feature₁) >> Preserve(feature₂) >> Preserve(feature₃) >> Preserve(F)-[w

An example of a language with Symmetric Coalescence is Afar. The behavior of Coalescence in Afar is summarized in (10).

- (10) Symmetric Coalescence in Afar (Bliese 1981):
 - a. If either input vowel is [-high], the output is [-high]:

examples:
$$/u+o/$$
, $/o+u/ > [o]$ $/e+i/$, $/i+e/ > [e]$
 $/u+e/$, $/e+u/ > [o]/o+i/$, $/i+o/ > [o]$

b. If either input vowel is [low] (=/a/), the output is [low] (=[a]):

$$/a+V_2/ = /V_2+a/ = [a]$$

c. Where neither vowel is [low], if either input vowel is [round], the output is [round]:

examples:
$$/e+o/$$
, $/o+e/ > [o]$ $/i+u/$, $/u+i/ > [u]$ $/i+o/$, $/o+i/ > [o] /e+u/$, $/u+e/ > [u]$

d. [front] loses out to any competing feature (i.e., [round] or [low]).

The feature preferences exhibited by Afar can be captured by the pair of crucial rankings in (11): a height feature ranking that encodes the dominance of [low] and [-high] over [+high] and a "color feature" ranking that encodes the preferences for [low] and [round] over [front].

- (11) Preserve(F) hierarchies for Afar:
 - a. height feature hierarchy
 - { Preserve(low), Preserve(-high) } >> Preserve(+high)
 - b. color feature hierarchy

Preserve(low) >> Preserve(round) >> Preserve(front)

Note that there is no evidence to establish a crucial ranking of Preserve constraints referring to certain features that are never in direct competition with each other, for example [low] and [-high].

Since positional preferences play no evident role in the Afar Coalescence contexts, the members of both of the hierarchies in (11) must crucially dominate the position-sensitive constraint Preserve(F)-[w, as stated in (12).

(12) a. { Preserve(low), Preserve(-high) } >> Preserve(+high) >> Preserve(F)-[
$$_{\rm w}$$

Further components of the analysis are as follows. First, there are structure preservation constraints that rule out various combinations of incompatible features. These constraints, shown in (13), are not crucially dominated by any other constraints.

- (13) undominated cooccurrence constraints:
 - *D A vowel must not be both [round] and [low] (Kaun 1995).
 - *æ A vowel must not be both [front] and [low].
 - *e A vowel must not be both [front] and [round].

Second, the constraint Uniformity, which prohibits Coalescence, must be dominated by the feature-sensitive Preserve constraints that drive Coalescence. Finally, constraints that rule out other forms of hiatus resolution, such as Epenthesis, must be undominated.

I now illustrate the effects of these rankings on various sequences, beginning with the sequence /a##o/ illustrated in (14).

(14)	/a##o/	*p,*æ,*œ	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(rnd)	Pres(frt)	Pres(F)-[w	Unif.
\Rightarrow	a					*		**	
	0		*!						
	α	*!							*

Here the second candidate [o] loses out to the low vowel [a], despite that fact that it occurs in word-initial position, due to the ranking of Preserve(low) above both Preserve(F)-[w and Preserve(round). Note also that the third candidate, a low round vowel, loses out because it violates the undominated cooccurrence constraint against segments that are simultaneously [low] and [round].

In (15), the sequence /e+u/ undergoes Coalescence to [o], preserving both the [-high] value of V_1 and the roundness of V_2 , as a consequence of the ranking of Preserve(-high) above Preserve(+high) and of Preserve(round) above Preserve(front).

(15)	/e##u/	*p,*æ,*œ	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(rnd)	Pres(frt)	Pres(F)-[w	Unif.
	e				*	*!		**	
	u			*!			*		
\Rightarrow	0				*	·	*	*	*

The tableau in (16) shows that the reverse sequence /u+e/ also coalesces to form [o], for the same reasons. Note that, in both cases, the low ranking of Preserve(F)-[w prevents it from exerting any influence, with the result that the outcome is determined entirely by featural, rather than positional preferences.

(16)	/u##e/	*p,*æ,*œ	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(rnd)	Pres(frt)	Pres(F)-[w	Unif.
	e				*	*!			
	u			*!			*	**	
\Rightarrow	0				*		*	*	*

The ranking of Preserve(round) above Preserve(front) entails that the sequences /e##o/ and /o##e/ will also be realized as [o], as shown in (17) and (18).

(17)	/e##o/	*p,*æ,*œ	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(rnd)	Pres(frt)	Pres(F)-[w	Unif.
	e					*!		*	
\Rightarrow	0						*		
	œ	*!							*

(18)	/o##e/	*p,*æ,*œ	Pres(lo)	Pres(-hi)	Pres(+hi)	Pres(rnd)	Pres(frt)	Pres(F)-[w	Unif.
	e					*!			
\Rightarrow	0						*	*	
	œ	*!							*

5 Feature-Sensitive Elision

We may now consider a third form of hiatus resolution. Note that the possibility of Coalescence depends crucially on the ranking of Uniformity below the Preserve constraints. If Uniformity is undominated, a language with the same kind of Preserve(F) hierarchy as Afar will not manifest Coalescence but will display instead a kind of Elision, which I refer to as *Feature-Sensitive Elision*, in which the vowel with the most highly preferred feature is the one that survives, in its entirety. An example of such a language is Modern Greek (Kaisse 1977), which has the strength hierarchy in (19):

(19)	Stro	ngest		Wea	ıkest
	<u>—</u> а	0	u	e	i

In any vowel sequence, the strongest vowel is the one that is preserved, as described in (20) and exemplified in (21).

```
(20)
        a. a+V, V+a > [a]
        b. o+u, u+o > [o]
        c. o+e, e+o > [o]
        d. o+i, i+o > [o]
        e. u+e, e+u > [u]
        f. u+i, i+u > [u]
        g. e+i, i+e > [e]
        a. ta éxo
them I have
                                            táxo
(21)
        b. me ayapapai
me he loves
                                            mayapái
        c. ta onirévome
them I dream
                                            tanirévomé
        d. to alazo
it I change
                                            talazo
        e. to urliazi
it he howls
                                            torliazi
          tu oðiyó
to him Í lead
                                            toðiyó
        f. tu
        g. to éðosa
it Í gave
                                            tóðosa
        h. me oðiýi
me he leads
                                            moðivi
        i. me ide
                                            méde
          me he saw
                                            muðosa
                  eðosa
          to me he gave
```

Note that this pattern differs from the one in Afar in that, although the outcome is determined by the features of the vowels, there is never any actual Coalescence; either V_1 or V_2 is preserved in its entirety in all cases. This shows up most clearly with the input pair /e/, /u/ listed in (20e). Even though Greek exhibits the same preferences for preserving [round] over [front] and [-high] over [+high] that we saw in Afar, a coalescent merger of /e+u/ or /u+e/ to form [o] is impossible due to the undominated position of Uniformity, which rules out Coalescence completely. Thus, whereas in Afar there is no direct evidence of a relative preference for [round] versus [-high], the impossibility of Coalescence in Greek forces these two otherwise perfectly compatible features into competition with each other. Since the actual attested outcome in (20e) is [u] rather than [e], it is clear that [round] is more highly preferred than [-high].

The full feature-value ranking hierarchy needed for Greek is given in (22).

(22) Preserve(low) >> Preserve(round) >> Preserve(-high) >> Preserve(front) >> Preserve(+high)

As in the case of Coalescence, Feature-Sensitive Elision requires that this hierarchy be ranked above the position-sensitive constraint Preserve(F)-[_w, as stated in (23).

These rankings will lead to results like those in (24) through (29).

(24)	/a##o/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
\Rightarrow	a				*				*
	О			*!					
	α	*!	*						
				II		II	Ш	Ш	<u> </u>
(25)	/o##a/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
\Rightarrow	a				*				
	0			*!					*
	α	*!	*						
			ı	II .		Ш	П	II .	<u> </u>
(26)	/e##i/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
\Rightarrow	е							*	*
	i					*!			
									
(27)	/i##e/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
\Rightarrow	e							*	
	i					*!			*
				II 5 4)	The 2 to	II 5 (11)	II 5 (0.)	1 5 (15)	
(28)	/e##u/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
	e				*!			*	*
\Rightarrow	u					*	*		
	0		*!				*	*	*
					П				
(29)	/u##e/	*p,*æ,*œ	Unif.	Pres(lo)	Pres(rnd)	Pres(-hi)	Pres(frt)	Pres(+hi)	Pres(F)-[w
	e				*!			*	
\Rightarrow	u					*	*		*
	О		*!				*	*	*

We have looked at three types of hiatus resolution through featural loss: ordinary Elision, Symmetric Coalescence, and Feature-Sensitive Elision. Which of the three arises in a given language depends on the relative rankings of the feature-sensitive Preserve constraints, the relevant position-sensitive Preserve constraints, and Uniformity. There are six logically possible rankings to consider. As shown in (30), each of these rankings gives rise to one of the three resolution strategies we are considering.

(30)	highest	second	bottom	result:
	constraint(s)	constraint(s)	constraint(s)	
a.	Uniformity	Pres(F)-[w	Pres(F)	regular Elision
b.	Pres(F)-[w	Pres(F)	Uniformity	regular Elision
c.	Pres(F)-[w	Uniformity	Pres(F)	regular Elision
d.	Pres(F)	Uniformity	Pres(F)-[w	Symmetric Coalescence
e.	Pres(F)	Pres(F)-[w	Uniformity	Symmetric Coalescence
f.	Uniformity	Pres(F)	Pres(F)-[w	Feature-Sensitive
				Elision

In (30a-c), we see that where the position-sensitive constraint Preserve-[w is ranked above the feature-sensitive preserve constraints, here abbreviated as Pres(F), we predict ordinary position-sensitive Elision, regardless of the position of Uniformity in the hierarchy. Where on the other hand the feature-sensitive Preserve constraints are ranked above Preserve-[w, we predict either Symmetric Coalescence or Feature-Sensitive Elision, depending on the position of Uniformity in the hierarchy, in particular its position with respect to the feature-sensitive Preserve(F) constraints. If Uniformity is dominated by the Preserve(F) constraints, as in (30d,e) then the result will be Coalescence. If Uniformity is undominated, as in (30f), then Coalescence will be impossible and the ranking of Preserve(F) above the position-sensitive constraint Preserve-[w will therefore give rise to Feature-Sensitive Elision.

6 Asymmetric Height Coalescence

All of these cases we have looked at so far assume that the feature-sensitive Preserve constraints are ordered contiguously. There is no reason however to expect that this should be the case in every language. In other words, we expect that there could be a situation, shown in (31), in which only some of the feature-sensitive Preserve constraints are ranked above Preserve-[w, while others are ranked below it.

(31) { Preserve(F), Preserve(G) } >> Preserve(F)-[
$$_{\rm w}$$
 >> { Preserve(H) Preserve(I) } ... (where F, G, H, I are distinct feature values.)

While there are many logically possible situations of this type, there is one that occurs with particularly great frequency, giving rise, as we shall see, to a type of Height Coalescence schematized in (32), in which a non-high V₁ plus a high V₂ yields a non-high version of V₂. This type of Coalescence is found for example in Anufo (Adjekum, Holman & Holman 1993), Bolia (Mamet 1960), Chumburung (Snider 1985, 1989), Gichode (Keith Snider, field notes), Ila (Smith 1907), Kamba (Whitely & Muli 1962, Roberts-Kohno 1995a,b), KiYaka (Eynde 1968, Kidima 1991), Lugisu (Brown 1969), Nawuri (Casali 1995), Owon Afa (Awobuluyi 1972), Si-Luyana (Givon 1970), SiSwati (Cahill 1994), Southern Sotho (Doke & Mofokeng 1957), and Xhosa (Aoki 1974, McLaren 1955).

(32) Height Coalescence:

$$\begin{array}{ccc} V_1 & V_2 & V_2 \\ \hbox{[-high] [+high] > [-high]} & a+i>e,\ e+u>o,\ o+i>e\ etc. \end{array}$$

In other words, this type of Coalescence involves the preservation of a [-high] value of V_1 together with the frontness or roundness of V_2 . Within a rule-based approach, this type of Coalescence has often been accounted for using the ordered rules in (33). (See for example Aoki (1974), Snider (1985, 1989).)

(33)
$$V \rightarrow [-high] / V \longrightarrow [-high] V \longrightarrow \phi / \longrightarrow V$$

Fundamentally, this type of Coalescence is not symmetric: the reverse sequences are resolved not by Coalescence but by Vowel Elision or Glide Formation. For example, although a+i is realized as [e], the reverse sequence /i+a/ is realized as [a] or [ya], depending on the language.

In (34) I give the full range of coalescent realizations that this type of Coalescence gives rise to in a five-vowel system.

(34)
$$e+i > e$$
 $o+i > (w)e$ $a+i > e$
 $e+u > (y)o$ $o+u > o$ $a+u > o$

Note that other sequences in these languages, those in which V_1 is high and/or V_2 is non-high, are typically resolved by V_1 Elision or Glide Formation, as shown in (35).

In (36) I give a few actual examples, from Gichode (Keith Snider, field notes):

(36) coalescent realizations

The fundamental characteristic distinguishing Height Coalescence from other forms of Elision or Coalescence is that it involves <u>both</u> featural and positional preferences. The preference for preserving particular features shows up in the fact that [-high], if present, is systematically preserved. The positional preference is evidenced by the facts that (1) the non-height features that survive are always drawn from the word-initial vowel (V_2), and (2) in sequences that undergo Elision rather than Coalescence, it is always the word-final vowel (V_1) that is elided, as can be seen in (35). In the present framework, this dual preference can be encoded by ranking only the constraint Preserve(-high) above the constraint Preserve-[w, that is we will have the ranking in (37):

(37) Key ranking:

Preserve(-high) >> Preserve(F)-[w >> all other Preserve(F) constraints

In order to have Coalescence at all, it is also necessary for Uniformity to be ranked below the Preserve constraints. Also, as before, I assume the undominated constraints *p,*æ,*œ, which rule out combinations of features that are not attested in the underlying inventory.

Applied to an input sequence /a+i/, these assumptions give rise to the tableau in (38).

(38)	/a##i	*p,*æ,*œ	Pres(-hi)	Pres(F)-[w	Pres(lo)	Pres(rnd)	Pres(frt)	Pres(+hi)	Unif.
	/								
	a			**!			*	*	
	i		*!		*				
\Rightarrow	e			*	*			*	*
	æ	*!						*	*

Here the bottom candidate, a low front vowel [æ] fatally violates an undominated feature coocurrence constraint, while the second candidate [i] incurs a fatal violation of Preserve(-high). Remaining in the field at this point are the two candidates [a] and [e] that both satisfy Preserve(-high). Of these two, the candidate [e] best satisfies the next highest constraint Preserve-[w, incurring only a single violation in virtue of the underlying word-initial [+high] specification it fails to retain. By contrast, the candidate [a] incurs multiple violations of Preserve-[w, since it fails to preserve both the [+high] specification and the [front] specification of the underlying word-initial vowel /i/. The candidate [e] is therefore optimal.

Consider now the reverse sequence /i+a/, in (39).

(39)	/i##a	*p,*æ,*œ	Pres(-hi)	Pres(F)-[w	Pres(lo)	Pres(rnd)	Pres(frt)	Pres(+hi)	Unif.
	/								
\Rightarrow	a						*	*	
	i		*!	*	*				
	e			*!	*			*	*
	æ	*!						*	*

Here the coalescent candidate [e] violates exactly the same constraints that it did in (38). The reason it is no longer optimal is that the competing candidate [a], which in (38) fatally incurred two violations of preserve-[$_{w}$, does not violate this constraint at all in (39), since it occurs in word-initial position and not in word-final position as it did in (38). Thus, the candidate [a] is optimal in (39), that is we have simple Elision of V_1 rather than Coalescence. The behavior of other sequences is illustrated in the remaining tableaux in this section; for reasons of time I will not go through these in detail.

In conclusion, I have outlined a theory of Vowel Elision and Coalescence that treats both of these processes as violating Faithfulness constraints that desire preservation of features, there being, under this view, no segment-preserving constraint equivalent to MAX. The primary difference between the two processes is that whereas Elision is motivated by a preference for preserving the features that occupy a particular position, Coalescence is driven by a preference for preserving particular feature values. In addition, Coalescence violates Uniformity. Not only does this approach to Faithfulness provide a straightforward account of these two processes in their prototypical forms, but it also extends without further modification to both Feature-Sensitive Elision and Asymmetric Coalescence, providing an insightful characterization of the ways in which these processes diverge from prototypical Elision and Coalescence.

References

Adjekum, Grace, Mary E. Holman, and Thomas W. Holman. 1993. *Phonological processes in Anufo*. (Language Monographs, 2.) Legon: Institute of African Studies, University of Ghana.

Aoki, Paul K. 1974. An observation of vowel contraction in Xhosa. *Studies in African Linguistics* 5.223-241.

Awobuluyi, Oladele. 1972. The morphophonemics of Owon Afa. Research Notes from the Department of Linguistics and Nigerian Languages, University of Ibadan 5,2.25-44.

Beckman, Jill. 1995. Shona height harmony: Markedness and positional identity. *University of Massachusetts Occasional Papers* 18.53-75.

Bliese, Loren F. 1981. *A generative grammar of Afar*. Dallas: Summer Institute of Linguistics and University of Texas at Arlington.

Brown, Gillian. 1969. Syllables and redundancy rules in generative phonology. *Journal of Linguistics* 6.1-17.

Cahill, Michael. 1994. Vowel coalescence in Siswati. MS, Ohio State University.

Casali, Roderic F. 1994. Vowel Elision and Glide Formation in Niger-Congo: A Harmony Theoretic Approach. Paper presented at the January 1994 LSA meeting, Boston.

Casali, Roderic F. 1995. *Nawuri Phonology*. (Language Monographs no. 3.) Legon: Institute of African Studies, University of Ghana.

Casali, Roderic F. 1996. Resolving hiatus. Doctoral dissertation UCLA.

Doke, Clement M., and S.M. Mofokeng. 1957. *Textbook of Southern Sotho grammar*. Johannesburg: Longmans.

Elimelech, Baruch. 1976. A tonal grammar of Etsako. *UCLA Working Papers in Phonetics* 35.

Eynde, Karel van den. 1968. Éléments de grammaire Yaka: Phonologie et morphologie flexionnelle. Kinshasa: Université Lovanium.

Givon, Talmy. 1970. *The Si-Luyana language: A preliminary linguistic description*. University of Zambia Institute for Social Research Communication No.6.

Hsu, Chai-Shune. 1995. Coda lenition in Taiwanese. Paper presented at the UCLA Phonology Seminar, February 2, 1995.

Kaisse, Ellen M. 1977. *Hiatus in Modern Greek*. Doctoral dissertation, Harvard University.

Kaun, Abigail. 1995. *The typology of rounding harmony: An Optimality-Theoretic Approach*. Doctoral dissertation, UCLA.

Kidima, Lukowa. 1991. Tone and accent in KiYaka. Doctoral dissertation, UCLA.

Kirchner, Robert. 1993. Turkish vowel harmony and disharmony: an Optimality Theoretic account. MS, UCLA.

Mamet, M. 1960. Le langage des Bolia. Tervuren: Commission de Linguistique Africaine.

McCarthy, John, and Alan Prince. 1995. Faithfulness and reduplicative identity. *University of Massachusetts Occasional Papers* 18.249-384.

McLaren, J. 1955. A Xhosa grammar. Cape Town: Longmans, Green and Co.

Roberts-Kohno, R. Ruth. 1994. Vowel coalescence and hiatus in Kikamba. MS, Ohio State University.

Roberts-Kohno, R. Ruth. 1995. Empty root nodes in Kikamba: Conflicting evidence and theoretical implications. Paper presented at the 26th Annual Conference on African Linguistics, UCLA.

Rosenthall, Samuel & Marten Mous. 1995. Prosodic aspects of Iraqw word formation. Paper presented at the 26th Annual Conference on African Linguistics, UCLA.

Smith, Edwin W. 1907. A handbook of the Ila language. London: Oxford University Press.

Snider, Keith L. 1985. Vowel coalescence across word boundaries in Chumburung. *Journal of West African Languages* XV, 1.3-13.

Snider, Keith L. 1989. Vowel coalescence in Chumburung: An autosegmental analysis. *Lingua* 78.217-232.

Steriade, Donca. 1993. Positional neutralization. Paper presented at 23rd meeting of NELS.

Whitely, W.H., and M.G. Muli. 1962. *Practical introduction to Kamba*. London: Oxford University Press.