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Studies in African Linguistics is published three times a year. Occasional supplements are published at irregular intervals and are available to current subscribers at reduced rates.

Contributions to the journal should be sent to: The Editor, *Studies in African Linguistics*, Department of Linguistics, Memorial Hall 322, Indiana University, Bloomington, IN 47405. Contributors please refer to "Guidelines for Contributors" inside the back cover.

Correspondence concerning subscriptions or other business should be sent to: Managing Editor, *Studies in African Linguistics*, African Studies Center, University of California, Los Angeles, CA 90024-1543. Subscription rates are the following:

Individuals	$25.00 per year
Institutions:	$50.00 per year
Single issue:	$10.00
Supplements:	variable price depending on supplement

(Add $17.00 per year for overseas Air Mail subscriptions)

Make checks payable to **The Regents of the University of California**

Volume 24, Number 1 • 1995

ISSN 00390-3533

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FROM THE EDITOR: MOVING INTO THE NEXT QUARTER CENTURY

Robert Botne
Indiana University

With this issue *Studies in African Linguistics* begins a second quarter century of publication. When *SAL* first appeared 25 years ago relatively little attention was given in general linguistics journals to African languages and their potential contributions to general linguistic theory. This situation has changed considerably since that time, with research on African languages contributing significantly to the study and understanding of language typology and universals. Today, articles applying current theory to the grammatical analysis of African languages or outlining the importance of African grammatical structures for linguistic theory regularly appear in general linguistics journals. One might ask, then, what need there is for rejuvenating a journal that has a specific areal focus.

The journal, as I view it, represents an essential nexus within the community of African language scholars. It provides not only a public forum for discourse and dialogue, but also a focus for professional and collegial interaction in many important ways:

- First, part of the role of the journal and its editor is to facilitate and promote the publication of African language data and analysis that might not find a place easily or suitably in more general journals.
- Second, while it may be the editor's role to make final decisions about the kinds of articles that will be published, it is the expertise and tireless efforts of associate editors and reviewers—through their comments, suggestions, and critiques—that add to and enhance the quality of the work produced and give direction to future research.
- Third, the journal permits its readers to participate in the discussion of issues that face the professional field—nomenclature, etc.

For the reasons stated above, I believe it is important for the editor to encourage active participation with the journal. Consequently, I have sought to have an active group of associate editors who represent the breadth of the community in scholarship and experience. And, in accordance with this spirit of participation, this group

should not be a permanent body, but rather should serve for short terms, allowing a larger number of individuals in the Africanist community to serve and contribute.

Even with hard-working associate editors, it is not possible for them to review all manuscripts submitted for publication. Finding appropriate and willing readers can be difficult and frustrating, both for the editor and for authors. Thus, I would like to encourage all individuals who have expertise in African languages and linguistics to participate as reviewers for the journal. For those willing to contribute their time and expertise, please complete the "reviewer's card" accompanying this issue of the journal (or, for library patrons, copy and complete the information on p. 82) and return it to me.

As the reader can see from the new cover design, some changes have already been made. I hope in the future to make other changes in the format and content of the journal so that it will better serve the Africanist community. As part of this process of evolution I welcome comments from all concerned individuals about all aspects of the journal.

Publication policy for *SAL* will remain very much in the spirit of the founders of the journal: contributions are not expected to adhere to any particular theoretical framework or linguistic "school", but should be data oriented and of potential theoretical interest. Given the limitations of space, articles should generally not exceed 50 pages. All submissions will be reviewed by the editor and at least one other referee. All reviews will proceed by anonymous (blind) submission. In all cases I hope to be able to notify authors of a decision about their paper within sixty days of acknowledgment of receipt of their manuscript.

SAL averages about 4 articles per issue. Over the course of a year, then, only about a dozen articles can be published. This represents a publication to submission ratio of approximately one in five. In order to maintain a timely appearance of articles and an outlet for current work, only the best and most interesting articles will be published each year. Both authors seeking to publish and the general readership will be best served, I believe, by avoiding a large backlog of articles.

As *SAL* moves into a new phase, I felt it was appropriate to recognize the valuable contributions of the journal's former editors both to the Africanist linguistic community and to the field itself over the past 25 years. The former editors and their dates of service are:

Talmy Givón	1970-1972, 1973-1974
Larry M. Hyman	1972-1973
Thomas J. Hinnebusch	1973-1978, 1982-1983
Russell G. Schuh	1975-1992

Initially this issue of *SAL* was intended to be a special "Editors" issue. Each of the former editors was invited to submit a paper. Unfortunately, because of the late date at which this idea presented itself, only two individuals—Larry Hyman and

Russ Schuh—were able to contribute articles in time for this issue. A third—Tom Hinnebusch—will have an article in the next issue.

During their tenures nearly 300 articles were published in the journal, authored by more than 200 individuals. Approximately 125 different languages have been described and discussed. This diversity reflects, I believe, the wide-spread interest that African languages have for general linguistics and the large number of individuals who look to the Africanist community as the audience for their work. My expectation and hope is that the journal will continue to provide a useful outlet for this diverse community.

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NASAL CONSONANT HARMONY AT A DISTANCE: THE CASE OF YAKA*

Larry M. Hyman
University of California

In a number of Bantu languages the [d~l] reflex of Proto-Bantu *-Vd- suffixes alternates with [n] when the consonant of the preceding syllable is nasal, e.g., /dim-id-/ 'cultivate for' → [dim-in-]. Because these Bantu languages do not allow nasalized vowels, it is necessary to view such assimilation as operating "at a distance" [Poser 1983], with the intervening vowel(s) being transparent. Transvocalic nasal consonant harmony (NCH) is widespread within Bantu [Greenberg 1951], and was repeatedly cited by phonologists in the 1970's, e.g., from Luba [Howard 1972, Johnson 1972] and Lamba [Kenstowicz and Kisseberth 1979]. In this paper I treat a more extensive and dramatic case of NCH at a distance in Yaka, a language spoken in Zaire. In this language /-Vd-/ suffixes are realized [-Vn-] even when the triggering nasal consonant is not in the immediately preceding syllable, e.g., /-miituk-id-/ 'sulk for' → [miituk-in-] (cf. Ao [1991], Piggott [1993] and Odden [1994], who cite parallel facts from Kongo). I begin by documenting the pervasiveness of the (stem-level) nasal harmony effects in the language, which therefore require a phonological analysis (vs. one involving allomorphy). Discussion centers around the problem of why voiceless and prenasalized consonants should be transparent to NCH.

1. Introduction

As noted by Greenberg [1951], in many Bantu languages the consonant /d/ or /l/ assimilates in nasality across a vowel which does not nasalize.[1] Examples are seen

* Oral versions of this paper were presented at the Berkeley/Stanford Phonology Workshop, the University of California, Santa Cruz, the University Lumière Lyon 2, and the 26th Annual Conference of African Linguistics at U.C.L.A. I am particularly indebted to these audiences for their comments, especially Sharon Inkelas, Jaye Padgett, and Rachel Walker. I would also like to thank Lukowa Kidima and Glyne Piggott for sharing their unpublished work on nasal consonant harmony with me. Research on Yaka was supported in part by National Science Foundation grant no. SBR-93-19415.

[1] The one exception I know to this is Umbundu [Schadeberg 1982], where approximants such as /l/ nasalize in the same context. Schadeberg points out that both the preceding and following vowels are also nasalized after nasalized approximants (but not before and after nasal stops).

in (1) from Yaka, a language spoken in Zaire (Guthrie H.31) and the subject of this paper.[2]

(1) a.	*tsúb-idi*	'vagabonder'	b.	*tsúm-ini*	'coudre'
	kúd-idi	'chasser qqn'		*kún-ini*	'planter'
	kík-idi	'barrer'		*wún-ini*	'murmurer' (< *-wuny-*)
	kás-idi	'lier'			

c. /tsúm-idi/, /kún-idi/, /wúny-idi/, etc.

In these examples I cite perfective forms of verbs from the Ruttenberg [1970] dictionary, from which most of the data presented in this study are also taken.[3] As seen, the perfective ending is *-idi* in (1a), where the preceding consonant is oral, vs. *-ini* in (1b), where the preceding consonant is nasal. The underlying representations in (1c) can be assumed, with the /d/ of the /-idi/ ending becoming nasalized whenever the base to which it is added ends in one of the three nasal consonants in the language: /m, n, ny/. I shall refer to this rule as nasal consonant harmony (NCH).

The purpose of this paper is to provide a detailed description of NCH in Yaka. In order to appreciate NCH fully, we will find it necessary to consider the distribution of nasality in this language in general. In the discussion that follows it will be suggested that only voiced consonants are nasal-bearing units (NBU's) in Yaka, and that there are literally no opaque segments to NCH, which not only regularly crosses vowels but also voiceless and prenasalized consonants. We will see that nothing blocks the rightward spread of nasality if the [+nasal] feature can find an appropriate NBU to its right within the stem. This conflicts with certain views on nasal spreading (and locality conditions in general) that have been proposed in the literature. The study thus naturally raises two questions: first, how can transparent segments be represented formally; and, second, how can one account for Yaka-style long-distance spreading of nasality without bending the theory so badly that other (consonant-) harmonies are let in that we would like to rule out. These are the questions that are taken up in the following sections.[4]

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[2] Throughout this paper I refer to Bantu languages without their class 7 *ki- noun class prefix. Thus: Yaka instead of Kiyaka, Kongo instead of Kikongo, Luba instead of Ciluba, etc.

[3] For this purpose the Yaka-Français part of Ruttenberg (1970) was scanned, proof-read, and entered into the Comparative Bantu On-Line Dictionary (CBOLD) at Berkeley.

[4] As will be pointed out, the same essential facts of NCH can be found in the Kongo dialect/language cluster spoken to the West of Yaka in Zaire and Congo, where they have been known for quite some time [Bentley 1887:627; Meinhof 1932]. NCH in Kongo has received attention recently by Ao [1991], Piggott [1993] and Odden [1994].

2. The Basic Facts of NCH

In this section I establish the basic facts of NCH in Yaka. Most of the demonstration will center around the realization of the perfective suffix /-idi/, which was seen to alternate between [-idi] and [-ini] in (1). The data in (2) differ in two ways from those already seen.

(2) a. *kéb-ele* 'faire attention'
sód-ele 'déboiser'
ték-ele 'vendre'
sób-ele 'changer'

b. *kém-ene* 'gémir'
són-ene 'colorer'
kón(y)-ene 'retrousser' (< *-kóny-*)

c. /kém-idi/, /són-idi/, /kóny-idi/, etc.

[N.B. /d/ is pronounced [l] except when preceded by [n] or followed by [i].
I will thus henceforth write "d" in all cases where /d/ is oral.]

First, the perfective ending shows the familiar Bantu height harmony: When the preceding vowel is mid, the perfective ending will have the vowel [e] in both syllables, rather than [i]. Second, the oral consonant in (2a) is [l] rather than [d]. This is because the phoneme /d/ is realized [l] unless preceded by a nasal or followed by /i/, in which case it is still realized [d].[5] For the purpose of this study, I thus recognize the underlying representation /-idi/ in (2c), which undergoes height harmony to become *-ele* and, where appropriate, NCH to become *-ene*. Because of this complementary distribution, I will write "d" for [l] in most cases.

A basic question that arises is how does nasality cross the vowel? A possible approach is to first nasalize the vowel, then the consonant. In this case the nasalization would be strictly local (though applying twice). There are two problems with this. First, how do we state the rule so that it hits exactly one vowel and one (nasalizable) consonant? The second problem is that these languages do not have nasalized vowels. One might think this is not a problem and that the nasality can simply be removed from vowels later. This seems unlikely, given the structure-preserving nature of nasal consonant harmony, which I now demonstrate.

But first note that the nasal harmony applies only within the "stem domain", which we can also identify as "stratum 1" within the framework of lexical phonology. As seen in (3a), the Yaka stem, as generally the case in Bantu, consists of a verb root and possible suffix(es). Prefixes such as noun class 6 *ma-* to the right in (3a) fall outside the stem and are added only at the word level. As seen in

[5] Kidima [1991] assumes /l/ with a hardening rule to [d] after /n/, also before /i/. Nothing seems to hinge on this choice—although see Odden's [1994] analysis of NCH in Kongo which crucially refers to [+lateral] and, hence, to underlying /l/.

(3b), the /m/ of *ma-* does not cause the root-initial /d/ to become [n]. What this also means is that forms such as (3c) must be analyzed as consisting of a prefix (*ma-*) plus stem. (Recall that /d/ will be pronounced [l] unless preceded by /n/ or followed by /i/.)

(3) a. [tsúm-ini]$_{stem}$ 'coudre' vs. [ma- [dáfú]$_{stem}$]$_{word}$

b. *ma-dáfú* 'vin de palme' (cl. 6)
ma-dókísí 'bruit' (cl. 6)
ma-déemba 'douceur' (cl. 6)

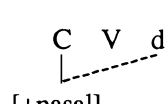
Since NCH applies in stratum 1, it is not surprising that it is a neutralizing rule. In (4a) we see that /d/ and /n/ contrast in root-final position.[6]

(4) a.	*búd-idi*	'briser'	*bún-ini*	'péter'
	yád-idi	'étaler'	*yán-ini*	'crier de mal'
	tékwédé	'toucher qqn pour l'appeler' (< *-tékud-*)	*tékwéné*	'verser' (< *-tékun-*)
b.	*dók-ede*	'ensorceler'	*nók-ene*	'pleuvoir'
	du-dúungu	'fruit d'un poivrier'	*du-núungu*	'raison'

The examples in (4b) show that /d/ and /n/ constrast in root-initial position as well. Thus, NCH clearly neutralizes /d/ and /n/, or is structure-preserving, not introducing any new segment into the inventory.

An alternative to spreading the nasality first to the vowel then the consonant is to establish a feature geometry such that the appropriate node of the consonant can be targeted across the vowel. This would not be a problem, for example, if, as generally assumed, the feature [nasal] were on its own tier. Simply by stipulating that lexically only consonants can have a [+nasal], NCH can be stated as in (5).

(5) Nasal Consonant Harmony (NCH):



For the moment let us sidestep the question of how the /d/ is uniquely targeted. The important point is that the [+nasal] should be able to get to the /d/ without first hitting the intervening vowel. In this way the transparency of vowels derives from their not being NBU's, and the rule falls under the general heading of

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[6] The third example of each column shows the *-idi* suffix becoming "imbricated" [Bastin 1983], such that instead of getting *tékud-idi* and *tékun-ini*, we obtain *tékwédé* and *tékwéné*.

"consonant harmony" (cf. Shaw [1991] and Odden [1994] for surveys of such phenomena, especially coronal harmony).

Now, many Bantu languages do exactly as we have shown above: *-idi/-ele* equivalents are pronounced with [n] just in case the immediately preceding consonant is [+nasal], e.g., Bemba, Lamba, Tonga, Luba, Suku, etc. These languages also share the property that nasal harmony is not conditioned by an immediately preceding prenasalized consonant. The examples in (6) show that [+nasal] does not spread rightwards from a prenasalized consonant in Yaka either.

(6) a.	*bíímb-idi*	'embrasser'	b.	*bééndz-ede*	'couper au couteau'
	kúúnd-idi	'enterrer'		*hééng-ede*	'tamiser'
	tááng-idi	'lire, compter'		*kóómb-ede*	'balayer'

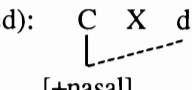
Whatever framework one assumes, and whatever representation of prenasalized consonants, the facts in (6) are as expected. We expect nasality to be propagated only by a consonant which has a nasal release, not by a prenasalized consonant which is released orally. This non-propagation of nasality would automatically be accounted for if prenasalized consonants were represented with a [+nasal][-nasal] contour, or with two root nodes, the first of which is [+nasal], the second [-nasal] (or [o nasal]).

There is, however, an important aspect in which Yaka diverges from the above-mentioned languages. The interest of Yaka (as well as Kongo) is that it takes the nasal harmony process one step further. As seen in (7), NCH can also go through a voiceless consonant.

(7) a.	*mák-ini*	'grimper'	b.	*fínúk-ini*	'bouder'
	mék-ene	'essayer'		*hámúk-ini*	'se casser'
	ník-ini	'moudre'			
	nók-ene	'pleuvoir'	c.	*míítuk-ini*	'bouder'
	nyéék-ene	'se baisser'		*nútúk-ini*	's'incliner'

The examples in (7a) show that nasality can spread through a voiceless consonant from stem-initial position, while those in (7b) show nasal spreading from stem-medial position. Finally, as seen in (7c), [+nasal] can spread through more than one [-voice] consonant. As a result of these facts, (5) might be revised as in (8).

(8) NCH (revised):



(where X contains V's and voiceless C's)

This is truly surprising, since we think of voiceless obstruents blocking the spread of nasality (if this is related to "local nasal assimilation"). In fact, since nasality

was shown in (4) to be contrastive on consonants, Yaka reveals itself to be a serious counterexample to the claim that "voiceless consonants are opaque, if Nasal is distinctive in consonants; they are neutral, if Nasal is redundant" (Noske, to appear). NCH in Yaka is thus of considerable typological interest.

We might at this point contrast two approaches that have been taken to account for the differential behavior of consonants with respect to nasal spreading. First, noting that voiceless consonants are clearly not NBU's in such systems, Pulleyblank [1989] suggests that a possible account of this would be to say that /t, k/, etc., also cannot be specified for [nasal]. However, Pulleyblank's account is for one where /t, k/, etc., are *opaque* with respect to nasalization, not transparent. The idea is that nasality will spread (rightwards in this case) until it reaches a segment to which it cannot link. This is accomplished through a "grounding condition" (cf. Archangeli and Pulleyblank [1994]): If [-voice], then not [+nasal]. While this correctly handles the fact that /t, k/ cannot become nasalized in Yaka, it incorrectly suggests that they should therefore stop nasal spreading from proceeding any further. However, as we have shown, /t, k/ are not opaque in Yaka, but transparent. The equation of non-NBU with opacity also incorrectly predicts that spreading of [+nasal] should actually have been blocked by the vowel even before reaching the [-voice] consonant (i.e., if a vowel, then [-nasal]).

A more promising strategy would thus be to adopt Archangeli and Pulleyblank's [1987] distinction between "minimal/maximal scansion": A feature may target either the immediately dominating mother node (=minimal scansion) or may target the next segment, whatever it is (=maximal scansion). If /d/ has an appropriate landing site for [+nasal] which both vowels and [-voice] consonants lack, we could regard NCH as a minimal scansion rule (cf. Shaw's [1991] conclusion concerning consonant harmonies in general). Although an ad hoc move, for this purpose one might adopt Piggott's [1992] soft-palate (SP) node and say that nasal consonants have a SP node with a [+nasal], while /d/ has a SP node lacking a [+nasal]. The rule would then be to spread [+nasal] to the next SP node (see below). Since vowels and voiceless consonants lack the SP node, they would automatically be skipped by this minimal scansion.[7]

There is, however, a problem with this. The second surprising fact in Yaka is that prenasalized consonants are also transparent, as seen in (9).[8]

(9) a.	*mwááng-ini*	'semer'	*nóóng-ene*	'viser'
	nááng-ini	'durer'	*núúng-ini*	'remporter une victoire'
	mééng-ene	'haïr'	*nyééng-ini*	'être consummé'
b.	*bééng-ede*	'mûrir'	*ngéng-ede*	'luire'

[7] Piggott [1993:8] considers analyses whereby voiceless consonants too can be targeted by NCH. I return to this below.

[8] Unfortunately the only NVCVNC- and CVCVNC- stems in Kiyaka involve the ending *-ung*, which has special properties (see the examples in (30c) below).

It does not seem promising to assume that prenasalized consonants are also not NBU's. And yet, we first saw that they fail to condition nasal harmony in (6), and now that they are transparent to nasal harmony in (9).

Assuming that the non-triggering of nasal harmony by NC is not a problem, we still have three things to explain:

(10) a. Action at a distance
b. Transparency of voiceless consonants
c. Transparency of prenasalized consonants

The major problem I have been discussing is how to allow the nasal harmony rule to seek out a /d/ at some distance without weakening phonological theory to allow any and all kinds of long distance effects of this type. For example, could we have a language where [+voice] spreads from certain consonants to others, or maybe [+cont], etc.? The second problem has to do with the surprising result that something which normally blocks nasal harmony fails to do so here, viz. voiceless consonants. The third problem is that the [+nasal] of prenasalized consonants can be crossed in nasal harmony, so to speak. In the next section we show that the effects of NCH are considerably more general than the above would suggest.

3. The Distribution of Nasality

As a means of introducing the distributional properties of nasality in Yaka, let us mention a possible strategy that might seem at first glance to get us out of the problems mentioned in §2. This would be to say that the nasal harmony is not a phonological rule, but rather a case of allomorphy. If it is allomorphy, this means that there are two forms /-idi/ and /-ini/ (abstracting away height harmony). The allomorph /-ini/ is chosen when there's a full nasal in a stem; the allomorph /-idi/ is chosen in the elsewhere case (i.e., when there is no full nasal, but possibly an NC).

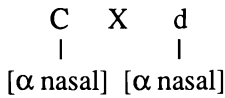
The first argument against this strategy is: Even if it's allomorphy, we still need to account for it. We should not suppose that phonologically conditioned choice of allomorphs is completely arbitrary. Most cases we know are natural in the sense that there is a motivated relationship between the choice of the allomorph and the environment in which it is chosen. In the Yaka case, the nasal allomorph is chosen in a nasal environment (however problematic the statement of that environment might be). In addition, there is frequently a natural relationship between the "conditioned" allomorph and the elsewhere case. That is, it is not arbitrary that we get [n] in the nasal environment, but [d/l] in the non-nasal environment.[9]

[9] Phonological conditioning is not always completely natural in this sense, e.g., the nominative case marker is *-ka* after vowels vs. *-i* after consonants in Korean. The syllable structure is motivated, so we have the naturalness of the allomorph to the environment. In this case, however, it is not clear which is the "conditioned allomorph".

Thus, even if this is allomorphy, we would want to have a theory of what is "visible" to allomorph selection. Can an allomorph arbitrarily look into a base for whatever feature it wants? That is, does replacing the phonological account with the allomorphy rule "choose *-ini* when there's a full nasal in the base, otherwise choose *-idi*?" make the situation any more natural or expected? It does not seem so. Assume for the moment what would be possible if NCH were treated as allomorphy. First, and perhaps not that bad, we could have an arbitrary relationship between the allomorphs, e.g., *-ini* after a base with a full nasal, but, say, *-aka* in the elsewhere case. But second and more important, we could have *-ini* after a base which has a labial, and *-idi* in the elsewhere case. The only way to enforce a natural relationship between the phonologically conditioned allomorph and the base is to express this in *phonological* terms. But in this case the phonological terms appear to be "at a distance" [Poser 1983]. Thus, the problem of locality is still there and there is no advantage of attempting allomorphy.

Note that the same argument would hold against an analysis which is phonological but does not see the nasal harmony as assimilation (i.e., as spreading within the autosegmental context). In (11) I have expressed the rule as one of "nasal agreement", i.e., [α nasal] in the SPE sense.

(11) Nasal "agreement":



(where X contains V's and voiceless C's)

This is equivalent to allomorphy and only hides the same question, which is when can one alpha see another alpha? The rule in (11) is no advantage over (8).

However, there is a more important argument against such an allomorphy analysis: Nasal consonant harmony is not restricted to the perfective suffix and, hence, is not allomorphy in Yaka. It's phonology. In order to appreciate this consider, first, that NCH affects all suffixes that have a /d/ in them in exactly the same way we saw for perfective /-idi/. Consider the data in (12)-(14).

(12) a.	*fut-id-*	'payer pour'	*hyook-id-*	'passer par'
b.	*hang-id-*	'faire pour'	*dong-id-*	'enseigner à'
c.	*hun-in-*	'tromper pour'	*son-in-*	'colorer pour'
d.	*nat-in-*	'porter à'	*mek-in-*	'essayer pour'
e.	*miituk-in-*	'bouder à/pour'	*nutuk-in-*	's'incliner à'

(13) a.	*bal-uk-*	'être renversé'	*bad-ud-*	'renverser'
	dob-uk-	'sortir'	*dob-ud-*	'évacuer, faire sortir'
b.	*haamb-uk-*	'se séparer, être séparé'	*haamb-ud-*	'mettre à part, séparer'
	huung-uk-	'être ramené'	*huung-ud-*	'ramener'

c.	*hon-uk-*	'se défaire, tomber'	*hon-un-*	'défaire, laisser tomber'
	sun-uk-	'se défaire (noeud)'	*sun-un-*	'délier' (noeud)
d.	*nik-*	'moudre, pulveriser'	*nik-un-*	'remuer, essuyer, effacer'
	nut-uk-	's'incliner' (**nut-*)	*nut-un-*	'bousculer, élancer'

(14) a.	*beet-*	'frapper'	*beei-udud-*	'frapper de nouveau'
	hyook-	'passer, dépasser'	*hyok-udud-*	'repasser'
b.	*hang-*	'faire'	*hang-udud-*	'reconstruire, refaire'
	sumb-	'acheter'	*sumb-udud-*	'racheter'

The examples in (12), partly from Ruttenberg, partly based on extrapolations from Ruttenberg and from van den Eynde [1968], show that the applicative suffix /-id-/ is realized *-in-* after a base that has a full nasal. The examples in (13) are all from Ruttenberg, who without exception indicates a relationship between the forms in the left and right columns. In these examples, /-uk-/ is the intransitive reversive suffix, while /-ud-/ is the corresponding transitive reversive. As seen, /-ud-/ is realized *-un-* after a root with a full nasal. In (14) I show cases of the /-udud-/ suffix that marks repeated action. Unfortunately, there were no examples of this suffix appearing after a base with a full nasal in Ruttenberg [1970]. This should be possible, in which case we expect *-unun-* (as in related languages). It is also possible to add nasal suffixes to each other, e.g., *-un-in-*, but few of these were found in the dictionary.[10] One case that does appear in Ruttenberg is *-nyeek-in-* (applicative of *-nyeek-* 'se baisser, se courber'), which has the perfective *-nyéék-én-éné*, i.e., applicative followed by perfective, with height harmony. In this case we see the multiple application of the NCH rule. Finally, (15) shows that nasality spreads not only through /t/ and /k/, but also the /s/ of the causative suffix -is-.[11]

(15)	*dem-is-in-*	'faire attendre pour'
	dam-is-in-	'faire coller pour'

So, if this were allomorphy, it would be odd that every suffix with /d/ would have show the same variation.

Two even more conclusive arguments that NCH is phonological are available. The first is that the n/d distributions are completely general at the stem (stratum 1) level. Whether mono-, bi-, or tri-morphemic, verb roots do not permit a /d/ to occur after a full nasal in a verb. The second is that these distributions extend beyond /d/.

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[10] We can be confident, however, that these exist in Yaka. Both Howard [1972] and Johnson [1972] are particularly concerned with multiple application of NCH. Thus, both cite the Luba derivation /u-dim-id-id-e/ 'he cultivated for' → [u-d^{y}im-in^{y}-in-e], which shows both applicative /-id-/ followed by perfective /-id-/ undergoing NCH.

[11] Since there are no roots of the shape -NVf- or -NVs-, it is necessary to cite such causative + applicative forms to show that nasal harmony also crosses voiceless fricatives. Lukowa Kidima has kindly provided the examples in (15).

For the purpose of studying the distribution of the various [±nasal] consonants, the Comparative Bantu On-Line Dictionary (CBOLD) project prepared an electronic version of the Yaka-French portion of Ruttenberg's [1970] dictionary. Approximately 3800 entries were obtained in the scanned section and are presently useable on FilemakerPro™.[12] The Yaka dictionary has the following fields available:

(16) CBOLD Yaka Dictionary Fields

prefix	stem	pos	gfn	class	gloss
	perfect				
	segments				

Looking at the first row, the first field has noun prefixes, followed by the stem, the part of speech [pos] (typically n. or v.), grammatical function [gfn] (e.g., applicative, causative, connective), noun class (e.g., 1/2) and gloss (which can wrap around to include as much information as needed or desired). On the second row the perfective forms of verbs are indicated. The third row is identical to the root field, except that there are no indications of tone. This was included in case the presence of accent marks interfered with the search functions of FilemakerPro™.

For this study I did the following searches in the stem field (for both [l] and [d], since Ruttenberg distinguishes these in his orthography), indicated in (17).[13]

(17) Sample searches in segments field:

a. *m*l* and *m*d* [omit *mb*l* and *mb*d*]
b. *n*l* and *n*d* [omit *nd*l*, *nd*d*, *ng*l*, *ng*d*]

The results of the search in (17a) are shown in (18), while the results of the search in (17b) are given in (19).

(18) Results of search (17a)

a. Prefix-stem demarcation

maléemba 'doucement' (cf. cl. 6 *ma-léemba* 'douceur, lenteur')
máálu 'jambes, pieds' (cf. cl. 5 *kúúlu* 'jambe, pied', hence < /ma-Vdu/)

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[12] I would like to acknowledge the help of John Lowe, Jeri Moxley, Gail Solomon, Van Wong and myself for the efficienct job we did so that the first presentation of this paper could be made on Nov. 3, 1994.

[13] What will eventually be built into the FoxBasePro™ version of CBOLD is a featural capability of searching. For the moment, the system is imperfect.

b. Borrowings

súmééla	'chômeur'	*kómísyééla*	'commissaire'
kómélésáa	'commerçant'	*mandéléni*	'mandarine'
kómélése	'commerce'		

c. Residue

moola	'peut-être'	
bu-móólo	'paresse'	
tímíláádi	'tribunal'	
mong-ulul-	'reprendre'	(cf. *bong-ulul-* 'reprendre' < *bong-/mong-* 'prendre')

(19) Results of search (17b)

a. Prefix-stem demarcation: n/a (no prefix has shape nV-)

b. Borrowing

nóódi	'nord'
sántúnyééla	'sentinelle, gardien'
n-sínyéela	'monseigneur, évêque'
nééla	'fenêtre, volet' (< Port.)

c. Residue

yúúnuk-idi	'être étiré, être allongé'
náámbik-idi	'mettre au lit'
nyáámbik-idi	'amasser, accumuler'

As seen in (18a) and (19a), where we did not have explicit identification, our imperfect parsing may occasionally include a prefix within the stem domain (rather than separating it into the prefix domain). This happens particularly when an item is identified as an adverb or the like (i.e., when it is neither a noun, which has an identifiable noun class prefix, or a verb, which is entered without any prefix). Eliminating these, we then see in (18b) and (19b) that there are borrowings that fail to obey the pattern. Finally, in (18c) and (19c) there is a very small residue. (The form *-mongulula* has an alternate *-bongulula*, which is regular; perhaps the former exists dialectally?).

We thus arrive at the following inescapable conclusion: There is a constraint against /m/ and /n/ being followed by /d/ within the "stem", i.e., whether within morphemes or across them at the stem (stratum 1) domain.

There can be no question of allomorphy then. There is a generalization that covers morphemes and derived stems that must be accounted for, and it seems that the account must be a phonological one.

To see whether the above story could be generalized further, I did additional searches involving all other consonants in initial vs. non-initial position within the

stem. In (20) I give the full C_1 consonant system (i.e., consonants that are found initially in roots).

(20) The Yaka Consonant System

a. *"Soft" Consonants*				b. *"Hard" Consonants*		
h	t	k		ph	th	kh
f	s			pf	ts	
b	d		⇒	mb	nd	ng
v	z			mbv	ndz	
w		y		ngw		ngy
m	n	ny		mb	nd	ndy[14]

For expository reasons I have divided the system into two groups: the soft consonants vs. the hard consonants. The hard consonants are generally found in environments where a preceding nasal is structurally (and often phonetically) present (e.g., 1sg. prefix, 9/10 prefix, etc.).[15] What is important for our purposes are the restrictions on stem-internal consonants, both when preceded by a nasal and when not. The frequent "C_2" consonants are shown in (21).

(21) "Well-Attested" C_2 Consonants

a. *"Soft" Consonants*			b. *"Hard" Consonants*		
	t	k			
f	s				
b	d		mb	nd	ng
				ndz	
w		y			
m	n	ny			

I have left out from (21) those consonants that are not attested or attested only in a small number of forms in C_2 position (e.g., ph, v, etc.). What is important for our argument that the d/n alternation is phonological is the following: Without exception, there are no words that contain a full nasal (m, n, ny) followed by [b], [w], [d], [l] or [y]. That is, voiced oral consonants may not occur in stems which have an earlier (full) nasal. All other (soft and hard) C_2 consonants are free to occur after either an oral, prenasalized or full nasal consonant.

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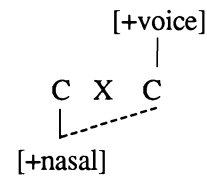
[14] Published sources typically omit any mention of the realization of the palatal nasal when preceded by a nasal morpheme. Thanks to Lukowa Kidima for this information.

[15] Note that the nasal consonants /m, n/ become [mb, nd] when prenasalized [Ruttenberg 1970; Kidima 1991]. This will be important for the analysis. Also note that "soft" "p" is realized [h]. There are some occurrences of unaspirated [p], but they are limited. Finally, not all hard consonants owe their etymology to a nasal (e.g., *-tsum-* 'sew' is from Proto-Bantu (PB) *-tụm-).

The alternation between n/d must thus fall out from the more general property that nasality spreads onto a following voiced consonant, as in (22).

(22) NCH (revised):



(where X does not contain a non-prenasalized voiced consonant)

(22) operates first as a morpheme structure condition and then as a phonological rule. Unfortunately, the only stem-level morphemes that can undergo (22) have underlying /d/, so we do not actually see m/b alternations (nor do we know what /w/ and /y/ would alternate with—though their "hard" counterparts are [ngw] and [ngy], respectively). Specified as in (22), the variable X now stands for anything *but* a [+voice] consonant: i.e., it may contain vowels, voiceless consonants—and, for some reason, prenasalized consonants, the last of which must be voiced in Yaka (i.e., there is [mb, nd, ng], but no *[mp, nt, nk], which, with only a small amount of residue, have developed into [ph, th, kh]).

4. Interpretation and Analysis

To recapitulate with slight revision, the questions we face in this study are those listed in (23).

(23) *Questions:*

a. Why are only voiced consonants targeted?
b. How/why are voiceless consonants not subject to nasalization? transparent?
c. How/why are prenasalized consonants not subject to or conditioners of nasalization? transparent?

The answer to the first question may conceivably have to do with structure preservation. We have shown that NCH is a property of stratum 1 phonology. As expected, it is a neutralization rule. In other words, it is structure preserving. So, if the structure preservation constraint is operative, this will mean that the segments that can be targeted for nasalization are those which have underlying nasal counterparts, viz. voiced b/m and d/n, for instance.[16]

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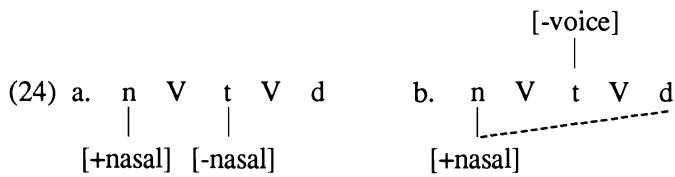
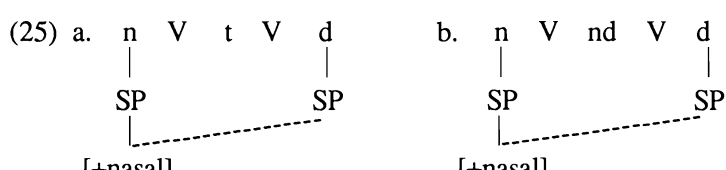
[16] The issue is less clear for /w/ and /y/; Are their counterparts ngw and ngy? If so, then why don't /t, k/ nasalize as [th, kh]? On the other hand, it is possible that /y/ is a real consonant, but that /w/ is really /Cw/. There is no evidence for plain /g/ when not prenasalized. On the other hand, since [w] and [y] alternate with [ngw] and [ngy], it is possible that /w/ is /gw/ and that /y/ is /gy/, with the /g/ dropping out when not prenasalized. Cf. *kúúlu* 'leg' < PB *ku-gudu.

The second question is why voiceless consonants are (a) not subject to nasalization; (b) transparent? The first part of this question has been answered in a number of ways in the literature. One is to say that voiceless consonants are prelinked as [-nasal], as in (24a).



This representation would, however, prevent the [+nasal] from spreading rightwards, since NCH would result in a line-crossing. To allow [+nasal] to spread through them, we might underspecify [nasal] (and possibly [voice]) on voiceless consonants or we could prespecify them at [-voice] as in (24b). In this case there is no line-crossing, since the features [nasal] and [voice] are on separate tiers. But the question still remains as to why voiceless consonants allow [+nasal] to spread through them, i.e., why they are transparent. As mentioned above, this is a surprising result. Pulleyblank [1989], for instance, establishes an antipathy between nasality and voicelessness in order to account for the *blocking* effect that the latter have on nasal spreading. The problem here is that this antipathy in Yaka is only against association *to* the voiceless consonant—not to continued spreading onto a subsequent appropriate consonant.[17]

Another tack we might take involves the establishment of a more articulated feature geometry. For the purpose of illustration I will use Piggott's [1992] SP node. Voiceless consonants could be claimed to lack a SP node. Consequently, the feature nasal would hit a /d/ by simply targeting the next SP node, as in (25a).



We would have to say that only voiced consonants have an SP node. /b, d, w, y/ have the SP node, but no feature [-nasal]. Thus, nasal spreading passes easily through voiceless consonants, as desired. The crucial point is that NCH is not

[17] Technically we have not demonstrated that [+nasal] fails to associate to voiceless consonants, only that there is no audible evidence of this. Schadeberg [1982] shows that /k/ in Umbundu becomes nasalized [$h^{\tilde{}}$] when a nasal consonant occurs in the preceding syllable. This suggests that we could consider an analysis where [+nasal] hits voiceless as well as voiced consonants in Yaka (cf. Piggott [1993]).

allowed to build nodes as it goes. In this case, this is taken care of by structure preservation.

How does this analysis fare with respect to prenasalized consonants, however? These do not condition nasalization, so we must first ask why not. They also are transparent to NCH (and do not appear to undergo it—see below, however, for whether they do undergo NCH vacuously). The natural first attempt would be to extend the representation of (25a) to (25b), where the prenasalized consonant, like voiceless consonants, lacks an SP node. It would then be necessary only to propose a proper underlying representation for NC's onto which the SP and [+nasal] could later be inserted.

Such an analysis in fact already appears in Ao [1991], who treats prenasalized consonants as CC clusters. Ao suggests that the nasality on the first C is predictable and can thus be underspecified, allowing the [+nasal] to spread right across it (i.e., ignoring it). This also accounts for why NC's do not condition nasalization to their right. However, according to what we have said, it should be possible for NCH to hit the NC, particularly since the C is voiced.[18] Now, it turns out in Yaka that /mp, nt, nk/ do not surface as such, but rather as [ph, th, kh], which are very rare in C_2 position. Because Kongo allows [mp, nt, nk], which are in turn transparent to NCH, we will not attempt an analysis whereby Yaka stem-internal [mb, nd, ng] would be analyzed as /mp, nt, nk/.[19]

Given recent feature geometric accounts of prenasalization, we are not forced into a CC analysis. Piggott [1989] sees prenasalized consonants as single segments consisting of two root nodes, while Steriade [1993] analyzes these as a single consonant with two aperture nodes, the first nasal, the second oral. On the other hand, Padgett [1991:54-55] considers that prenasalized consonants "are simply homorganic nasal-obstruent onset clusters". Whether NC are analyzed as complex consonants vs. consonant sequences depends in part on one's model, specifically on whether there is something corresponding to a skeletal (CV or X) tier, or whether there are only moras/weight units. In Yaka a single C analysis would seem to be preferable, particularly since the language shows vowel length opposition before NC (e.g., *-denga* 'partir en vacances' vs. *-deenga* 'rendre lisse, polir'). By Ao's argument, we would need to syllabify /deenga/ as deen.ga, which is highly unlikely from a Bantu persective. On the other hand, we could get the

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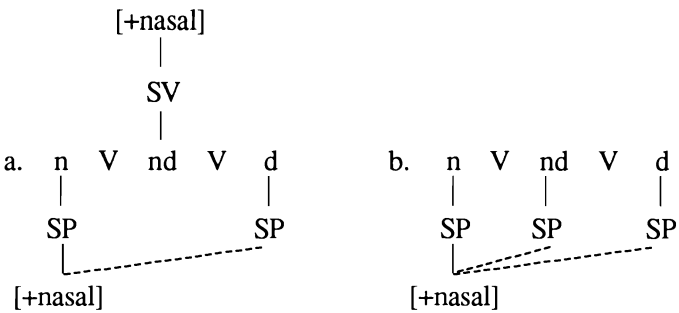
[18] Both Ao [1991] and Odden [1994] skirt around this problem without addressing it. Ao has nasal spreading onto a [+cor, -str] consonant, not addressing why it fails to hit /t/ or whether he considers it to hit /nd/. Odden spreads [+nasal] onto a [+lat]. This works only if the underlying representation of [d/l] is /l/ and the rule applies before /l/ is specified as [d] before /i/. In this case NCH would also presumably apply to /nl/ (which I assume would be Odden's underlying representation of [nd]), thereby deriving Cn, if we assume Ao's CC representation. (Odden doesn't discuss prenasalized C's in his brief citing of NCH in Kikongo). Although aware of distributional constraints (e.g., failure to find roots of the shape -mVb-), neither author incorporates the effects of NCH functioning as an MSC.

[19] This would, however, have the advantage of explaining why we have [ng], but not [g] in this language. The fact that /m+p/, /n+t/ and /n+k/ sequences are realized [ph], [th] and [kh], respectively, across a stem boundary would not necessarily be fatal to this other analysis, since we could assume a difference at stratum 1 (stem) vs. stratum 2 (word). Prefixes, recall, come in only at stratum 2 and could have a different phonology from the stem phonology.

same result by assuming that the preconsonantal nasal is a segment, but non-moraic.

In any case, a tempting strategy to account for the behavior of NC entities would be to underspecify them for [nasal]. In addition to underspecification, the logical alternative is present to exploit feature geometry further. I personally would seek to avoid an analysis whereby the [+nasal] feature of NC would be different—for example, on a different plane—from the [+nasal] of pure nasals, as in (26a).

(26)



Odden [1994] allows for potential transparency such as that shown in (26a), where the [+nasal] would be on different planes, because the mother node is different. In this case I have arbitrarily shown the [+nasal] of the NC to report to a "spontaneous voicing" (SV) node vs. the SP of the full nasal.[20] Steriade [1993] has proposed a representation of nasal vs. prenasalized consonants in terms of aperture nodes, such that the spreading process could be conditioned to start from a "released" nasal (i.e. from the last aperture node of a nasal consonant). One natural extension to make of (25) would be to set up an SP node for the nasal part of the NC sequence (reporting to its own root node), as in (26b). As shown, the [+nasal] of the preceding nasal consonant would first spread onto the nasal half of /nd/ and then on to the /d/ of the next syllable. It would not hit the /d/ of the /nd/ because of two possible reasons: Either this /d/ lacks an SP (as in (26b)), or if it has an SP, NCH would be blocked by structure preservation (because *nn is not permitted).[21] On the other hand, as was indicated in (20), illustrated in (27),

[20] Since preparing this presentation I have received Piggott [1993], who talks about an analysis where voiced C_2 consonants would be treated as sonorants, i.e., with an SV node, vs. prenasalized consonants, which would have the normal SP nasal feature. This is the opposite of what is shown in (26a). There seems to be no end to the strategies available to us. Another conceivable way to get the feature nasal on different planes would be to consider the nasality of full nasals to be a "morpheme feature" which maps on to all available NBU's starting from the one to which it is prelinked.

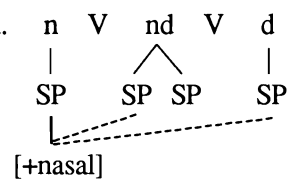
[21] In fact Yaka has two preconsonantal nasals: a non-moraic one (which we have been investigating) vs. a moraic one which is derived from *mu- prefixes, e.g., *n-náti* 'porteur' (< mu-nat-i). So what has to be said is that one cannot have a sequence of non-moraic nasal + nasal consonant in Yaka.

structurally "prenasalized nasals" are realized as the corresponding prenasalized voiced oral consonants.[22]

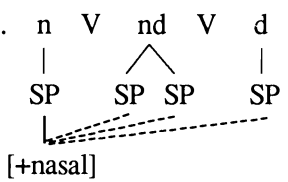
(27)	a.	N+m	→	mb	*e.g.*,	[N- [mak-idi]]	→	*mbakiní*	'I carved'
		N+b	→	mb	*e.g.*,	[N- [bak-idi]]	→	*mbakidí*	'I caught'
	b.	N+n	→	nd	*e.g.*,	[N- [nuuk-idi]]	→	*nduukiní*	'I smelt'
		N+d	→	nd	*e.g.*,	[N- [duuk-idi]]	→	*nduukidí*	'I became wise'
	c.	N+ny	→	ndy	*e.g.*,	[N- [nyem-idi]]	→	*ndyemené*	'j'ai poussé'

Also, note in (27a), as pointed out by Kidima [1991], that NCH first nasalizes the perfective ending before denasalization of N+m to [mb]. Thus, it is possible to have (28a) or (28b).

(28) a.



b.



In (28a) we show NCH hitting the first SP of /nd/, but not the second, because of structure preservation (noting, however, that it could hit it, and then undergo the same denasalization process illustrated in (27)). In (28b) we show the [+nasal] hitting both SP nodes of the /nd/ consonant.

However, what would these SP's be? In this analysis we have used the presence of the SP to condition NCH. Piggott [1992], on the other hand, uses the SP to block nasalization: voiceless consonants have an SP, but no nasal feature (or perhaps a [-nasal]), and by his Maximal Application Principle, it is the SP node that spreads, not the feature [+nasal]. We have done just the opposite (as per the minimal scansion of Archangeli and Pulleyblank [1987]). In our case, the SP node encodes voicing—although with some question as to whether /mb, nd, ng/ should have one vs. two SP nodes. Since /mp, nt, nk/, as existing in Kongo would presumably have only one, i.e., on the nasal part of the complex segment, we assume that one would be led to the double representation in (28a) (rather than the single SP in (26b)). But if SP is just a stand-in for [+voice], why not refer directly to the latter instead, as in (22)?

The problems with the above are thus two: First, it is not clear how to represent the prenasalized portion of the NC segment. It could have any of the following representations in (29):

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[22] The data in (27a,b) are from Kidima [1991].

(29) *Representation of N part of NC:*

a. Empty first root node
b. Root node with empty SP
c. Root node with empty SP and [-cont]
d. Root node with empty SP, [-cont] and [+voice]
e. Aperture analysis [Steriade]

As we can see from the "hard" consonants in (20), there is reason to have [-cont], since fricatives harden. There is, however, also reason to have [+voice], since this could condition the dropping of the nasal before a voiceless consonant, with which [+voice] is not compatible. On the other hand, [+nasal] could also do this—and in any case, we have to derive the [+spread] found on aspirated consonants.

Whichever way we do it, there is a second problem: As soon as we let [+nasal] spread onto the NC, whatever its representation, we have violated structure preservation—which we held to be responsible for the targeting of voiced consonants in the first place. That is, when [+nasal] hits the SP of a voiced consonant we derive a nasal (e.g., d → n). This is a neutralization. When the [+nasal] would hit the SP of a prenasalized structure, the output would not be distinct from the input, i.e., this would not be a neutralization. The more likely solution, then, would be not to have an SP node on the nasal, and to block spreading onto the SP node of the voiced consonant (if there is one—but if there isn't, why isn't there? It would be redundant in both cases, i.e., both on /nd/ and on /d/, unless SP is taking the place of [+voice]).

However, another interpretation is possible by which the linking of [+nasal] to an underspecified NC is in fact structure-preserving. What we have thus far avoided is using an overt [+nasal] specification on NC consonants. This has allowed us to account for the failure of NC's to nasalize *-idi* (etc.), as in (30a), and also for their transparency to nasalization going through them from the left, as in (30b).

(30) a.	*búúng-idi*	'gaspiller'		*bééng-ede*	'mûrir'
	hááng-idi	'créer'		*sóóng-ede*	'aiguiser'
b.	*mwááng-ini*	'semer'		*méeng-ene*	'haïr'
	núúng-ini	'triompher'		*nóóng-ene*	'viser'
c.	*húkung-ini*	'errer'		*tébong-ene*	'devenir faible' < *-tebung-*
	díndung-ini	'rouler (intr.)'		*syéétong-ene*	'glisser (intr.)' < *-syeetung-*

However, as seen in (30c), verb roots which have a third syllable with *-ung-* invariably show nasal allomorphs such as *-ini*. The best way I can see to get this would be to say that the *-ung-* ending, probably a suffix [van den Eynde 1968], has a prelinked [+nasal] on the nasal part of its /ng/ segment. A search through the Yaka dictionary on computer has revealed that *-ung-* is the only VNC to

occur in post-CV(V)(N)C position within the stem domain.[23] If we adopt a prespecified [+nasal] only on the quasi-formative *-ung-*, restricted in this way, then the linking of [+nasal] as in (28a), would constitute only a minor violation of structure-presevation: A [+nasal] NC would thus already exist lexically, though limited in distribution. On the other hand, it may be that not all applications of NCH must obey structure preservation.

5. Conclusion

In the preceding sections we have taken a close look at nasal consonant harmony at a distance in Yaka. The pattern which we have discovered is an unusual one. In order to account for it we have considered (combinations of) two strategies: unusual underspecification and unusual feature geometry. None of the analyses considered here or in Ao [1991], Piggott [1993] or Odden [1994], is particularly persuasive or conclusive. Yaka NCH is not problematic because no solution can be found for it, but rather because so many ad hoc ones can be produced on the spot. I have attempted to make each one as reasonable-sounding as possible, and there are still other ones that might be pursued. While it has not been possible to choose definitively between these approaches, we at least get a clear picture of a quite general case of NCH. Other Bantu languages have variations on this theme, which I am now investigating from a comparative and historical perspective. For example, there are languages which nasalize *d only when the preceding nasal consonant is tautomorphemic (e.g., *-mid- 'swallow' > *-min-*) vs. heteromorphemic (e.g., *-túm-id- 'send to' > *-túm-il-*). There are others where certain roots condition nasalization of suffixes, but not others. The study that I have in mind would carefully investigate the phonologization and dephonologization of NCH throughout the Central and Western Bantu languages where it is attested. It is hoped that a comprehensive (electronic) lexical study of NCH in some of the languages neighboring Yaka might shed further light on this problem.[24]

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[23] The only exception to this statement among verb roots is *-fining-* 'couvrir'. In this case it is not clear if the [n] in its perfective, -fíning-ini, is due to the preceding /ng/ or to the preceding [n].

[24] One of the questions which I am currently investigating, for instance, concerns the question of whether the Yaka-Kongo version of NCH can exist only in a language in which N+N results in a denasalization of the second nasal, as we saw in (27). In other words, is denasalizaiton a prerequisite for NC transparency? So far I have found only one additional language, Bushong, which also regularly denasalizes root-initial nasals when a nasal prefix precedes [Edmiston, n.d.: 13]. While Bushong has denasalization without NCH, I know of no language with transparent NC, but without N+N denasalization.

APPENDIX

Unconditioned Nasality

In response to a question posed to me by Thilo Schadeberg, a search was undertaken to find cases of unconditioned nasality among the 1,780 verb entries in the Yaka dictionary. The results of this search are, I think, important to report here in this Appendix. For this search reflexes of the *-am-* and *-an-* suffixes were ignored, since these are reconstructed with nasality in Proto-Bantu. I instead endeavored to find possible cases where reconstructed *id and *ud appear as [in] and [un] without an appropriate preceding nasal conditioner. In the examples below tone marks are not indicated on verb roots, since they are not contrastive. The results of this search are as follows:

1. Unconditioned nasality of [in]
   A single example was found of unconditioned [in]:
   -sukinin- 'arriver en retard, être en retard'

The related forms *-suk-* 'prendre fin, être fini' and *-sukinis-* 'retarder' (= a causative form) indicate that the above verb should be analyzed as *-suk-inin-*, i.e., with exceptional unconditioned nasality on the suffix.

2. Unconditioned nasality of [un]
   In all, 21 verbs were found that have [un] without a preceding full nasal in the stem. These fall into two roughly equal groups which are distinguished according to the nature of the consonant immediately preceding [un]: either voiceless or [ng]. In what follows I give possibly related forms in Yaka as well as Proto-Bantu reconstructions from Meeussen [1969/1980] which I have been able to determine. I have provided all cases where a phonetically identical verb root exists without [un], even where the gloss suggests homophony rather than relatedness. Where I am sufficiently convinced by the related forms or the reconstruction that [un] is a reflex of the *-ud- 'transitive reversive/separative' suffix, I place a hyphen between it and the preceding root.

2.1 Cases of [un] preceded by a voiceless consonant: /t, k, ts, f, s/
   11 verbs were found in this category, as follows:
   -bukun- 'couper transversalement; abattre un arbre; couper en morceaux (ex. poisson); trancher'
      cf. *-buk-* 'traiter, soigner un malade' [assume not related]
      yi-búku 'morceau, tranche, demi, étape' [related, but direction of derivation not clear]
   -bukunun- 'morceler; recouper; mutiler' [related to preceding]

-hesun- 'couper, prendre un petit morceau (ex. noix de cola, viande seche)'
cf. *n-hésu* 'partie, petit morceau'
yi-hésu 'petit morceau' [direction of derivation not clear]

-huut-un- 'trop raccourcir, couper plus que prevu, prendre trop'
cf. *-huut-* 'couper trop; prendre trop à la fois au repas'

-sokun- 'cueillir (des fruits, mais un à un)'
cf. *-sok-* 'charger (ex. un camion, fusil)' [related?]

-taak-un- 'déchirer'
cf. *-taak-* 'déchirer'

-tafun- 'macher' < PB *-takụn- 'chew, masticate'

-tekun- 'verser (ex. un liquide de sorte qu'il sort à petites quantités)'
cf. *-ték-* (+ *máámba* 'eau') 'puiser de l'eau'
-tek-is- 'vendre, écouler'
< PB *-ték- 'draw water'

-tsootsun- 'enlever, arracher les feuilles d'un arbres les arachides de leurs racines; médire; calomnier'
cf. *-tsoots-* 'tremper du luku dans la sauce' [assume not related]

-zot-un- 'couper un petit morceau (excl.viande); casser en tirant (ex. corde)'
cf. *-zot-uk-* 'être coupé' [=intransitive reversive/separative]

-zyokutun- 'ronger'

2.2. Cases of [un] preceded by [ng]

10 verbs were found which have [un] preceded by [ng]:

-fwoongun- 'ronfler'

-hiingun- 'couper au milieu'
cf. *-hiing-* 'remplacer, relayer, succéder (prendre la place de qqn); attendre qqn' [assume not related]

-kuungun- 'enlever (poussière ou saleté quelconque)'
— *móóko* 'essuyer les mains'
?< PB *-kung- 'fasten, attach'; *-kúng- 'gather'

-saangun- 'se montrer content, se réjouir ouvertement de, exulter'
cf. *-saang-* 'mélanger, meler, mettre en commun (ex. argent); jeter un peu de farine de manioc dans l'eau bouillante, pour voir si elle bout vraiment; danser la danse au couteau de chef' [related?]
?< PB -cang- 'be crazy, furious'; *-cang- 'meet, mix, connect'

-suungun- 'enlever les défenses d'un animal (cornes, griffes)'
cf. *bu-úungu* 'chasse organisée (en groupe)'
n-úungu 'chasseur (en groupe)'
-suung- 'soupeser pour voir, pour essayer (ex. si c'est possible de porter qqch)' [not related?]
?< PB *-cung- 'tend animals'

-taang-un- 'parler d'un absent'
cf. *-taang-* 'lire, compter, énumerer; médire, calomnier'
n-táangu 'discours (il s'agit de plaintes et d'accusations, prononcées par qqn qui parcourt le village de bout en bout, le matin surtout)'
< PB *-táng- 'read'

-teengun- 'ouvrir (ex. une plaie, elle se referme quand on la lache)'

-tongun- 'ramasser par terre'

-tuung-un- 'faire sortir de'
cf. *-tuung-* 'construire, batir, édifier; tresser, coudre, tricoter, confectionner; s'installer, s'établir' [=reversive of last meaning]
< PB -túng- 'plait, sew, build; put or pass through'

-woongun- 'souhaiter du mal'
cf. *-woong-* 'rassembler qqch, grouper, cotiser, économiser, accumuler, entasser, ramasser' [assume not related]

3. Cases of [ul] preceded by [ng]

Since 10 examples of unconditioned nasality involved [un] preceded by [ng], it was decided to see how many verbs show the expected shape [ul] when preceded by [ng]. As seen below, 14 verbs fell into this category.

-buungul- 'coiffer; prendre une grande partie'
cf. *-buung-* 'gaspiller, négliger' [related?]
?< PB *-bung- 'collect, gather'

-heengul- 'chercher'
cf. *-heeng-* 'tamiser, filtrer; vouloir à tout prix, bruler d'envie; se dépecher, être pressé, être haté, se presser, se hater, s'élancer, se précipiter; esquiver' [assume not related]

-huung-ul- 'ramener (ex. une brebis au troupeau, le troupeau au village; qqch qui flotte sur l'eau à la rive)'
cf. *-huung-uk-* 'être ramené'
-huung-ik- 'mettre de coté'
-huung- 'détourner le visage; activer (le feu), tisonner; ventiler
— *mbááwu* 'activer le feu avec un soufflet'
[assume *-huung-* not related]

-kaang-ul- 'ouvrir; frire'
cf. *-kaang-* 'fermer, renfermer; fixer, lier; griller; freiner
— *tsúúnda* 'sourciller'
-kaang-am- 'être lié, fermé, être embourbé'
< PB -kaḍing- H 'roast on coals'

-leeng-ul- 'polir, rendre lisse, retoucher, embellir; regarder d'un mauvais oeil, toiser'
cf. *-leeng-* 'rendre lisse, polir, aiguiser, embellir; étaler (*luku*); se dépecher'
-leeng-uk- 'être acheve, être parfait, être embelli'
?< PB -deng- 'be wet'

-luungul- 'se parer, s'endimancher'
cf. *-luung-* 'attendre, se tenir pret (pendant la chasse)'
—*ye buta* 's'armer' [assume not related?]

-seengul- 'culbuter, changer subitement'
cf. *-seeng-* 'glaner; injurier (fort); creuser légèrement avec une houe (ex. en pourchassant un cri-cri)' [assume not related]

-soong-ul- 'rendre pointu'
cf. *-soong-* 'aiguiser, tailler (ex. crayon, fleche, dents)'
-soong-uk- 'être pointu, être aigu, être taillé'
< PB *-congok- 'be pointed'; *-congok-od- L 'point'

-suungul- 'nommer, parler de qqn, médire de qqn'

-woong-ul- 'détruire, trouer; mettre en pièces détachées (ex. meubles)'
cf. *-woong-* 'rassembler qqch, grouper, cotiser, économiser, accumuler, entasser, ramasser'

-yaang-ul- 'ouvrir une porte'
cf. *-yaang-uk-* 'être ouvert'
-yaang-il- 'fermer une porte'
-yaang- 'mettre à la broche'

-yuungul- 'tamiser'
?< PB *-cung- 'sift'

-zaang-ul- 'soulever, prendre'
cf. *-zaang-ik-* 'placer qqch a une certaine hauteur'

-ziing-ul- 'expliquer, exposer; dérouler (ex. tapis)'
cf. *-ziing-* 'durer, vivre, enrouler'

4. Discussion

As seen, there is a certain amount of "residue" where verbs have [un] sequences that cannot be attributed to NCH. There are even two minimal pairs in the above data: *-suungul-* 'nommer, parler de qqn, médire de qqn' vs. *-suungun-* 'enlever les défenses d'animal' and *-woong-ul-* 'détruire; mettre en pièces détachées' vs.

-woongun- 'souhaiter du mal'. The fact that 10 cases of [un] appear after [ng] is clearly related to our finding that the quasi-suffix *-ung-* always conditions NCH (see (30c)). However, there are more cases of [ul] after [ng] than there are [un]. As can be seen from the above hyphenations, I have felt comfortable identifying *-un-* as a suffix in only 2 out of the 10 cases after [ng]. By way of contrast, *-ul-* can be identified as a suffix in as many as 8 out of the 14 cases after [ng]. It is possible that some cases of unconditioned [un] trace back to *n rather than *d (e.g., *-tákụn- 'chew, masticate'). Involvement of [ng] suggests, however, that these cases of [n] result from NCH. Two interpretations fit the partial data at our disposal. The first is that [ng] used to condition NCH in all environments, but has since become restricted. Under this interpretation we would posit a gradual change from *...ng-un-* to *...ng-ul-*, particularly in cases where [un] was identified as the reversive suffix *-ud-. The second interpretation is that NCH is being spread to new environments by analogy. This must have happened already in the history of these languages in order for NCH to skip over syllables with either voiceless or pre-nasalized consonants. Under the second interpretation NCH has become extended to the suffix *-ung-* and is now gradually coming to be triggered by other cases of [ng]—perhaps retarded in cases where the reversive suffix *-ul-* is clearly segmentable by Yaka speakers. In order to choose between these two scenarios it would be necessary to look at the details from a variety of languages which show such skewing. It is conceivable that the results from such a study would not only bear on NCH, but also on some of the other interesting phenomena that center around the feature of nasality in Bantu languages.

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[Received March 24, 1995;
accepted April 10, 1995]

Studies in African Linguistics
Volume 24, Number 1, 1995

ASPECTS OF AVATIME PHONOLOGY*

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Avatime is one of 14 Central-Togo languages (formerly known as "Togo Remnant Languages") spoken in the Volta Region of Ghana and contiguous areas of Togo. The most striking typological feature of these languages compared to their closest Kwa relatives is the fact that they have active noun class systems. The present paper is a description of Avatime phonology, with emphasis on certain features which have been poorly described and/or are of general linguistic interest. Within the consonant system, Avatime has bilabial fricatives and a full series of labiovelar obstruents, including fricatives. Consonants with following glides are considered to be segment sequences rather than consonants with secondary articulations. The vowel system has nine vowels with [ATR] harmony. Continguous vowels undergo a variety of coalescence processes, which differ depending on morphological context and the specific vowels involved. Modern Avatime requires an analysis with four contrasting level tones. However, many instances of two of these tones (the highest level and the lower mid level) are derived through still active processes. One feature of the tone system not previously described is the presence of glottal stop following a syllable bearing non-low tone when that syllable falls at a phonological phrase boundary.

* This paper derives from about a month of fieldwork I did on Avatime, partly in conjunction with Ian Maddieson, in November and December 1994. Travel to Ghana for Maddieson and myself was made possible by a University of Ghana/UCLA faculty exchange program funded by the United States Information Agency through UCLA's James S. Coleman Center for African Studies. The field work consisted of 2-3 weeks on the University of Ghana campus at Legon and a five day trip to Amedzofe. At Legon, we worked with Chris Kwami Bubuama, a 28 year-old native of Amedzofe who had completed his O-level examinations and who is employed at the University's Balme Library. In Amedzofe we worked with a number of speakers, but the primary informants were Christian "Sony" Dedume, a 40 year old teacher at the Amedzofe Government Secondary School, and Martin K. Aboni, who is 22 years old and has recently completed his O-level examinations at Vane, the area headquarters. I am grateful to Okusie Akyem Foli V, Chief of Amedzofe, for facilitating our field work in his community and to Christian Dedume, Martin Aboni, Wilson Adinyira, and Joseph Mawuena for their help in Amedzofe. Special thanks go to Andy Ring of the Ghana Institute for Literacy and Bible Translation (GILBT) for making the trip to Amdedzofe possible, profitable, and enjoyable. Thanks also to Robert Botne, who commented on a draft of this paper. And most especially, thanks to Chris Bubuama for his indefatigibility, patience, insight, and advice.

1. Background

Avatime is one of 14 languages referred to as "Central-Togo" languages in Kropp Dakubu and Ford [1988]. These languages were first recognized as a group by Struck [1912], who referred to them by the term "Togorestsprachen" (rendered in English as "Togo Remnant Languages"). Most of the "Central-Togo" languages are spoken in the Volta region of Ghana, though several, including the largest, Kposo, are spoken in Togo, and one, Basila, is spoken in Benin. Avatime is spoken north of Ho in seven towns, the largest of which is Amedzofe (*À̀mèdzɔ̀fē*). The language is called *Sɪ̀yà* or *Sɪ̀yàsɛ̀̃* by its speakers, who refer to themselves as *Kèdāɳ̄mà* (m.sing. *Kèdɔ̄nē*, f. sing. *Kèdēdzē*). "Avatime" is the Ewe appellation, but I retain it here since it is the term most widely used in the literature and also in Ghana to refer to the people and their language. According to Kropp Dakubu and Ford [1988:121],[1] Avatime had about 11,600 speakers in the late 1980's. Avatime, along with Nyangbo-Tafi and Logba, are the southernmost Central-Togo languages, separated from the primary Central-Togo speaking area by Ewe. Ewe is the lingua franca and language used in primary education for the area. The effects of Ewe contact on Avatime (and other Central-Togo languages) will arise at several points in the discussion below.

What has struck researchers about the Central-Togo languages from the earliest times is the fact that they have active noun class systems utilizing prefixes and concord much like the Bantu languages. This is in contrast to the languages which appear to be their closest linguistic relatives, where lexical noun class and concord systems are entirely absent. Greenberg [1966] listed the Central-Togo languages together with Ewe, Akan, Gã, and a number of other languages as the "b" subgroup of his "Kwa" group. Though a fairly close linguistic affiliation of the Central-Togo languages with geographically nearby "Kwa" languages has long been recognized, dating from Struck [1912], the Central-Togo languages have generally been considered to comprise an independent subgroup. Heine [1968], using a number of lexical, morphological, and lexicostatic diagnostics, proposed a two-way division within the group, which he referred to as the the "NA" and "KA" branches, based on the reconstructed root that the respective languages use for 'meat'. Avatime is a member of Heine's KA branch.[2] More recently, Stewart (as reported in Kropp Dakubu and Ford [1988:122]) has proposed that Heine's NA branch is to be

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[1] Kropp Dakubu and Ford [1988] base their demographic information on Heine [1968] and Ring [1981] and the internal Central-Togo linguistic classification on Heine [1968]. They present a succinct and useful summary of the historical, social, and linguistic situation of the Central-Togo languages. Here, I repeat only that information relating particularly to Avatime. Heine [1968:78-93] outlines all the literature on the Central-Togo languages over the hundred years 1867-1967.

[2] Though Avatime is classified within the KA branch, the Avatime root for 'meat', *kɪ̄-dzā*, is not cognate with the reconstructed root for this branch. The cognate item shows up in *ɔ̄-gā* 'animal' [Heine 1968:221].

grouped with the Volta-Comoe languages (the subgroup of Kwa which includes Akan) whereas Heine's KA branch is to be grouped with separate Ewe-Fon subgroup of Kwa. If this hypothesis proves plausible, the Central-Togo languages do not represent a genetic unit at all, despite the striking typological characteristic which they share.

The earliest descriptive works on Avatime are a grammatical sketch in Funke [1909] and a German-Avatime wordlist in Funke [1910]. The most extensive single work on Avatime, and also the most detailed and reliable, is Ford [1971a]. Although Ford focuses on syntax, he includes an extensive discussion of the tone system and of both nominal and verbal morphology. Other significant published work includes a fairly large wordlist in Kropp [1967], a presentation of nominal class and concord morphology in Ford [1971b], a 27 page sketch of Avatime and Lolobi (Siwu) phonology, morphology, and syntax by Ford in Kropp Dakubu and Ford [1988], and phonological, morphological, and lexical information in Heine [1968]. Schuh [1995] presents details of the noun class system and concord in attributive noun modifiers.

2. Consonants and Syllable Structure

2.1. Consonant inventory and remarks on individual segments

Table 1. Avatime consonants

	Bilabial	Labio-dental	Dental	Alveo-palatal	Velar	Labiovelar
Stops	p, b		t, d		k, g	kp, gb
Fricatives	(ʃ), v	f, v	s, z		x, ɣ	xw, ɣw
Affricates			ts, dz			
Nasals	m		n	ny	ŋ	ŋw
Liquid(s)			l [l/r]			
Semivowels	w			y		

2.1.1. ʃ: The voiceless bilabial fricative appears only in Ewe loanwords, e.g., *àʃùlā* 'the ocean' (< Ewe *ʃù* + *lá*; 'sea-the'), *séʃɔ̀ʃoɛ̀* 'flower' (< Ewe *séʃòʃò*).

2.1.2. x, ɣ, xw, ɣw: The sounds listed as velar fricatives have only light local noise at the velum, if there is any local noise at all. Perceptually, they are more often than not realized as [h, ɦi, h^w, ɦi^w], respectively.

2.1.3. ts, dz: All published sources which comment on consonants note a distinction between dental and alveopalatal affricates: Funke [1909:291] gives *ts, dz* vs. *tsy, dzy*; Kropp [1967:2] says, "In Avatime [*c* and *j*] contrast with *ts, dz*";

Heine [1968:105] gives *ts, dz* vs. *c, ɟ*; Ford [1971a:17] gives *ts, dz* vs. *t͡ɕ, d͡ʑ*. However, Ian Maddieson and I were unable to find any cases of contrast between affricates at different places of articulation. There was a difference, perhaps generational, between individual speakers as to whether they used dental [ts, dz] or alveopalatal [č, ǰ]. Maddieson made a number of recordings with groups of speakers repeating the same word one after the other, and speakers sitting next to each other and repeating the same word varied as to whether they used dental or alveopalatal pronunciation of affricates. Chris Bubuama, the main informant for this study, consistently used the alveopalatal pronunciation for all affricates. However, I will use *ts, dz* to represent these sounds since these are the symbols used in the widely known orthography for Ewe, which does not have the dental/ alveoplalatal distinction but which does tend to use an alveopalatal pronunciation, at least in Ghanaian dialects.[3]

2.1.4. [l/r]: The liquid sounds are in complementary distribution, [r] appearing as the second consonant in clusters with dentals and alveopalatals, [l] elsewhere, e.g., *à-srā-nà* 'laziness', *ɔ̀-nyrɔ̄-mɛ̀* 'farm', but *ɔ̄-pli-ɛ̄* 'louse', *ɔ̀-kl̩̄-lɔ̀* 'foot', *l̩̄-vlɛ̂-lɛ̀* 'morning'.

2.1.5. q̣: Heine [1968:105] and Ford [1971a:17] list *q̣* among the Avatime consonant phonemes. Ford notes that *q̣*, along with *ƒ*, is "found almost exclusively in loan words". Neither Maddieson nor I found any words containing *q̣*, though it may well occur in Ewe loanwords.

2.1.6. [ʔ]: Heine [1968], alone among all previous writers on Avatime, includes glottal stop (which he writes /'/) among Avatime consonants. As evidence for the phonological distinctiveness of /'/, he cites the following examples of apparent minimal pairs (p. 97, orthography as in Heine): *olé'/olé* 'Hals/eins', *tɔ́'/tɔ́* 'etwas/ kochen'. It turns out, however, that presence or absence of final [ʔ] is conditioned by tone (see §4.2). The items here *without* glottal stop terminating a non-low syllable (a number and a verb) are exceptional and raise questions of tone analysis which go beyond the scope of this paper. Heine [1968:106] remarks, "/'/ hat die

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[3] Related to the issue of affricate contrast is Funke's [1909:291] remark, "In manchen Fällen klingen [*t* und *d*] wie *ts* und *dz*, werden aber von diesen Lauten genau unterschieden, so vor *u* und *i*." This observation continues to hold true, and occasionally, I mistranscribed *t* in particular as *ts*. Heine [1968:106] states, "Im Dialekt von Amedzofe is die Opposition der Konsonanten /t/ und /ts/ vor den zungenhöchsten vokalen /i/ und /u/ aufgehoben, es kommt nur /ts/ vor. Desgleichen ist die Opposition der stimmhaften Entsprechungen /d/ und /dz/ in diesen Umgebungen neurtralisiert." It seems to be Funke rather than Heine who has the correct picture here. Although my data do not contain enough examples of the relevant consonants before high vowels to argue one way or the other, Ford's [1971a:246-256] appendix of 383 verb roots has many examples of both *t* and *ts* before high vowels, e.g., *ti* 'get dry' vs. *tsi* 'grow up/old'.

Allophone [ʔ] im Wortauslaut, und [h] in allen anderen Umgebungen." It is not clear what Heine means by "[h]" in his distributional statement, since Avatime has no /h/ phoneme. As noted above, /x/ is often perceptually [h], but if this is what Heine intends, then [ʔ] is no more in complementary distribution with [h] than with any other consonant, since, aside from syllables terminated by the tonally conditioned [ʔ], which appears only before pause, Avatime allows only open syllables (see §2.2).

2.1.7. Labiovelars: In addition to the labiovelar stops *kp*, *gb*, the "labiovelar" column in Table 1 includes *xw*, *ɣw*, and *ŋw*. Heine [1968] and Ford [1971a] have implicitly assumed this labiovelar categorization by listing these consonants in the same column as *kp*, *gb* (neither lists *ŋw* as a segmental unit, nor does Heine list *ɣw*). Kropp Dakubu and Ford [1988:127] write the fricatives as *xɸ* and *ɣβ*, implying actual occlusion at both lips and velum, but Maddieson [1995] shows that not only is this implausible on physiological grounds, but also that videotaped data from a number of speakers show that there is no occlusion at the lips for these sounds. Even though the fricatives (and nasal) are not labiovelars from a strictly articulatory point of view, a number of factors justify grouping the labialized velars phonologically with the labiovelar stops. First, among the velars, labial occlusion and labial rounding are in complementary distribution depending on manner of articulation: the two stops have only total occlusion, i.e., there are no labialized velar stops [kʷ] or [gʷ],[4] whereas the fricatives and nasal have only labial rounding. Second, the consonants in the labiovelar column can appear as the first member of a consonant cluster:[5] *ɔ̀-kplɔ̄-nɔ̀* 'table', *ɔ̀-gblāgɛ̄* 'snake', *ká-ɣwl̃tsà̃* 'chameleon', *sɪ̄-ŋwlɛ̀-sɛ̀̃* 'mucous'. If the labiovelar consonants, including those with labial rounding, were viewed as sequences rather than units, clusters such as those illustrated here would consist of three consonants, a combination which is otherwise impossible in Avatime.

2.1.8. Labialized and palatalized consonants: Ford [1971a:17] says, "Most consonants occur in both rounded and unrounded forms." However, aside from the labialized velars, which I have argued in the previous paragraph to be labiovelar phonological units, my data and Ford's appendix of 383 verb roots show lexical examples of only *mw* and *fw*, e.g., *ɔ̀mwɪ̣̄* 'goat', *fwɛ̃* 'breathe'. Ford's and my

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[4] I found two loanwords, *àkwlɛ̄* 'canoe' (also cited in Ford [1971a:17] as *àkwlɛ̄* 'boat') and *kùkwí* 'pepper' (cf. Ewe *kùklúí*), which contain labialized *k*'s. Strictly speaking, introduction of labialized velar stops into the Avatime phonological inventory makes the phonological categorization of labialized velar fricatives ambiguous, but within the native vocabulary, the labialized velar fricatives clearly pattern with the labiovelar stops.

[5] I have found no examples of *xw* in a cluster and only one example of *x*, viz. *xlã̄* 'wind, coil'. The voiceless velar fricatives, both plain and labialized, are relatively infrequent, so this is probably an accidental gap.

data also include examples of labiodental and dental consonants with a following palatal glide,[6] e.g., *fyo* 'drink soup', *vya* 'implant seeds', *kụ̀vyà* 'palm oil', *tya* 'choose', *ādyāmèdzē* 'deer(?)', *ḹsyānè* 'horn', *zyɔ* 'lean', *lya* 'harden'. There is a notable absence in these data of velars, labiovelars, and bilabials followed by either front or back glides. In over 1000 items of nominal and verbal vocabulary in Ford's and my data, I have found only the two loanwords with *k* + *w* cited in fn. 4, one example of *ŋw* + *y* (*ŋwya* 'throw' from Ford [1971a:247]), and no examples of bilabial + *y* or *w* other than *mw* (which is fairly common). Such apparent systematic gaps aside, it seems necessary to recognize lexical (underived) cases of C*w* and C*y* in Avatime.

There are three plausible analyses for C*w* and C*y*: (1) they are phonological units with secondary articulations of labialization and palatalization, respectively; (2) they are sequences of consonant + glide, exactly as their orthographic representation suggests; (3) they are CV sequences where the V has undergone glide formation as part of a general process affecting vowels, e.g., *ōbī* 'child' + *ē* 'the' → [ōbyē] 'the child' (see §3.4). Setting aside the single loanward *àkwlē* 'boat' cited in fn. 4, C*w* and C*y* seem never to participate with other consonants in clusters. Analyses (2) and (3) share the claim that C*w*/*y* are sequences rather than units, and thus, either analysis explains why C*w*/*y* do not cluster with another consonant. Viewing C*w*/*y* as a sequence also fits with Avatime phontactics in a natural way by expanding the class of complex syllable onsets from just C*l* to the more general class $CC_{[+sonorant, -nasal]}$. Although many postconsonantal glides can be derived from non-low vowels, as in the example 'the child' cited just above, there is no justification, at least in contemporary Avatime, for deriving the glides from vowels in words such as *fwɛ̄* or *fyo*. In this paper I will use the following convention to distinguish apparently underlying glides from glides derived from vowels:

> CONVENTION FOR REPRESENTATION OF POSTCONSONANTAL GLIDES:
>
> (1) *Underlying glides* will be represented as *w* or *y*, as in the examples in the preceding paragraphs.
>
> (2) *Glides derived from underlying non-low vowels* will be represented as the underlying vowels but will bear no tone marking. Tone will be marked on the following vowel, e.g., *ɔ́nɔ̀* 'person' + *ɛ̄* = *ɔ́nɔɛ̄* 'the person', *ōbiɛ̄* 'the child'.

This convention for representing glides may have importance beyond distinguishing the underlying sources for glides, viz. it is possible that the original vowel distinctions are maintained even when the vowels change to glides. Only

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[6] The nasal *ny* is written in accordance with the standard pattern of orthography for Ghanaian languages. Though written as a consonant sequence, it is unquestionably a unitary (alveo)palatal segment. It can, for example, appear as the first consonant in a cluster, e.g., *nyrɔ* 'sink, submerge, drown'.

instrumental studies will provide a definitive answer, but I observed one aspect of glide formation that suggests the distinction is preserved. Were the vowel distinctions neutralized, the four back vowels *u*, *ụ*, *o*, *ɔ* should all be reduced to [w], for which any phonetic variation could be predicted by environment (as opposed to features of the source vowel). The same would hold for the parallel front vowels with respect to the glide [y]. However, I found that usually, if not always, I heard the [+ATR] vowel *u* as the front rounded glide [ɥ] whereas I did not hear any of the other back round vowels as fronted in this way. During elicitation, I was not consistent in marking this fronting because it was clearly subphonemic, but in looking through my notes, I find dozens of cases (counting multiple tokens of the same word) where I did mark it for underlying *u*, but no cases where I marked it for the other back vowels. Compare the following examples (Table 2). These are all nouns plus a definite suffix. I have put a hyphen before the suffix, but the final CV-V is pronounced as a single syllable. I mark the fronting of *u* with an umlaut.

Table 2. Fronting of glided [+ATR] high back V but not other glided back V's

u	*ụ*	*o*	*ɔ*
óbü-ɛ̄ 'bee'	*ɔ̄bụ-ɛ̄* 'god'	*ōkpo-ɛ̄* 'corpse'	*ɔ́nɔ-ɛ̄* 'person'
kībü-è 'thorn'	*kī̩fụ-è* 'fire'	(no ex. this class)	*kī̩gɔ-è* 'occiput'
kétsü-à 'forehead'	(no ex. this class)	(no ex. this class)	*kāgɔ-à* 'dove'
kùtsü-ō 'foreheads'	*kụ̀mụ-ɔ̀* 'oil'	(*o*, *ɔ* are elided by the -O suffix)	

2.2. Syllable structure. Including C*w*/*y* as sequences, the possible syllable types in Avatime are V, CV, CGV (G= "glide"), C*l*V (where "l" = [l] or [r], distributed as noted in §2.1.4), and n̩ (syllabic nasal), e.g., *à-plī̩-là* 'clouds' (V-ClV-CV), *kpāī̩* 'much, many' (CV-n̩). In In CG and C*l* clusters, the C cannot be of the same type as the following sonorant, i.e., there are no GG clusters and no *rl* or *lr* clusters. Syllabic nasals appear only word final in ideophones. Syllables of the shape V occur only word initial. Moreover, it is not possible to have two syllabic vowels in sequence. When two vowels come in contact, one of three processes takes place: (i) a glottal stop separates the vowels, e.g., *mɛ̄* 'my' + *ɔ̀kplɔ̄nɔ̀* 'table' → *mɛ̄ 'ɔ̀kplɔ̄nɔ̀*; (ii) one of the vowels is elided, e.g., *mɛ̄* 'my' + *ɔ̄ka* 'father' → *mɔ̄kà*; (iii) the first vowel is reduced to a glide—cf. [ōbyē] 'the child' cited above. I return to processes affecting contiguous vowels in §3.4. All consonants other than /n/ and /l/ itself can be the C of a C*l* cluster:[7] *ple* 'unload', *ble* 'untie', *fli* 'split', *lī-vlɛ̀-lɛ̀* 'morning', *mlɔ* 'swallow', *trɛ* 'go', *dra* 'open', *sra* 'smear', *zrɔ* 'to smooth', *tsrɛ* 'change', *dzro* 'dilute', *nyrɔ* 'submerge', *lī-klà-nɛ̀* 'stone', *glu* 'sow (rice)', *xlã*

[7] I have found no examples of *vl* or *xwl*. I assume that these are accidental gaps.

'wind, coil', *ɣla* 'vomit', *ŋle* 'shine', *ɔ-kplɔ̄-nɔ̀* 'table', *gbla* 'incite', *kà-ɣwlîts-ā̀* 'chameleon', *sɪ̣̄-ŋwlè-sɛ̀̄* 'mucous', *wlo* 'bathe', *yrɔ* 'wither'.

3. Vowels

3.1. Vowel inventory and vowel hamony. Avatime has a nine-vowel system, with the vowels divided into two groups, differentiated by a feature generally called "Advanced Tongue Root" (ATR) in West African languages. All 9 vowels may also have distinctively nasalized variants (see §3.3 for discussion). The oral vowel system is as follows:

Table 3. Avatime vowels

	Front		Central	Back	
	[+ATR]	[-ATR]	[-ATR]	[+ATR]	[-ATR]
High	i	ɪ̣		u	ʊ̣
Mid	e	ɛ		o	ɔ
Low			a		

The vowels participate in a cross-height vowel harmony system whereby roots and associated affixes contain only vowels which match for the feature [ATR]. This is easiest to illustrate with affixes whose vowels vary depending on the [ATR] feature of the root to which they are attached:

i/ɪ̣: *lī-gbō-lè/lɪ̣̄-gɔ̀-lɛ̀̄* 'chair'/'year'; *bī-bū-wè/bɪ̣̀-gʊ̣̄-wè* 'thorns'/'wars'; *sī-sē-sè/ sɪ̣̄-tā-sè* 'clay'/'saliva'

e/ɛ: (see suffix examples just above; *ɛ* does not appear in any prefixes); *é tē yɛ̄/ á mɔ̄ yɛ̄* 'he knows him'/'he sees him'

u/ʊ̣: *kù-bē/kʊ̀-mwè* 'tear'/'salt'; *kù-tsō/kʊ̀-pɔ̄* 'monkeys'/'antelopes'

o/ɔ: *ō-dzē/ɔ́-dzē* 'wife'/'woman'; *ò-lō-lò/ɔ̀-sɔ̄-lɔ̀* 'crocodile'/'elephant grass'; *wɔ̀ pè/wɔ̀ gà* 'you are tired'/'you walked'; *é tē wō/á mɔ̄ wɔ̄* 'he knows you'/'he sees you'

e/a: *kē-tsō/kā-pɔ̄* 'monkey'/'antelope'; *ē-gbō-là/ā-gɔ̀-lā̀* 'chairs'/'years'; *mè sē/mà yɔ̄* 'I ran'/'I stood up'

In the last row, *e* and *a* are paired as vowel alternants in prefixes. This pairing is not based on a [±ATR] differentiation. It is possible that Avatime at one time had paired low vowels *ɜ/a* (a contrast that does exist in some West African languages) and that *ɜ* fell together with *e*. However, there is not now any phonetic contrast between the *e* paired with *ɛ* and that paired with *a*. The following distributional facts are worth noting:

(1) Prefixes have only the *e/a* alternation, suffixes only the *e/ɛ* alternation.

(2) Suffixes with an *a* are invariable, even in environments where suffixes with other vowels do show alternation.[8] Relevant examples are the *-la* suffix paired with the nominal *e-/a-* prefix (cf. 'chairs'/'years' illustrating *e/a* above), the *-ba* or *-wa* suffix paired with the *be-/ba-* nominal prefix (*bē-dzē-wà/bá-dzē-wà* 'wives'/'women'), the *-a* suffix paired with the nominal *ke-/ka-* prefix (*kè-zi-ā̀/ká-dzi-á* 'bowl'/'hawk'), and the 3rd person plural object pronoun (*é tè wā̀/á mɔ̀wā̀* 'he knows them'/'he sees them').

(3) The *e/ɛ* alternation is limited to suffixes which are paired with prefixes having vowels other than *e/a* and suffixes not paired with prefixes. Relevant examples are suffixes paired with the prefixes *li-/li-*, *ki-/ki-*, *bi-/bi-*, and *si-/si-* (cf. examples illustrating *i/i* above), the suffix *-e/-ɛ* associated with the "Class 1" prefix *o-/ɔ-* (see 'wife'/'woman' illustrating *o/ɔ* above), and the 1st and 3rd person singular object pronouns (*é tē mē/á mɔ̄ mɛ̄* 'he knows me'/'he sees me', *é tē yē/á mɔ̄ yɛ̄* 'he knows him'/'he sees him').

These distributional facts have obvious implications for which affixes should be reconstructed with front mid vowels vs. low vowels. In modern Avatime, however, these facts and the patterns of vowel harmony in general are frozen as a feature which cannot be accounted for in phonetic terms and probably not even in purely phonological terms. Presumably vowels within native Avatime roots would harmonize, but in practice this is difficult to illustrate because nearly all undecomposable native Avatime roots are monosyllabic, and even those not obviously decomposable could be frozen compounds comprising roots with different harmony features. Loanwords retain their original vowels, even where they are disharmonic, e.g., *mángò* 'mango' and the name of the town *Àmèdzɔ̀fé*, both from Ewe, have mixed vowels with respect to the [ATR] feature. Compounds comprising only native Avatime roots may likewise be disharmonic, e.g., *ɔ̀sàyōlɔ̀* 'place for weaving' < *-sà-* 'cloth' + *yō* 'weave'; *kèdɔ̄nɛ̄* 'Avatime man', composed of the [+ATR] root *ked-* "Avatime" and the [-ATR] root *ɔ́nɔ̀* 'person' (cf. *kèdōbiē* 'Avatime child', where both roots happen to be [+ATR]). Even some Avatime derivational processes give rise to disharmonic words. Thus, the *-lɔ* suffix seen on *ɔ̀sàyōlɔ̀* 'place for weaving', which is part of a locative noun dervational process, always has a [-ATR] vowel even though its associated prefix *o-/ɔ-* harmonizes with the first root of the derived form, e.g., *ɔ̀sēlɔ̀* 'place for running' < *sē* 'run'—cf.

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[8] The fact that *a* in such suffixes can have a [+ATR] host suggests that *a* is a "neutral" vowel for the feature [ATR]. However, in prefixes, *a* only cooccurs with [-ATR] hosts, and when *a* is the vowel of a root, it always conditions [-ATR] harmony in affixes. I therefore consider *a* to be a [-ATR] vowel, and view the "invariable-*a*" suffixes as being a case of tolerated disharmony. The [ATR] feature is ultimately a *phonetic* property, of course, so it should be possible to bring instrumental data to bear on the [ATR] nature of *a*.

òsēlò 'tree', an underived word which obeys vowel harmony and which differs from 'place for running' only in the vowel of the suffix.

3.2. The [±ATR] contrast in [+high] vowels. Among previous writers, only Funke [1909:288-289] recognizes a nine-vowel system. Everyone else analyzes Avatime as having seven contrasting vowels, *i, e, ɛ, a, ɔ, o, u,* i.e., a system with no [±ATR] contrast among either the high or low vowels. Kropp [1967:3] says, "In Avatime there are many words with apparently free alternation between *i* and *e*, *u* and *o*. Funke [1909] writes these as two further vowels, but I doubt that this is necessary." Heine [1968:105] lists seven vowels for Avatime, noting (p. 106), "Funke erwähnt zwei weitere Vokale *ė* und *ů* ..., die nicht nachgewiesen wurden." Among recent writers, Ford [1971a:16] comes closest to recognizing a more elaborate vowel system. He says, "There are seven oral surface vowels [i, e, ɛ, a, ɔ, o, u] .... Ford [1970][9] recognizes the following ten underlying qualities: [i,ɪ e,ɛ ɜ,a o,ɔ u,ω], being pairs of vowels differing on the basis of the feature tongue-root advancing." Though Ford [1971a] has little more to say specifically about the vowel system, it is clear from his transcriptions that he considers the "tongue-root advancing" feature to be phonetically neutralized for high and low vowels. Even Funke [1909], though recognizing nine phonetically distinct vowels, seems equivocal about the status of a contrast within pairs of front and back high vowels. Aside from the sections where he explicitly discusses the vowel system (pp. 288-291), he does not mark the distinction for high vowels, nor does he mark it in Funke [1910].

Funke's [1909] analysis provides an interesting counterpoint to Ford's [1971a] account. As noted, Ford set up an underlying contrast between pairs of vowels which he claimed to be phonetically neutralized for high and low vowels. Funke, on the other hand, seems to have believed that there was no underlying contrast between the vowels in any of the pairs *i/i̱, e/ɛ, u/u̱, o/ɔ*. Rather, the right-hand vowel of each pair is the phonetic result of a coalescence of the left-hand vowel with *a*. His analysis can be illustrated using his statements and examples for *u̱* (which he writes *ů*). For each of the vowels *i̱, ɛ, u̱, ɔ*, he makes a statement such as, "[*ů*] ist aus *ua* entstanden" (p. 288); he illustrates this with examples such as *kůsa* 'Kleid' = *ku-asa*, *kudẽ* 'Weg' = *ku-edẽ* (p. 291).

Funke's illustrations of /V + *a*/ all show the vowel of a noun prefix coalescing with a putative underlying vocalic prefix on a noun stem. Not only is there no evidence for such vocalic prefixes at any level, synchronically or historically,[10] but

[9] The bibliography of Ford [1971a] lists Ford [1970], "On vowels and vowel-harmony in Avatime," unpublished mimeo. I was unable to locate this paper in the Linguistics Department library at the University of Ghana, and apparently it was never published.

[10] Funke's thinking was influenced by Ewe, which he probably knew quite well. He seems to have believed that Avatime has added its noun class prefixes to word stems that looked like Ewe nouns, most of which have a canonical VCV structure. In Funke [1909:290] he says, "Da das

continued on next page ...

in assuming that the [-ATR] vowels derive from /V + *a*/, he would have to claim that *every* [-ATR] vowel, including those internal to roots, results from a similar derivation, clearly a *reductio ad absurdum*. Although Funke's analysis cannot be accepted, he did recognize a contrast which later writers have denied but which does exist in modern Avatime, both phonetically and phonologically. What is the evidence for this contrast?

The most important evidence for the constrast is the fact that *i*/*i̱* and *u*/*u̱* are four phonetically distinct sounds. Funke [1909:288] said of this distinction, "*ė* ... liegt in der Mitte zwischen *e* und *i*. Gewöhnlich hört man nur ein enges etwas nach *i* hinüberklingendes *e*. ... *ů* is ein weites, offenes *u*. In rascher Aussprache klingt es stark nach *o* hinüber." Of course, modern Avatime could have neutralized a [±ATR] distinction for high vowels that existed at the time when Funke wrote, but in fact it has not. The vowel distinctions in question are perceptually distinct in minimal and near minimal pairs such as the following:

Table 4. Pairs distinguished (in part) by [ATR] specification for high vowels

[+ATR]		[-ATR]	
sīnīsè	'mushroom'	*sı̀mı̱sè*	'excrement'
ɲ̄nīnè	'soups'	*ɲ̣nyı̱̄nè*	'firewoods'
ɲ̄bìlɛ̀	'wound'	*ɲ̣bɲ̣lɛ̀*	'snail'
kūvùvù	'catching'	*kū̱vù̱vù̱*	'newness'
ɲ̄mùnɛ̀	'lake'	*ɲ̣mū̱nè*	'unprocessed rice'
kībū	'thorn'	*kı̱fū̱*	'fire'
kīkù	'yam'	*kı̀gū̱*	'war'

The claimed perceptual distinctions here are confirmed by instrumental data. Maddieson [1995] shows that for a data set comprising single repetitions by a group of 12 speakers (8 male, 4 female) and multiple repetitions by a single male speaker, the F1 frequencies of the [-ATR] vowels are significantly higher than for the corresponding [+ATR] vowels. Moreover, the [-ATR] high vowels have significantly lower F1 frequencies than the [+ATR] mid vowels, belying a merger of these vowels implied in the quote from Kropp [1967] in the first paragraph of this section. F2 frequencies also differ, the [-ATR] high front and back vowels having lower and higher frequencies respectively than their [+ATR] counterparts, but again remaining distinct from the [+ATR] mid vowels.

Präfix aus Konsonant und Vokal oder nur aus einem Vokal besteht, so kollidiert bei der Anfügung an ein Substantiv sein Vokal mit dem vokalischen Anlaut des Substantivs, das (wie im Ewe) in seiner ursprünglichen Form nur aus einer Silbe, und zwar Konsonant + Vokal mit einem tieftonigen Vokal (*a*, *e*, *o*) als Anschlag oder Anlaut, besteht."

The transcription practices of previous researchers demonstrate that they, too, must have been hearing the distinctions here, though they did not use the [±ATR] label. Funke, quoted above, noted the phonetic similarity between the [-ATR] high vowels and the [+ATR] mid vowels, but in most of his work he wrote *i* for both his "*i*" and "*ė*" and *u* for both his "*u*" and "*ů*". Kropp noted what she considered to be "free alternation" between vowels in the pairs *i/e* and *u/o*. However, it is not the case in her transcription practice that this "free alternation" takes place in all lexical items. Rather, it is strongly skewed toward those which have [-ATR] harmony. This can be illustrated, as in Table 5, from Kropp's [1967] list in the following way: For most nouns, Kropp gives both the singular and the plural forms. In many singular/plural class pairs, the singular class prefix has a high vowel whereas the corresponding plural has a mid or low vowel, or vice versa. Kropp and other writers are relatively consistent in noting [±ATR] distinctions among mid and low vowels.

Table 5. Kropp's [1967] transcription of [-ATR] high vowels

Prefix pair	as written, Kropp [1967]	# of cases	example word
li-/e- [+ATR]	*li-/e-*	17	*li-ne/e-* 'tooth'; Funke *line-ne/e-*
	le-/e-	Ø	
l̩i-/a- [-ATR]	*li-/a-*	18	*li-nyɔ/a-* 'nose'; Funke *linyɔ-ne/a-*
	le-/a-	11	*le-gba/a-* 'life'; Funke *ligbã*
o-/i- [+ATR]	*o-/i-*	17	*o-le/i-* 'neck, voice'; Funke *ole-lo/i-*
	o-/e-	2	*o-pi/e-* 'tail'; Funke *opi-no/i-* *o-tsri/e-* 'okra'; Funke *otsre-no/i-*
ɔ-/l̩i- [-ATR]	*ɔ-/i-*	18	*ɔ-na/i-* 'heart'; Funke *ɔna-nɔ/i-*
	ɔ-/e-	11	*ɔ-kele/e-* 'leg'; Funke *ɔkli-lo/i-*
ku-/be- [+ATR]	*ku-/be-*	3	*ku-de/be-* 'road'; Funke *kudẽ/be-*
	ko-/be-	Ø	
kụ-/ba- [-ATR]	*ku-/ba-*	9	*ku-ka/ba-* 'fence'; Funke *kuka/ba-*
	ko-/ba-	3	*ko-nya/ba-* 'bow'; Funke *kunỹ-a/ba-*
ke-/ku-[+ATR]	*ke-/ku-*	7	*ke-zi/ku-* 'plate, bowl'; Funke *kezi-a/ku-*
	ke-/ko-	Ø	
ka-/kụ- [-ATR]	*ka-/ku-*	9	*ka-gɔ̃/ku-* 'bush fowl'; Funke *kagɔ̃/ku-*
	ka-/ko-	5	*ka-wala-mɛ/ko-* 'palm'; Funke *kawlamɛ/ku-*

For the majority of words in Kropp's list, we can thus determine whether a root is [+ATR] or [-ATR] from the plural (or singular) prefix containing the mid or low

vowel. For example, the *li-/lị-* singular class is paired with the *e-/a-* plural class, where the left-hand variant is [+ATR] and the right is [-ATR], e.g., *lɪ̄gbōlè/ēgbōlà* 'chair' with the [+ATR] vowel /o/ in the root vs. *lɪ̣̄vōlè/āvōlà* 'mud' with the [-ATR] vowel /ɔ/ in the root. I counted all examples of the relevant class pairs in Kropp [1967] where she provided both singular and plural forms. Table 5 above summarizes the results. The fourth column compares Kropp's transcriptions with those in Funke [1910]. I have written Funke's e̲ and o̲ as ɛ and ɔ, respectively, and I have omitted tone marking from both sources since neither source has a consistently applied tone marking system, and tone is not relevant to the point at hand in any case. I have given just the prefix for the plural. Funke's citations usually have a definite marking suffix as well as a prefix whereas Kropp's citations have no suffixes.

These figures for Kropp [1967] can be summarized as follows:

Total high vowel prefixes written as **high** vowels in [+ATR] words:	44/46	(96%)
Total high vowel prefixes written as **mid** vowels in [+ATR] words:	2/46	(4%)
Total high vowel prefixes written as **high** vowels in [-ATR] words:	54/84	(64%)
Total high vowel prefixes written as **mid** vowels in [-ATR] words:	30/84	(36%)

I made a similar count for the Avatime items which Heine [1968:212-257] cites in his comparative wordlist, with the results summarized below:[11]

Total high vowel prefixes written as **high** vowels in [+ATR] words:	18/18	(100%)
Total high vowel prefixes written as **mid** vowels in [+ATR] words:	0/18	(0%)
Total high vowel prefixes written as **high** vowels in [-ATR] words:	17/25	(68%)
Total high vowel prefixes written as **mid** vowels in [-ATR] words:	8/25	(32%)

These figures show that both Kropp and Heine transcribed about 1/3 of the prefixes with high vowels as mid vowels when they were attached to [-ATR] roots, but in [+ATR] roots Kropp transcribed only 2 out of 46 high vowels as mid and Heine none.[12] In contrast to Kropp's and Heine's practice, Funke [1909, 1910] and Ford [1971a] transcribe only *i* and *u* in the relevant prefixes. These differences in transcriptions for the various writers and the fact that the Kropp's and Heine's variation between high and mid vowels occurs almost exclusively with [-ATR] roots has only one explanation, viz. high vowels in [-ATR] words differ in some way from those in [+ATR] words.

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[11] In his comparative wordlist, Heine [1968] sometimes used citations from other sources, esp. Funke [1910], where he lacked the relevant item in his own materials. I have counted only those items which Heine did not attribute to some other source.

[12] The smaller absolute number of [+ATR] roots as compared to [-ATR] roots holds across the entire Avatime lexicon. In my list of 315 underived nouns, 146 (46%) are [-ATR], 101 (32%) are [+ATR], and 68 (22%) are disharmonic. The latter are all loanwords.

Casali [1994] discusses the reduction of 9 vowel systems to 7 vowel systems in Niger-Congo languages, generally by neutralizing the [±ATR] distinction in the high vowels. He further lists several examples of languages which were originally described as having 7 vowel systems but which turned out to have 9 vowel systems, a list to which Avatime could be added. Casali's explanation for why 9 vowel systems would reduce to 7 vowel systems is auditory rather than articulatory, as has been proposed in most discussions of this subject. He says, "Acoustic studies have revealed that in a number [of languages with Cross Height Vowel Harmony systems], the first and second formant values of [ɪ] and [ʊ] compare very closely with those of [e] and [o] ... A natural outcome of this sort of acoustic overlap might be that at some point, children learning such a language would fail to detect the contrast between the two pairs and consequently merge them in the grammar they construct "(p. 9). This auditory, rather than articulatory explanation for historical vowel mergers would account for why researchers have not been consistent in hearing and transcribing vowel distinctions in Avatime and the languages which Casali lists. Although English and German, the native languages of the researchers on Avatime, have an *articulatory* distinction of at least four vowel heights among non-low vowels, the primary difference between the [+ATR] and [-ATR] vowels is not height, but rather is an *auditory quality* distinction, generally accounted for as an effect of advancing or retracting the tongue root (but see Fulop, Kari and Ladefoged [1995], who question the universality of the [ATR] gesture as the basis for West African vowel harmony systems).

Because the auditory properties based on [ATR] do not correspond in a direct way to the tongue height distinctions of European languages, it is not surprising that European researchers have also shown some inconsistency in transcribing Avatime *mid* vowels. Kropp [1967] sometimes transcribes the [+ATR] front mid vowel *e* as *i*, e.g., 'okra' in Table 5 (cf. Heine *o-tsre'*), *o-ni/be-* 'mother' (Funke *one/be-*, cf. Heine *o-ne*), *ke-dzi/ku-* 'rat' (Funke *kedzẽ/ku-*). (A casual perusal of Kropp's list has not revealed parallel examples of *u* written for *o*.) Though not as pervasive as variation in high vowel transcriptions, there are also examples where writers have transcribed [+ATR] mid vowels in place of [-ATR] mid vowels or vice versa, e.g., Funke *lible* 'snail' (root should be *-blɛ* as can be seen by the [-ATR] plural prefix in *a-ble* [sic]), Kropp *kɛ-tu* 'forehead' (should be *ke-tu*—there are no prefixes containing *ɛ*), Heine *ɛ-nyi'* 'names' (should be *e-nyi*). Significantly, none of the writers who show variation in their vowel transcriptions were aware of (or at least did not describe) a vowel harmony system for Avatime. Like these writers, I had difficulty in consistently distinguishing the [±ATR] vowel pairs, but often a "disharmonic" transcription on my part would lead me to recheck items and, on rehearing, to detect what, for me, were subtle quality differences.[13]

[13] I have had the same perceptual problem with mid vowels in Ewe and Wolof, both of which have seven vowel systems and at least vestigial [ATR] vowel harmony. I might note that I also have the corresponding production problem. In working on Ewe and Wolof, both of which I have

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This comment leads to the final piece of evidence that the [±ATR] distinction between high vowels is alive and well in modern Avatime, viz. native speaker intuition. What I described as "subtle quality differences" were categorical for Chris Bubuama, the speaker with whom I worked most. In my first few field work sessions, before I was atuned to the sounds of Avatime and before I had worked out the system of noun class affixes, I made such transcriptions as *lēxwàlɛ̄* 'bone' instead of *lɪ̰xwàlɛ̀*, *kèklēẅɪ̰* 'toe' instead of *kɪ̰klɪ̰wɪ̰*. Chris Bubuama showed considerable interest in Ian Maddieson's and my work on his language and watched as we transcribed his utterances. In examples such as those just mentioned (and several times later as field work progressed), he corrected my incorrect *e*'s to *i*'s. He is literate in Ewe and is therefore familiar with symbols particular to Ewe orthography. For example, he knew the orthographic distinctions between *o*/ɔ and *e*/ɛ, and it was he who pointed out to me that the *-lɔ* suffix on locative nouns, mentioned in the last paragraph of §3.1, is invariable when he saw that I was more or less mechanically transcribing it as *-lo* or *-lɔ* depending on the [ATR] value of the stem vowel. The segment inventory of Ewe and Avatime are quite similar except that Ewe has a 7 vowel system. Chris was thus unfamiliar with any special symbol for [-ATR] high vowels, but he was insistent that the vowels in question be written with a high vowel symbol rather than a mid.

3.3. Phonologically distinctive nasalization. Avatime has a phonological distinction between nasalized vowels and their non-nasalized counterparts. This distinction is disappearing, a process which has probably been going on for some time. Funke's [1910] vocabulary contains examples of the following nasalized vowels:

ã: *zã* 'be ripe', *liklã-ne* 'stone'
ɛ̃: *klɛ̃* 'shine', *kedzɛ̃* 'rat', *kudɛ̃* (pl. *bedɛ̃-ma*) 'road'
ɛ̃: *sɛ̃* 'leave, go out', *livɛ̃* (pl. *avɛ̃*)[14] 'guilt'
ɔ̃: *mɔ̃* 'see', *kutɔ́̃* 'urine'
ĩ: *tsyitsyĩ* 'red'
ũ: *vũ* 'catch', *ligũ-ne* (*egũ-na*) 'palm kernel', *livũ-ne* (*evũ-na*) 'nest'
ṵ̃: *kukũ* (pl. *bakũ*) 'spear', *lisṵ̀* (pl. *asṵ̀*) 'worm', *kigṵ́-ie* 'war'[15]

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tried to use at least minimally as spoken languages, and during field work on Avatime, I have never been able produce a "convincing" distinction between the pairs of mid vowels. This is almost surely a result of my attempting to use a vowel height distinction based on English vowels in place of a quite different articulatory gesture.

[14] Funke writes *ɛ̃* rather than *ɛ̃* in this and a number of other examples. However, the plural prefix *a-* rather than *e-* shows that the root is conditioning [-ATR] vowel harmony.

[15] Funke [1910] does not mark the distinction between [+ATR] and [-ATR] high vowels. In the words for 'spear' and 'worm', the plural prefixes *ba-* and *a-* rather than *be-* and *e-* show that the roots are [-ATR] and must therefore contain *ṵ̃* rather than *ũ*. The word for 'war' does not

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In Funke [1910], nasalized *ã* is by far the most frequently occurring nasalized vowel; *ĩ/ɪ̃* and *ẽ* are the least frequent (most apparent examples of *ẽ* in Funke's list can be shown to be *ɛ̃*—see fn. 14). I could find no examples of *õ* in Funke's list, and the word for 'red' was the only unequivocal example I found of *ĩ* or *ɪ̃*. Other examples of nasalized high front vowels raise questions. For example, Funke gives *sìmĩ-sɛ* 'Kot', with a nasalized vowel, but *simí-sɛ* 'Exkrement', clearly the same word, but without nasalization marked on the vowel. Similarly, he gives *ɔ́nɔ' kpikpĩ* 'Neger' ("person black"), with a nasalized vowel on the adjective, but *kpikpi* 'black', with no nasalization marked. In the first pair of examples, the preceding nasal consonant probably plays a role. Indeed, in modern Avatime there is some perseverative nasalization on vowels following nasal consonants,[16] though in the majority of words containing nasal consonants, Funke does not mark nasalization on vowels following the nasals. There is no *phonetic* explanation, such as a contiguous nasal consonant, for why Funke heard nasalization in *ɔ́nɔ' kpikpĩ* vs. *kpikpi*.

The foregoing remarks suggest that even at the time Funke was working, early in this century, phonologically distinctive vowel nasalization was not a phonetically prominent feature of the vowel system. For recent generations of speakers, it seems to have nearly disappeared. Ian Maddieson and I, working both together and independently with Avatime speakers, found only three words in the nominal vocabulary with unconditioned nasalization, and the roots of these words are all borrowings from Ewe: *lãklẽ* 'leopard' (< Ewe *lãkle*), *ɔ̀-kwẽ̃* 'soap' (< Ewe *kɔ̃e*) and *sɪ̀-gẽ̃-sɛ̀* 'Gã language' (< Ewe g*ɛ̃́*). I did find a few verbs with nasalized vowels, including the two in Table 6 which show near minimal contrast with words which lack nasalization. Nasalization must therefore still play at least a marginal phonological role. Citations are the verbal nouns, which are in the KU class; the first pair bears the definite suffix -O.

Table 6. Pairs contrasting nasalized and non-nasalized vowels

Nasalized		**Non-nasalized**	
kūtsítsĩ̀ɔ̃̀	'be red'	*kʊ̄tsɪ́tsɪɔ̀*	'cut off'
kʊ̄zázã̀	'be ripe, be fair-skinned'	*kʊ̄zāzà*	'pass'

provide morphological evidence for its [-ATR] status, but Ian Maddieson and I used this word extensively in our work in checking [ATR] in high vowels.

16 Definite suffixes for several classes have alternate forms, one with a non-nasal consonant, one with a nasal, e.g., *lɪ̄-xwà-lɛ̀/ā-xwà-lã̀* 'bone/bones' vs. *lɪ̄-mwā-nɛ̀/ā-mwā-nà* 'breast/breasts'. This alternation was originally conditioned by whether or not the preceding vowel was nasalized, whether through distinctive nasalization or perseverative nasalization from a preceding nasal consonant. See Schuh [1995] for further discussion.

Funke [1910] shows nasalization on both nasalized words here; Ford [1971a: 69, 251] shows it on 'be ripe' but not on 'be red'. I have two recorded tokens of the latter. In one, the nasalization is all but inaudible, and in both tokens, I hear it as clearly emerging only on the *-o* suffix. Ford [1971a], in his appendix of 383 verbs, marks only 9 verbs as having nasalized vowels. Of these 9, 2 have the vowel *ɛ*, and the other 7 have *a*, corresponding to the distribution already evident in Funke's material, which showed unconditioned nasalization to be most common among non-high, [-ATR] vowels. Many of the verbs which Funke marks with nasalized vowels do not have nasalized vowels in Ford's list, e.g., Funke *kɛ̃*, Ford *ke* 'be sated, have enough to eat'; Funke *tsɛ́̃*, Ford *tsi*[17] 'peel'; Funke *klɛ̃*, Ford *kle* 'shine'. Note the vowel differences in the first two, where nasalization apparently conditioned a lowering effect, which Funke transcribed as a phonological vowel feature.

In short, distinctive nasalization remains as part of Avatime vowel phonology, but it seems to be playing a less prominent role than in earlier times and is difficult to document for the full vowel inventory.

3.4. Processes affecting juxtaposed vowels. Vowels frequently come together across morpheme boundaries. Avatime does not allow consecutive vowels to form separate syllable peaks. This is avoided using one of three strategies: (i) both vowels remain as syllable peaks with a glottal stop initiating the second syllable, e.g., *Yàwò ʼɔ̄gɛ̄* 'Yawo's animal'; (ii) one of the two vowels is elided, e.g., */mɛ̄ + ɔ̄kà/ → mɔ̄kà* 'my father'; (iii) high or mid vowels followed by unlike vowels change to the corresponding glide to form a C + glide syllable onset, e.g., */kèzī + a/ → [kèzyà]* 'the basket', */kāgɔ̄ + a/ → [kāgwà]* 'the bushfowl'. Avatime does not exploit a fourth possibility, viz. vowel coalescence resulting in a monophthong different from either of the source vowels (*/a + i/ → [e]*, etc.).

The choice of strategy depends in part on the type of phrase boundary separating the vowels, in part on the specific construction, and in part on the vowels themselves. I have not looked systematically at the possible phrase types where vowels could abut, nor have I systematically checked acceptability of the various strategies in particular environments depending on factors such as speech tempo, stylistic level, etc. The following observations therefore point in research directions to be further explored.

Strategy (i) is possible only when a word boundary separates the two vowels, i.e., the strategy of inserting a glottal stop is not possible at the level of a clitic or affix boundary. The number of environments where vowels could come together across word boundaries is large. If, however, strategy (i) comes into play at fairly

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[17] This root actually contains the [-ATR] high front vowel, i.e., *tsi̱*. This is evident in the vowel harmony pattern of clitics, e.g., *mà tsī* 'I peeled' rather than *mè...* as would be the case with a [+ATR] root.

low level syntactic phrasal boundaries, one can assume that vowels coming together across higher level boundaries would likewise be subject to strategy (i) rather than strategies (ii) or (iii), which clearly show tighter phonological phrasing. I found strategy (i) to apply in at least the following environments:

Possessor + possessed: *Yàwò 'ɔ̄gɛ̄* 'Yawo's animal', *blɔ́ 'ɔ̄gɛ̄* 'our animal'
Preposition + complement: *ní 'ɔ̀kplɔ̄nɔ̀-và* 'on the table' ("at table-topside")
Verb + object:[18] *ɛ̄ vù 'ɔ̄gɛ̄* 'he caught the animal'
Subject + verbal agreement clitic: *ɔ̀kplɔ̄nɔ̀ 'è kɛ̄mè* 'the table is big'

These examples and all others that I have checked are from elicited data. I have not investigated examples of rapid or casual speech to see whether it would be possible to apply strategies (ii) or (iii) in these environments. However, I have many examples of all the types above, and in some cases I asked speakers to repeat utterances in a rapid relaxed manner. With the exception of possessive pronoun + possessed object (about which more below), I found only strategy (i) to apply. I therefore believe that it is safe to say that even if some sort of vowel elision or coalescence is an option in environments such as these, it is not nearly as pervasive as it is in a language such as Yoruba.

At clitic boundaries, the choice between strategies (ii) and (iii) depends on the interaction of several factors, including the specific vowels, the position of the vowel (V_1 or V_2), the specific morphemes, and stylistic factors. Some environments show variation. One environment where variation does not appear to exist is the construction Noun + Definite Suffix. Several noun classes have definite suffixes which are only a vowel, and when this vowel is suffixed to a noun, the vowel contact phenomena are invariable. This morphological context shows a skewing which exists in all other contexts involving only clitic boundaries, viz. only the low and mid vowels occur in V_2 position. Table 7 outlines the relevant data. It turns out that in Avatime, there are almost no vocalic affixes which begin in a high vowel and which could follow another vowel. The only exception that I know of is the plural noun class prefix I- (see Table 8b for an example).

[18] The illustration here is of Verb + Object Noun. In many languages, Verb + Object Pronoun constitutes a lower level phrasal boundary than Verb + Noun and hence would be a candidate for strategy (ii) or (iii). However, all object pronouns/clitics in Avatime begin in consonants and thus never involve juxtaposed vowels.

Table 7. Vowel contact processes between noun final vowels and definite suffixes

Noun class	Final V	Suffix	Result	Example			
KA-	a	a	a	kāwā + a	→	*kāwà*	'the axe'
	O		wa	kāgɔ̄ + a	→	*kāgɔà*	'the bushfowl'
	E		a	kēlédē + a	→	*kēlédà*	'the nape'
	U		wa	kētsū + a	→	*kētsuà*	'the forehead'
	I		ya	kèzī + a	→	*kèziā*	'the bowl'
KU-, KÙ-	a	O	a (KU-)	kụ̀sà + O	→	*kụ̀sā*	'the cloth'
			O (KÙ-)	kụ̀wā + O	→	*kụ̀wɔ̀*	'the axe'
	O		O	kū̩nɔ̄ + O	→	*kū̩nɔ̀*	'the flour'
	E		O	kūdè + O	→	*kūdò*	'the road'
	U		wO	kùmū̩ + O	→	*kùmụ̀ɔ̀*	'the oil'
	I		yO	kùdròwī + O	→	*kùdròwiò*	'the dogs'
O-, KI-	a	Ē, E	Ē	ɔ̄lā + Ē	→	*ɔ̄lē*	'the metal'
				kɪ̀dzā + E	→	*kɪ̀dzè*	'the rat'
	O		wE	ɔ̄nụ̀vɔ̀ + Ē	→	*ɔ̄nụ̀vɔ̀ɛ̀*	'the child'
				kɪ̀gɔ̄ + E	→	*kɪ̀gɔè*	'the occiput'
	E		E	ōvè + E	→	*ōvē*	'the mouse'
				kɪ́dē + E	→	*kɪ́dē*	'the mortar'
	U		wE	ɔ̄zū̩ + Ē	→	*ɔ̄zụ̄ē*	'the fly'
				kìkù + E	→	*kìkuɛ̀*	'the yam'
	I		yE	ōbī + Ē	→	*ōbiē*	'the baby'
				kínībī + E	→	*kínībiè*	'the eye'

With that limitation on environments in mind, the following generalizations emerge for V + Definite Suffix:

(1) $V_i + V_i \rightarrow V_i$, where front/back and height features are the same for each V_i. (See below for discussion of [ATR] specifications of contiguous vowels.)

(2) *Fate of V_2*: Retained, except for the singular KU- class, where *-a* + O → *a*.

(3) *Fate of V_1*:

(a) High vowels are always retained in the form of a glide.

(b) *a* is elided by both E and O except for the case noted in (2).

(c) O is retained in the form of a glide.

(d) E is elided by both *a* and O.

A second environment where strategy (ii) is applied in an invariant way is Possessive Pronoun + Kin Term. Below is a full paradigm for the noun *ɔ̄kà* 'father'. The accompanying paradigm of pronouns makes it clear which vowel is elided.

Table 8a. Vowel elision with possessive pronouns

	Possessed Noun		Independent Pronouns	
	Singular	Plural	Singular	Plural
1	*mɔ̄kà*	*blɔ̄kà*	*mɛ̄*	*blɔ̀*
2	*wɔ̄kà*	*mlɔ̄kà*	*wɔ̄*	*mlɔ̀*
3	*yɛ̄kà*	*bākà*	*yɛ̄*	*bà*

These are the only accepted pronunciations for these possessive constructions, i.e., **mɛ̄ 'ɔ̄kà* (application of strategy (i)) and **myɔ̄kà* (application of strategy (iii)) are both unacceptable. This is the only complete possessive paradigm I collected for kin terms. Funke's [1909:303] paradigms show the same pattern of vowel elisions. Funke [1909:303-304] gives further relevant examples. First, he notes that with plural kin terms, the *b-* of the *be-/ba-* prefix is elided, such that the vowel of the pronoun comes in contact with the *vowel* of the prefix. He also gives examples of three non-kin terms from classes with vocalic prefixes.[19] Below are Funke's full paradigms. I have omitted his tone marking and replaced his *e̲* and *o̲* with *ɛ* and *ɔ*, respectively.

Table 8b. Possessive paradigms from Funke [1909]

	bakaba 'fathers'	*one* 'mother'	*beneba* 'mothers'	*agba* 'houses'	*ɔnyɔ* 'time'	*inyɔ* 'times'
1S	*makaba*	*mone*	*mɛneba*	*magba*	*mɔnyɔ*	*mɛnyɔ*
2S	*wɔakaba*	*wone*	*wɔeneba*	*wagba*	*wɔnyɔ*	*wɔnyɔ*
3S	*yeakaba*	*yene*	*yɛneba*	*yagba*	*yɔnyɔ*	*yɛnyɔ*
1P	*blakaba*	*blone*	*blɔeneba*	*blagba*	*blɔnyɔ*	*blɔnyɔ*
2P	*mlakaba*	*mlone*	*mlɔeneba*	*mlagba*	*mlɔnyɔ*	*mlɔnyɔ*
3P	*bakaba*	*bane*	*beneba*	*bagba*	*banyɔ*	*bɛnyɔ*

I cannot verify Funke's forms from my own data, and some of his forms do raise questions. For example, the [+ATR] vowel of 3rd sg. *ye* for 'his fathers', 'his mother' is suspect since the possessive pronouns (actually the independent pro-

[19] In my own field work, I also found vowel elision to be a possibility for non-kin terms, e.g., *mɛ̀ɔ̄gɛ̄* = *mɔ̄gɛ̄* 'my animal', but I collected no full paradigms.

nouns) normally have invariant [-ATR] vowels (cf. *yɛ* in 'his mothers', even where the root is [+ATR]). In the same way, 3rd plural *be/bɛ* ('their mothers'/'their times') seem aberrant since invariable *ba* would be expected in every case. Nonetheless, certain generalizations emerge, some of which jibe with those for definite suffixes, some of which do not:

(1) $V_i + V_i \rightarrow V_i$, where front/back and height features are the same for each V_i.

(2) *Fate of V_2*:

  (a) Non-high vowels are retained, except for (i) any vowel after *a* and (ii) O after 3rd sg. *yɛ* in kin terms.

  (b) The high vowel *i* is elided. As noted above, this situation, where an I- class noun follows a possessive pronoun, is the only case I know of where a high vowel can be V_2 across a clitic boundary.

(3) *Fate of V_1*:

  (a) *a* as V_1 elides any following vowel.

  (b) O is retained in the form of a glide except in non-kin terms before *a*.

  (c) E is elided by following O and *a*, except for 3rd sg. *yɛ* before O in kin terms, where O is elided, and *yɛ* before *a* in kin terms, where E is retained as a glide.

The next environment to be considered is N + postposition where the postposition has the shape -VCV. Avatime expresses most locative relational concepts like 'in', 'on', 'under', etc. with postpositional clitics. Most of these clitics have the structure -CV, e.g., *kpòsiɛ̀-mɛ̀* 'in the bowl', *kpòsiɛ̀-sʉ̀* 'beside the bowl'. One postpositional clitic, *-ēsē* 'under', has the shape VCV and, hence, creates an environment for vowel contact processes. With this postposition, the final vowel of the noun, regardless of its frontness and height, nearly always elides the *-e-* of the postposition—from a list of 21 nouns that I elicited with the postposition, 11 nouns ended in a vowel other than *e/ɛ*, and in only one case was the vowel of the postposition retained (as a glide), viz. *ɔ̀tɔ̀sɨ̀lɔ̄sē* 'under the mat'.[20] Below are examples of each of the possible vowel combinations with this postposition.

[20] I did not check to see whether *ɔ̀tɔ̀sɨ̀lɔ̄sɛ̄*, with elision of *-e-*, was possible, though I am reasonably confident that it would be. As seen in Table 9, the [+ATR] vowel *o* elides *e*. [ATR] specification never seems to be a factor in choice of vowel contact strategies.

Table 9. Vowel elision with the postposition *-èsè* 'under'

e	*ɛ*	*i/ị*	*u/ụ*	*o*	*a*
kìkuē 'the yam' *kìkuēsē* 'under the yam'	(See discussion below.)	*kpòsī* 'a bowl' *kpòsīsē* 'under the bowl'	*òɣū* 'a car' *òɣūsē* 'under a car'	*òɣūlò* 'the car' *òɣūlōsē* 'under the car'	*sị̄wā* 'grass' *sị̄wāsē* 'under grass'

The second column in Table 9 raises the issue of what happens under strategy (ii) when the vowels in contact differ only in [ATR] specification—in this case, where the noun ends in the [-ATR] vowel *ɛ*, which is in contact with the [+ATR] *-e-* of the postposition. The predominance of data suggests that it is the [ATR] specification of the *second* vowel which prevails, even where that vowel is the one elided by vowels differing in features other than [ATR]. In the paradigm I collected for the postposition *-ēsē*, the following examples emerged: *kị́dēsē* 'under the mortar' (*kídè*), *bị́dāwēsē* 'under the mortars' (*bị́dāwè*), *sị̄wāsèsè* 'under the grass' (*sị̄wāsè*), *sị̄yàsēsē* 'under the hair' (*sị̄yàsè*). The paradigm for 'mother' in Table 8b also shows this pattern for [ATR], e.g., *wɔ + one → wone* 'your mother'. The pattern for [ATR] assignment parallels the pattern for tone assignment when two syllables bearing different tones are reduced to a single syllable by strategy (ii) or (iii)—cf. examples here and further discussion in §4. However, a few examples in the available data show the opposite [ATR] assignment. Thus, in the postposition paradigm I collected I found the following: *bị́dēsē* 'under yams' (*bídè*), *bìkùwēsē* 'under slingshots' (*bìkùwè*[21]). Likewise, the phrases *mɛ/yɛ + -eneba → mɛ/yɛneba* 'my/his mothers' from Funke in Table 8b show the [-ATR] vowel to predominate. In short, although the preponderance of available examples show a pattern $V_{[\alpha ATR]} + V_{[-\alpha ATR]} \rightarrow V_{[-\alpha ATR]}$, the issue requires further investigation.

The final class of cases involving strategies (ii) and (iii) are the indefinite *-Vtɔ̄* and the proximal demonstrative *-Vyà*.[22] The "V" in these nominal modifiers varies depending on the class of the noun to which they are appended.

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21 This is the plural of the word *kìkuè* 'rubber', which is a [+ATR] root. The expected plural definite suffix would thus be *-we*, not *-wɛ*. It is possible that I have mistranscribed the vowel both in the citation form and the form with the postposition, but the noun alone is repeated several times on the tape, and in the postposition constructions, differences in the vowels are easy to hear, inasmuch as they are in adjacent syllables.

22 Both Funke [1909:308] and Ford [1971a:24-25] report the indefinite, but both describe it as a separate word with a full prefix which can be reduced to -V-, e.g., "*kídɔ' kitɔ*, kurz *kidɔ́tɔ* ein Ding" (Funke, p. 308). The only forms Chris Bubuama ever volunteered were the -VCV forms reported here, and Ford's description suggests that his forms with full prefixes are abstract underlying forms which surface as in Table 10. Neither Funke nor Ford give a full paradigm for all noun classes. Funke does not list any forms that resemble the demonstratives here—his only demonstrative examples (p. 308) list a form *etsyia*, which takes a full nominal prefix. Ford

continued on next page ...

Table 10. Vowels with indefinite and proximal demonstrative suffixes

Class & suf. vowel	Both vowels retained	[V_1] elided	[V_2] elided
BA-, *a*	*bēveătɔ̄* 'mice'	*bādz[ɛ]átɔ̄* 'women'	(no examples)
BÀ-, *a*	*bàḷiáyà* 'th. palm trees'	*bèd[e]ǎyà* 'th. roads'	*bèdè[a]tɔ̄* 'roads'
KA-, *a*	*kèziáyà* 'th. bowl'	(no examples)	*kèzī[a]tɔ̄* 'a bowl'
A-, *a*	*égliàtɔ̄* 'some walls'	*ègl[i]ǎyà* 'th. walls'	(no examples)
KU-, O	*kūḷiɔ́tɔ̄* 'a palm tree'	*kūd[e]ǒyà* 'th. road'	*kūdě[ɔ]tɔ̄* 'a road'
KÙ-, O	*kùzióyà* 'th. bowls'	*kṵ̀w[a]ǒyà* 'th. axes'	*kùzī[ɔ]tɔ̄* 'bowls'
KI-, E	*kị̀gụéyà* 'th. war'	(no examples)	*kīku[ɔ]tɔ̄*
BI-, E	*bīkuéyà* 'th. yams'	(no examples)	*bị̄gú[ɛ]tɔ̄* 'wars'
LI-, E	*lḭ̄ḷiéyà* 'th. palm nut'	*lḭ̄b[a]ěyà* 'th. hoe'	(no examples)
(L)Ì-[23], E	*lĭpoéyà* 'th. doors'	(no examples)	*lĭpó[ɛ]tɔ̄* 'doors'
SI-, E	*sìmị́éyà* 'th. excrement'	*sḭ̄w[a]étɔ̀* 'grass'	*sḭ̄wá[ɛ]yà* 'th. grass'
O-, E	(no examples)	*ìɣ[a]ěyà*[24] 'th. knife'	*ɔ̄gá[ɛ]tɔ̄* 'an animal'
Ò-, E(?)[25]	*ŏpoéyà* 'th. door'	(no examples)	*ŏpó[e]tɔ̄* 'a door'

Not included in the table are cases where the stem final vowel of the noun is the same as the vowel of the suffix. As in other vowel hiatus environments, the resultant vowel is a vowel with the same front/back and height features as the source vowels, e.g., *ābătɔ̄* 'hoes', *ḳídétɔ̄* 'a mortar', *ɔ̄vĕtɔ̄* 'a mouse'. For [+ATR] roots, as in the case of 'a mouse', I have usually transcribed a [+ATR] result vowel. This would seem to contradict the generalization discussed above under Table 9. It may be that I have mistranscribed some of these vowels, or it may be the case that it is actually the [+ATR] V_1 which elides V_2, the more common direction for elision.

Although the data in Table 10 suggest a chaotic situation, examination of details reveals that certain combinations of vowel position are strong predictors of result vowels. In assembling data on indefinite and demonstrative suffixes, I elicited a total of 78 tokens. A numerical tabulation of the possibilities in the respective columns of the table immediately shows strong tendencies:

[1971a] does not discuss demonstratives, and Ford [1971b] lists only a set of prefixes said to be used on demonstratives, but no full demonstrative forms nor noun phrases with demonstratives.

23 All sources on Avatime give an Ì- plural class pairing with the Ò- singular class. Chris Bubuama accepted the Ì- prefix and sometimes volunteered it, but his normal prefix for this class was LÌ-. The vowel of the indefinite and demonstrative suffixes is E in either case.

24 The word *ìɣā* 'knife' does not have a prefix. All prefixless nouns in Avatime belong to the O-singular and BA- plural classes in terms of their agreement patterns.

25 The example in the first column is the only example from my data where the vowel of the suffix shows up. The vowel E seems questionable as the class vowel for these suffixes. In all other classes, the class vowel of the indefinite and demonstrative suffixes is the same as the vowel in the definite suffixes (see Table 7).

$V_1 = V_2$	20
Both V's remain, $V_1 \rightarrow$ glide	23
Elision of V_2	26
Elision of V_1	9
TOTAL	78

These figures show, first, that there is an overwhelming preference to preserve V_1, whether or not V_2 is elided. The specific vowel combinations where V_1 is elided reveal further skewing:

a + E → E	3	(cf. a + E → a, 6 cases)
E + a → a	4	(cf. E + a → E, Ø cases)
a + O → O	Ø	(cf. a + O → a, 3 cases)
O + a → a	Ø	(the only 2 cases of O + a → Oa)
O + E → E	Ø	(cf. O + E → O, 3 cases)
E + O → O	2	(cf. E + O → E, 1 case)

These figures suggest a strength hierarchy among non-high vowels, such that *a* > O > E. Even in the face of the strong preference for V_2 to elide, all elisions in combinations E + a are resolved in favor of *a*, showing *a* > E (there are two cases where no elision takes place, with E retained as a glide). In E + O, 2 out of 3 cases of are resolved in favor of O, showing O > E (there are no cases where E is retained as a glide). Although there are no cases of O + *a* being resolved in favor of *a*, there are also no cases of *a* being elided in this configuration, and moreover, in *a* + O, *a* always prevails, showing *a* > O. The one "aberrant" figure is the three cases of E prevailing in *a* + E, where the "weaker" vowel prevails in the "weaker" environment. I have no account for this other than to note that throughout this discussion, we are speaking of *tendencies*, and even here the tendency for *a* to dominate E is evident in the fact that *a* prevails over E in twice as many cases of *a* + E as E prevails over *a*. This apparent hierarchy of strength jibes with the observations for nouns + definite suffix (Table 7), where we find that E is elided before both *a* and O, and that in one case, O in V_2 position is elided in favor of *a*, even though elsewhere V_2 is retained with definite suffixes.

The high vowels do not appear as V_2 with indefinite and demonstrative suffixes, so it is not possible to compare symmetric $V_1 + V_2$ cases. In the data sample, there were 2 cases of -I + E → I and no cases of -I + O → I. There were 4 cases of -U + E → U; I had no examples of -U followed by the other non-high vowels. The single case of high V_1 eliding was I + a → a. However, in most combinations of high vowel + non-high vowel, both vowels were retained, with the high vowel becoming a glide. Thus, compared to mid vowels, there is a tendency toward gliding high vowels in preference to elision.

	V_1 = E	V_1 = O	V_1 = I	V_1 = U
V_1 or V_2 elided	7	3	7	4
V_1 glided	2	4	9	7

As with non-high vowels, the behavior of high vowels jibes with the data for noun + definite suffix (Table 7), where high vowels are always retained as glides.

We have examined four environments where contiguous vowels reduce to one syllable nucleus, either through elision of one of the vowels or by changing V_1 to a glide, which then becomes part of a complex syllable onset. The strategy chosen in any individual cases depends on a combination of the specific morphemes, the types of morpheme junctures, the positions of the respective vowels, and the qualities of the vowels. We can summarize with the following observations:

(1) **Specific morphemes:** Specific morphemes may dictate application of strategies which run counter to otherwise more general principles. We have seen two cases: (i) the definite suffix -O of the KU- singular class, which is elided by a preceding *a*, even though all other definite suffix vowels are retained, including the -O of the KÙ- plural class; (ii) the 3rd singular possessive pronoun *yɛ̄*, which retains the front vowel when prefixed to kin terms, even though the same vowel of the 1st singular *mɛ̄* follows the more general process of being elided in this environment.

(2) **Vowels with identical front/back and height features:** Regardless of morphological environment, V_i + V_i → V_i, where front/back and height features are the same for each V_i. Other possibilities, e.g., conversion of V_1 to a glide or a long result vowel,[26] never occur in Avatime. When like vowels are contracted in this way, there is an apparent tendency to retain the [ATR] specification of V_2.

(3) **Elision of V1 or V_2 as a function of type of morphological juncture:** When the elision option is chosen, the four environments examined show clear differences in preference for eliding V_1 or V_2. For the definite suffixes and nouns following possessive pronouns, the preferred option is to elide V_1; for the postposition and the indefinite and demonstrative suffixes, the preferred option is to elide V_2. There are good reasons for this. The *definite suffixes* all consist of a vowel alone. Were that vowel elided, morpheme identity would thus be lost, aside from possible tonal cues. In the *possessive constructions*, V_2 is the stem initial vowel of the noun, i.e., its class prefix. Again, important

[26] Vowels can be lengthened in Avatime for stylistic purposes. In an early field work session when I was eliciting noun + demonstrative constructions, I was given forms such as *lɪ̄gbo̱e̱eyà* 'this chair', with a lengthened intial vowel in the suffix. This vowel clearly has not been lengthened through vowel elision because the final stem vowel of the noun is also present.

information would be obscured by elision of this vowel, whereas the possessive pronouns all remain distinct from one another solely on the basis of their consonants. Elision of their vowels results in no information loss. On the other hand, in both the case of the *postposition* and the *indefinite and demonstrative determiners*, the intial vowels of these affixes (= V_2) are not necessary to retain morpheme identity—in the case of the indefinites and demonstratives, the vowels are even predictable based on the class of the noun to which they are affixed.

(4) **Vowel strength hierarchy among non-high vowels:** When both V_1 and V_2 are non-high vowels, there is a tendency for the affected vowel to be elided rather than to be converted to a glide (with *a*, glide formation is not even an option). Both in constructions with definite suffixes, where V_1 is more frequently elided than V_2, and in constructions with with indefinite and demonstrative determiners, where V_2 is more frequently elided than V_1, there is a dominance hierarchy *a* > O > E.

(5) **Glide formation with high vowels:** When V_1 is a high vowel, the strong preference is for the vowel to become a glide rather than to elide. This is categorially the case with the definite suffixes. The set of environments in Avatime where V_2 can be a high vowel are so limited that it is not possible to state any generalizations about high vowels in this position. There are a number of possible reasons why high vowels as V_1 should be particularly prone to gliding. One is that high vowels are articulatorily closer to glides than are non-high vowels, and glide formation thus involves only desyllabification with little further articulatory adjustment. Another, not unrelated hypothesis is that greater phonetic, and probably phonological distance between high vowels and non-high vowels than between non-high vowels as a set impedes the mechanism of elision, whatever that may actually be.

4. Tone

Avatime tone alone could occupy a monograph length work. Ford [1971a] devotes nearly 80 pages to what is really just a sketch of the system meant as background for his syntactic study. The system is one of many subtle, yet consistent distinctions, which I was often able to differentiate only through repeated listening to tonal pairs and instrumentally-aided comparisons. I must acknowledge my indebtedness to Ford's groundbreaking work. His analysis, using the linear segmental framework current at the time, would be formulated in different terms today, and my observations of the Avatime facts do not jibe with his in all details, but without having had his careful study available as I worked on Avatime, I suspect that I would still be scratching my head, mystified at the apparent tonal vagaries of this language.

4.1. Tone levels. Funke [1909:289] and Heine [1968:105] both state that Avatime has three tone levels, plus rising and falling contours. Likewise, Kropp [1967:3] says, "It seems probable that [Avatime, Lefana, and Akpafu] all have at least three phonemic tones," but as Kropp remarks, "No analysis has been made of the tone systems of these languages, by myself or anyone else to my knowledge." The only real analysis of the Avatime tone system is in Ford [1971a:Part I], with aspects of that analysis repeated in Kropp Dakubu and Ford [1988:128ff.].

Ford [1971a:20] says, "In any utterance, no more than four distinct levels of tone are used ... ." He labels the tones with the numbers 1-4, with tone 1 being the lowest. He also recognizes a rising tone, which seems always to be a combination of tones 1 + 4 conflated onto a single syllable (see §4.4). He does not mention a falling tone, and in my data, falling tone is unusual outside a few borrowed items with falling tone, such as *àyêmè* 'heaven', and cases where a falling glide seems to be a transition from a higher to a lower tone across a voiced domain, e.g., *kīkuêyà* [- ^ _] 'this yam'. My data confirm that Ford is correct in requiring up to four, but no more than four, distinct levels for a description of Avatime tone. I will therefore use his numbering 1-4 to refer to tones, and in marking tones on words, I will use the following diacritics:

Tone 1 *à*
Tone 2 *a̋*[27]
Tone 3 *ā*
Tone 4 *á*

Though the description of Avatime tone requires reference to four tone levels and at least a rising contour, tone 2 occupies a rather marginal position as an underived tone, and some instances of tone 4 are likewise derived. The description here will concentrate only on aspects of tones in the nominal system. The same general principles apply in the verbal system, but that system is tonally quite complex and would lead beyond the scope of this overview.

All native Avatime nouns (and many borrowed nominal roots as well) have a tone bearing prefix. Regarding tones of the prefixes and of underived nominal roots, Ford [1971a:21-22] points out two distributional gaps as follows: "Each prefix has certain tone possibilities ... where it will be noticed that no noun-class prefixes are found with tone 2. ... Among [nominal] roots, we find only the three tones: 1, 2, and 3." He lays out the prefix tone possiblities in a table (p. 22), from which I have adapted the data as Table 11. In the Table, note especially several minimal sets distinguished only by tone. I replace Ford's class numbering system

[27] The diacritic *a̋* looks unappealing. I am using it in part for typographical convenience, but it also has a certain iconic value, since, as we will see (§4.3), many cases of Ford's Tone 2 are actually tones 1 + 3 conflated onto one syllable, as the "˝" diacritic implies.

with a set of labels referring to classes by small capitals. The vowels in these class labels are cover symbols for the respective [+ATR] or [-ATR] vowels, the choice of which is determined by the [ATR] specification of the root. The singular and plural of a root always respect the singular and plural class pairings in the rows of the table. The exemplifying nouns in Table 11 all carry the class-sensitive definite suffix.

Table 11. Tones of noun class prefixes

Sing.	Tone	Plural	Tone	Sing. noun	Pl. noun	Meaning (sing. only)
O	4	BA	4	*ɔ́dzɛ̄*	*bádzɛ̄wà*	'woman'
	3		3	*ōzɛ̄*	*bɛ̄zɛ̄wà*	'thief'
LI	4	A	4	*l̩ívānè*	*ávānà*	'bean'
	3		3	*l̄ībīlè*	*ēbīlà*	'seed'
	1		1	*l̂ībīlè*	*èbīlà*	'tick'
KI	4	BI	4	*k̩ídè*	*bi̩dēwè*	'mortar'
	3		3	*kībuè*	*bībūwè*	'thorn'
	1		1	*kìbuɛ̀*	*bìbūwè*	'honey'
KU	4	BÀ	1	*kú̩nyɔ̀*	*bànyɔ̄wà*	'smoke'
	3		1	*kūtsɛ̄*	*bètsɛ̄wà*	'death'
	1		1	*kùbɔ̀*	*bèbōwà*	'tear'
KA	3	KÙ	1	*kāwà*	*kù̩wɔ̀*	'axe'
	1		1	*kèziɛ̀*	*kùziɔ̀*	'bowl'
Ò	1	(L)Ì[28]	1	*ɔ̀mwɛ̄nɔ̀*	*l̩ìmwɛ̄nè*	'orange'
		SI	3		*sī̩yàsɛ̀*	'hair'
			1		*sì̩yàsɛ̀*	'Avatime language'

With the exception of the Ò singular class prefix and the BÀ, KÙ, and (L)Ì plural class prefixes, all of which always bear low tone, the tone of the prefix is a non-predictable feature associated with the specific noun root. Because the tones on these prefixes must be lexically specified, they are sufficient to demonstrate that Avatime has at least three distinctive tone levels, a fact recognized by Funke [1909] and Heine [1968] prior to Ford's work. My data confirm that Ford is by and large correct in claiming that underived native Avatime roots do not bear tone 4. He says, "Loan words account for any occurrence of tone 4 [in underived roots]" (p. 23). However, it is undoubtedly the presence of three tone levels even in native Avatime words which has facilitated the borrowing of words with three contrastive tones, and there are many loan words with tone 4 syllables which are well-integrated into Avatime vocabulary, e.g., *mángoɛ̄* 'mango', *dzàté;* 'lion', *kùkwié*

[28] See fn. 23 for an explanation of the parenthesized (L).

'pepper', *kɔ̀rántiɛ̄* 'banana', *kɔ́ŋuɛ̄* 'kenke' (a type of staple food), *àsígɛ̄* 'ring', *tsàkplākpé* 'cockroach', etc. as well as proper names, e.g., *Ámà, Kɔ́kù, Kwămì* (1-4 rising tone on first syllable), etc. In addition, there are many native Avatime words with stems bearing a tone 4 where that tone may have originally been derived from tone 3 (see §4.4) but where the word is undoubtedly frozen with its current tone pattern rather than being derived "anew" each time it is used, e.g., *kīnémiè* 'tongue', *kēpléwià* 'ladle' (*mi* in 'tongue' and *wi* in 'ladle' are originally diminutive formatives < *-bi-* 'child'), *kākósà* 'chin' (*sa* is probably a root meaning 'under'), *ɔ̄gbágbɛ̄* 'wasp' (reduplicated roots often show tone 4 on the first reduplicant), etc. Finally, there is a presumably native preposition *ní* 'at, on, in', which invariably bears tone 4 (*ní kēdà* '[at] behind', *ní kùsiō* 'in the middle'). Such data further reinforce the assertion that Ford's tones 1, 3, and 4 must be recognized as being in phonological contrast with each other.

The status of Ford's tone 2 is less clear cut. To demonstrate that tones 3, 2, 1 and only those tones appear on underived roots, Ford [1971a:22-23] gives examples such as the following, rearranged and amended here to demonstrate the possible prefix + root combinations. The nouns are in their unsuffixed forms; items in brackets represent patterns where the first tone could not fall on a prefix; dashes show non-existent patterns:

Table 12. Nouns illustrating possible two-tone patterns

Descending patterns			Level patterns			Ascending patterns		
4-3	*ɔ́-dzɛ̄*	'woman'	4-4	-----		1-4	[*dzàtá*]	'lion'
4-2	[*Ámà*]	a name	3-3	*ɪ̀ɪ̄-ɪ̀ɪ̄*	'palm nut'	1-3	*kù-mū*	'oil'
4-1	*ɔ́-nɔ̀*	'person'	2-2	-----		1-2	*ɔ̀-lɛ̀*	'gecko'
3-2	*ɪ̀ɪ̄-vlɛ̀*	'morning'	1-1	*ɪ̀ɪ̀-bì*	'wound'	2-4	-----	
3-1	*kī-kù*	'yam'				2-3	-----	
2-1	-----					3-4	[*tsàkplākpá*]	'cockroach'

My data on these specific words agree with Ford's, e.g., the 4-2 pitch pattern of *Ámà* (name of a woman born on Saturday) does differ from 4-3 and 4-1, etc. Distinguishing tones 2 and 3 proves to be the greatest perceptual difficulty in Avatime tone. In fact, I do not believe that they are always distinguished in normal speech. Because this aspect of Avatime tonology proved particularly elusive, I recorded and repeatedly listened to many tokens of the putative tone 2 vs. tone 3 contrast, in some cases juxtaposing hard-to-hear contrasts by digital cutting and splicing. I found that the putative sequences 3-3 vs. 3-2 did not always contrast, sometimes both bearing a level pitch pattern, and the putative sequences 1-3 vs. 1-2 sometimes appeared to ascend over the same interval. However, the pairs of sequences differed in that it was virtually always tone 2 which merged with tone 3, not vice versa, i.e., a putative 3-3 sequence would always be pronounced with a

level pitch pattern, never [– –], and a 1-3 ascending pattern would always be heard as a greater ascent than 1-2.

With this caveat, it is clear that words like *Ámǎ, lī-vlɛ̌* 'morning' and *ɔ̀-lɛ̌* 'gecko', with tone patterns 4-2, 3-2, and 1-2, respectively, require recognition of a tone distinct from either tone 3 or tone 1. Though I have found no minimal sets contrasting words differentiated only by a syllable bearing tone 2 vs. a syllable bearing tone 3 or tone 1, there are no obvious phonological or other features of the illustrative words presented to this point which would allow us to derive tone 2 from some other underlying tone (though see §4.3 for discussion of *lī-vlɛ̌* 'morning'). In addition to substantive lexical items like those in Table 12, Avatime has other underived words and morphemes with tone 2 distinct from tones 1 or 3. The singular object pronouns bear tone 3, while the plural object pronouns bear tone 2, e.g., *ē vù mē* 'he caught me' vs. *ē vù bǎ* 'he caught them'. The first syllable of the interrogative adjective *wɔ̀li* 'which?' bears tone 2,[29] e.g., *bádzē wɔ̀lí wɔ̀ mɔ̄* '**which** women did you see?', *bēvè wɔ̀lí wɔ̀ mɔ̀?* '**which** mice did you see?'

Ford noted that tone 4 does not occur on native, underived nominal *roots*, and tone 2 does not occur on *prefixes*. Table 12 reveals that this restriction on occurrence of tone 2 is part of a broader generalization, viz. tone 2 never occurs word initial (or perhaps utterance initial if *wɔ̀li* 'which?' is taken to be a "word"). With these distributional facts in mind, an internal reconstruction of the Avatime tone system suggests that Avatime originally had only two tones (corresponding to Ford's tones 1 and 3) and that tones 2 and 4 were originally derived from tones 1 and 3 respectively by register raising processes.[30] Such processes are still active (§§4.3-4), but because of the introduction of large numbers of loanwords bearing underived tone 4 in particular, as well as some instances of underived tone 2, along with the obscuring of environments for derivation of at least some instances of tones 2 and 4 in native Avatime items, there seems to be no alternative in modern Avatime to recognizing four distinctive tone levels.

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[29] The tone of the second syllable of *wɔ̀li* varies according to the following tonal context. According to Ford's [1971a:29-30] description, *wɔ̀li* has a class agreement prefix. For Chris Bubuama, this word is invariant for all classes. Ford's and my data do agree on the tone of the first syllable.

[30] Ford [1971a:25-27], using the segmental model for tone current at the time, distinguishes the four tones with features [high] and [raised] as follows: tone 1 [-high, -raised], tone 2 [-high, +raised], tone 3 [+high, -raised], tone 4 [+high, +raised]. He expresses his tone rules in terms of these features, but he views them as an analytic convenience rather than something "real" about Avatime tones, saying, "The features proposed have little or no intrinsic content. They are looked upon as terms which express relationships between phonological units (here, tones). The matirx [of tone features] does not represent the level of systematic phonetics—the feature complexes must be translated into scalar values or some other form of surface representation" (p. 27). If, however, my suggestion that tones 2 and 4, in origin are derived from tones 1 and 3 respectively by *register* raising processes, his analysis of features may have more reality than he gave himself credit for!

4.2. Tone and glottal stop. One feature of the tone system which no previous researchers have noted is a final glottal stop associated with phrase final tones 3 and 4.[31] Note the following distinctions. The words are transcribed as above but with final glottal stop overtly represented as '.

Table 13. Examples of final glottal stop conditioned by tone

Final glottal stop (tones 3 and 4)		No final glottal stop (tones 1 and 2)	
ē vù mē'	'he caught me'	*ē vù bà̀*	'he caught them'
óbuē' /óbū + ē/	'the bee'	*kìbuè̀* /kìbū + è/	'the thorn'
ɲ̀lē'	'necks'	*ɲ̀bìlè̀* /ɲ̀bì + lè/	'the wound'
òlē'	'thirst'	*òlēlò* /òlē + lò/	'the thirst'
kụ̀wē'	'axes'	*kụ̀wɔ̀* /kụ̀wē + ɔ̀/	'the axes'
kụ̄wā'	'medicine'	*kụ̄wà* /kụ̄wā + ò/	'the medicine'
dzàtá'	'lion'	*mángò*	'mango'
tsàkplākpá'	'cockroach'	*sàplálà*	'onion'

4.3. Derived tone 2. Most tokens of tone 2 are derived from one of two sources: (i) tones 1 + 3 conflated onto one syllable; (ii) raised tone 1. Far and away the most frequent source of situation (i) in the nominal system comprises nouns of the O class with a final tone 1 in the stem + the tone 3 definite suffix for that class, Ē. Nouns in this configuration contrast tonally with O class nouns with stem final tone 3 or 4 plus definite suffix. In the latter cases, the resultant tone is tone 3 or 4 respectively. Of interest is the fact that if the tone 2 syllable resulting from tones 1 + 3 is phrase final, it ends in a glottal stop, i.e., this prosodic feature associated with tone 3 (§4.2) is preserved even though the result tone is no longer tone 3. The plural for each noun shows the underlying tone of the root syllable because the plural definite suffix, *-wa*, does not coalesce with the preceding syllable.

Table 14. Examples of tones 1 + 3 → 2ʔ vs. 3/4 + 3 → 3/4

Conflation of tones 1 + 3			Conflation of tone 3 or 4 + 3		
ōkpoè'	*bēkpòwà*	type of parasite	*ōkpoē'*	*bēkpōwà*	'corpse'
ɔ̄nụ̀vɔè'	*bānụ̀vɔ̀wà*	'child'	*ɔ̄gàsịē'*	*bāgàsɪ̄wà*	'lizard'
àgbèlìè'	*àgbèlɪ̀wà*	'cassava'	*dzàté'*	*dzàtáwà*	'lion'
mángoè'	*mángòwà*	'mango'	*ódzē'*	*bádzēwà*	'woman'

[31] As noted in §2.1.6, Heine [1968] did hear and transcribe final glottal stops in Avatime, but he did not recognize them as being tonally conditioned, rather construing the glottal stop as a distinctive consonantal segment.

One of Ford's examples of apparently underived tone 2 in Table 12 is the word *ĩivlɛ̃̀* 'morning' (definite form, *ɪ̃̀vlɛ̃̀lɛ̀* 'the morning'). This word without the definite suffix and in phrase final position ends in glottal stop, which the discussion above suggests is a diagnostic for the presence of stem final tone 3. I had originally transcribed this word, along with a number of others in the LI class, as having tones 3-3 on the prefix + root, e.g., *ĩtōlɛ̀* 'mountain', *ɪ̃̀gbālɛ̀* 'house'. Thinking that I might have mistranscribed some of these, I rechecked the tones of all of them. The only word other than 'morning' which had a 3-2 tone pattern on the prefix + root was *ɪ̃̀klɛ̃̀nɛ̀* 'stone'. 'Morning' and 'stone' differ from all the others I checked in that these two words are the only ones where the noun root begins in a consonant cluster. I therefore propose that the roots of these words were originally **-vèlɛ̄-* and **-kàlā-*, respectively, and when the vowels were syncopated, the 1-3 original pattern conflated to tone 2. One might propose that this syncopation and tone conflation is the way these words obtain tone 2 even in modern Avatime, obviating the need to assign lexical tone 2 to them. However, there is little evidence for claiming that the syncopated vowel is underlyingly present.[32] This observation, plus the fact that there are cases of tone 2 with no obvious derivational source, suggests that tone 2 is part of Avatime tonology and should be assigned as the lexical tone of items such as those in question.

I have claimed that a second source for tone 2 is raised tone 1. All tokens of this source are definite suffixes of nouns other than the O class. Ford [1971a:24], who is the only previous writer to describe the tones of the definite suffixes, does not derive the tones from a single underlying source, but rather gives the distributional statement, "... if the tone preceding is either 2, 3, or 4, the definite suffix will bear tone 1; if the preceding tone is tone 1, then the suffix will bear tone 2." I have chosen to provide the definite suffix with underlying tone 1 which dissimilates to tone 2 following tone 1. The main motivation for this is the fact that the existence of non-derived tone 2 seems to be an innovation in Avatime, yet we can assume that the tonal properties of the definite suffix are not. We would therefore not want underlying tone 2 suffixes to be part of the morphological inventory of Avatime:

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[32] Kropp [1967] actually transcribes the syncopated vowels, noting (p. 3), "In all [the languages included in the study], vowels in position C___*l*/*r* are usually very short." In my opinion, they are non-existent. I never heard anything more than a vowel-like transition between C_1 and C_2 in such words, and often not even that. Literate speakers, likewise, do not write vowels here.

Table 15. Definite suffixes with tone 2 or tone 1

Class	Tone 2 following tone 1		Tone 1 following tone 3	
BA	*bēvèwâ*	'mice'	*bēzēwà*	'thieves'
LI	*ɲ̀bìlɛ̂*	'wound'	*ɲ̀bīlɛ̀*	'tick'
A	*èbìlâ*	'wounds'	*èbīlà*	'ticks'
Ò	*ɔ̀ɣàlɔ̂*	'pig'	*ɔ̀ɣālɔ̀*	'group'
(L)Ì	*ɲ̀ɣàlɛ̂*	'pigs'	*ɲ̀ɣālɛ̀*	'goups'
SI	*sīpìsɛ̂*	'body hair'	*sīnīsɛ̀*	'mushroom'
KI	*kìkuɛ̂*	'rubber'	*kɪ̀gɔɛ̀*	'occiput'
BI	*bìkùwɛ̂*	'slingshots'	*bɪ̀gɔ̄wɛ̀*	'occiputs'
KU	*kʊ̀sâ*	'cloth'	*kʊ̄kà*	'fence'
BÀ	*bàsàwâ*	'cloths'	*bàkāwà*	'fences'
KA	*kèziâ*	'spoon'	*kēfūkpà*	'pot'
KÙ	*kùziɔ̂*	'spoons'	*kùfūkpò*	'pots'

For classes where the suffix forms a CV syllable, the tonal behavior is straightforward. For the classes whose prefixes have the form KV, the suffixes are just a vowel, which coalesces with the preceding vowel to form one syllable. Patterns of vowel coalescence for this case are illustrated in Table 16 (some examples repeated from Table 15). In all but one case, tones on the syllables resulting from vowel coalescence can be accounted for by a simple rule, viz. *the result syllable bears the tone of the final vowel.* The one case that cannot be accounted for by this statment is the last one, where tones 3-1 coalesce to tone 2 following tone 1. I propose that when the 3-1 underlying contour follows a tone *other than* tone 1, the tone 3 is absorbed into the preceding non-tone 1, leaving only the 1 on the final syllable, as in 'mortar', 'flour', 'hawk'. Following tone 1, the contour 3-1 in cases like 'war', 'oil', 'bowl' simplifies to tone 2. Note that this account allows us to say that either 1-3 or 3-1 on a single syllable simplify to tone 2. If the underlying final tone is 3, the final glottal stop appears phrase final; if the underlying final tone is 1, there is no glottal stop.

Table 16. Tones of definite suffixes coalesced with stem final vowels

P F-R*	Class	Example	Underlying		Evidence for underlying	
4/3 1-2 → 4/3 2	KI	*kīkuề*	/kīkù + è/	'yam'	*bīkùwề*	'yams'
	KU	*kūdō*[33]	/kūdè + ò/	'road'	*bèdèwà*	'roads'
	KA	*kāsà-mè*[34]	/kāsà + à/	'waist'	*kāsà-mè*	'a waist'
4/3 3-1 → 4/3 1	KI	*ḳ́ídè*	/ḳ́idē + è/	'mortar'	*bḭ́dēwè*	'mortars'
	KU	*kūnɔ̀*	/kūnɔ̄ + ɔ̀/	'flour'	*bànɔ̄wà*	'flours'
	KA	*kādzḭà*	/kādzī + à/	'hawk'	*kādzī'*	'a hawk'
1 1-2 → 1 2	KI	*kìkuề*	/kìkù + è/	'rubber'	*bìkùwề*	'slingshots'
	KU	*kùnyà*	/kùnyà + à/	'bow'	*bànyàwà*	'bows'
	KA	*kādròwià*	/kādròwì + à/	'dog'	*kādròwì*	'a dog'
1 3-1→ 1 2	KI	*kḭ̀gụ̀*	/kḭ̀gū + è/	'war'	*bḭ̀gūwè*	'wars'
	KU	*kùmụ̀ɔ̀*	/kùmū + ɔ̀/	'oil'	*bàmūwà*	'oils'
	KA	*kèzià*	/kèzī + à/	'bowl'	*kèzī'*	'a bowl'

*P = prefix tone; F = final root tone; R = result tone of coalescence

To summarize, we can identify active processes for deriving many tokens of tone 2, including some probable lexicalized cases of originally derived tone 2. However, there are enough cases where no transparent derivational source is available that it seems necessary to recognize tone 2 as a separate phonological entity.

4.4. Derived tone 4 and rising tone. Ford [1971a] documents a number of cases of tone 4 and rising tone, which he always analyzes as 1-4. His rule system is complex and in most cases involves examples from the verbal system, which I am not discussing here. Very roughly, tone 3 → tone 4 / ___3 when certain conditions are met. Here I list a few examples of compound or derived nouns where tone 4 is apparently derived from tone 3. I stress that these examples are not drawn directly from Ford's account, and he may not have chosen to derive them this way, but they fit into the general picture.

[33] I have transcribed this and the only other two examples that I collected from the KU class with tones 3-3 rather than 3-2. This could have been a transcription error or it could be the case that the speaker neutralized tones 2 and 3 when he pronounced these words, a neutralization which sometimes takes place, as noted above.

[34] *Mɛ̄* is a postposition meaning "in". It is included in the citation form of most nouns indicating locations, e.g., *ɔ̀nyrɔ̄-mè* 'farm', as well as in words indicating an area on the body (as opposed to words indicating specific body parts).

Table 17. Examples of words with derived high tones

Example		Source	
ɲ̀klámāsēnè	'knee'	/ɔ̀-klɪ̄ + -mā + ēsē/	/leg + ? + under/
ɲ̀nyɔ́ɣūlè	'nostril'	/ɲ̀-nyɔ̄ + ɪ̄-ɣū/	/nose + hole/
ɔ̀zyánētē	'poor person'	/ɔ̀-zyā + ō-nētē/	/poverty + possessor/
ɔ̀tsátsānɔ̀	'fruit bat'	/-tsā/	(reduplication)

As noted, Ford [1971a] derives rising tone from tones 1 + 4 on one syllable. As far as I can determine, all instances of derived rising tone do have this source, though in my data, the phonetic rise usually starts at the level of the preceding tone if there is one. Thus, *ōvètɔ̄* /ōvè + étɔ̄/ 'a certain mouse' has the phonetic pitch pattern [ˉ ˇ ˉ] (see §3.4 above, esp. Table 10, for analysis of the morphology). I have found one case where a 1 + 4 rise derives from tones 1 + 3 conflated to one syllable with the 3 raised to 4 as exemplifed in Table 17, viz. *ŏpōlò* 'door', plural *ɲ̀pōlè*. The singular and plural of this word were always pronounced in this way, with a rise to tone 4 on the first (prefix) syllable. Funke [1910:32] gives *opúpolo* [tones *sic*], showing that the source of the rising tone for my informant is haplology of the first root syllable but preservation of that syllable's tone.

In §3.4, Table 10, I illustrated a second type of case where Ford derives tones 4 and 1-4 rise, viz. noun + indefinite determiner *-tɔ̄*. According to Ford's [1971a: 24-25] analysis, the indefinite has the underlying form /prefix + *-tɔ̄*/, where the prefix bears tone 4 if the host noun has a prefix with tones 3 or 4 and tone 1 if the host noun has a prefix with tone 1. The prefix of the indefinite determiner ultimately coalesces with the final vowel of the stem, with the following tonal results:

/kū̱-ɲ̀ + ɔ́-tɔ̄/	→	*kū̱ɲ̀ɔ́tɔ̄*	'a certain palm tree'
/bē-vè + á-tɔ̄/	→	*bēveătɔ̄*	'certain mice'
/è-glɪ̀ + à-tɔ̄/	→	*èglìàtɔ̄*	'certain walls'
/bà-ɲ̀ + à-tɔ̄/	→	*bàɲ̀ìàtɔ̄*[35]	'certain palm trees'

Here, according to Ford's analysis, tone 4 is not derived, but is the *underlying* tone of the prefix on the indefinite marker if the host noun has a tone 3 or 4 prefix. If this tone coalesces with tone 3 or 4 from the last syllable of the noun stem, the

[35] I give tone 2 as the result tone on the second syllable. This is the tone Ford claims to result from the coalescence of stem final tone 3 + prefixal tone 1, and this is also the result that I would have predicted from the discussion at the end of §4.3. In my own data, however, I found the pitch of this syllable always to be at least at the level of *-tɔ̄*, and sometimes slightly higher, though not as high as tone 4 would be. There is some evidence from other environments that a sequence 2 + 3 levels to 2 + 2 or 3 + 3.

result tone is 4; if it coalesces with a stem final tone 1, the result is a 1-4 rise. As an alternative analysis, I suggest that the tone on the prefix of the indefinite marker always *copies* the tone of the host noun prefix. If that is tone 3, then it is raised to tone 4 before *-tɔ̄* by the process exemplified in Table 17. The ultimate surface tones will not differ from those predicted by Ford, but this account will give a more intuitive account of the tones of the prefix of the indefinite marker by using a tone raising process known to be needed in any case.

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[Received March 12, 1995;
accepted March 20, 1995]

Studies in African Linguistics
Volume 24, Number 1, 1995

VOICE ASYMMETRY IN EWE NOUNS

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I argue in this paper that the consonantal influence on tone is highly limited, restricting itself to the tone of the vowel immediately following the onset. This point is demonstrated via Ewe High Tone Insertion, which is blocked by a voiced obstruent if the insertion targets the initial vowel following the onset, but not if the insertion targets the second vowel of a bimoraic syllable. This result confirms a number of earlier studies which show that the phonetic impact of onsets on F_0 is limited to the first 100ms of the following vowel.

0. Introduction*

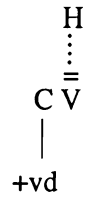
Previous investigations of consonantal interference with tone focus on the effects of the voicing of obstruents on left-to-right tonal spreading [Hyman and Schuh 1974]. These studies reveal that voiceless obstruents in syllable onset typically block low tone spread while voiced obstruents block high tone spread.

Though these studies are right to attribute tonal blocking to the voicing of consonants, they are not precise in identifying the duration of the voice impact on tonal operations. I demonstrate in this study that voice affects tone in a highly restricted manner, limiting itself to a tone on an immediately following vowel.

This point is illustrated through leftwards tonal insertion in Ewe.[1] I show that a voiced onset blocks High Tone Insertion if H is associated with an immediately following vowel (1a). But it does not block insertion when H is mapped onto the second vowel following the onset (1b).

* I wish to thank Jean Ann, Diana Archangeli, and Mike Hammond for discussing the contents of this paper. All errors that remain are mine.

[1] Ewe is a language of the Kwa group of the Niger-Congo family spoken by 1,700,000 people.

(1) a. 

b. 

This asymmetric behavior of voice has not received any attention in phonological studies of tone-voice interactions.

In section 1, I illustrate voice asymmetry with data from Ewe nouns. I argue in section 2 that this asymmetry can receive a principled account through invoking conditions on tonal operations. In section 3, I consider the problem that the voice asymmetry presents for a purported "general" account of tone-voice proposed by Lieber [1987].

1. Voice asymmetry

Ewe syllables are typically CV or CVV. In both the monomoraic CV or bimoraic CVV syllables, the onset consonant may be either an obstruent or a sonorant: *dà* 'snake', *te* 'yam', *tú* 'gun', *ñi* 'cow' and *ló* 'crocodile'. The bimoraic CVV syllable may have identical vowels or different vowels with the latter being the marked case: *toó* 'mortar' and *gàé* 'money'. In addition, a small number of Ewe syllables may consist of an additional liquid consonant in the onset, giving rise to ClV, ClVV, CrV, and CrVV syllables in Ewe: *glà* 'jaw', *kplɔ́ⁿ* (*kp* being a single velar-labial consonant) 'table', *tré* 'calabash', and *dréⁿ* 'dream' (the superscripted ⁿ indicates that the vowel(s) preceding it is nasalised)

Most Ewe nouns are monosyllabic. Larger nouns are compounds. Tonal patterns of noun compounds are derived from the tones of compound members [Stahlke 1971]. Thus, analyzing tones of monosyllabic nouns is crucial to an understanding of tonal patterns of noun compounds.

Ewe has three surface tones: H, M, L. Combining three tones with voiced, voiceless, and sonorant onsets predicts nine patterns of monomoraic nouns. Five are attested in (2). Significantly, voiceless and sonorant onsets do not cooccur with a following low tone, while voiced obstruents do not appear with either a high or mid tone.

(2)

	L		H		M	
[+vd] onset	*vù*	'fight'	—		—	
[-vd] onset	—		*fú*	'bone'	*fu*	'sea'
[+sn] onset	—		*mɔ́*	'road'	*mo*	'face'

Syllables of the CxV type also conform to the above patterns. If the first consonant is a voiced obstruent, only the low tone can occur: *glà* 'jaw'. If it is voiceless, a high or mid tone may occur: *tré* 'calabash' and *gli* 'wall'.

Tonal patterns of bimoraic nouns are even more restricted. One restriction of bimoraic nouns is that they all end with a H tone on the second vowel. Tonal variations on the first vowel are limited as well. Pairing LH, HH, MH with three types of onsets predicts nine logical possibilities. Three are attested: voiced onsets appear solely with LH, whereas voiceless and sonorant onsets take only MH.

(3)

	LH		HH	MH	
[+vd] onset	*víí*	'child'	—	—	
[-vd] onset	—		—	*fíí*	'digging stick'
[+sn] onset	—		—	*maá*	'greens'

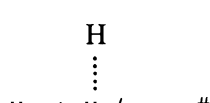
These data show severe cooccurrence restrictions between the onset and the tone on the immediately following vowel, but not between the onset and the tone on the second vowel. Thus, high tones surface on the second vowel of a bimoraic syllable, whether the onset is voiced or voiceless or sonorant in (3). This is also true of CxVV syllables, as illustrated by *drɔ̀é*^{n} 'dream' and *kplɔ́*^{n} 'table'.

2. Conditions on tonal operations

Tonal distributions of Ewe monosyllabic nouns are completely predictable. I propose that monomoraic and bimoraic nouns are not specified for any tone in underlying representation. High and low tones are derived by phonological rules; mid tones surface as default. Analyzing mid tones as default are consistent with the general observation that mid tones are not active in a three tone system [Pulleyblank 1986].

To account for high tones of monosyllabic nouns, I propose a rule of High Tone Insertion, mapping H onto a mora (μ) on the right edge, as in (4).

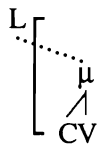
(4) High Tone Insertion[2]



[2] Following Steriade [1990] and Ishihara [1991], I assume that tone is mapped to moras. As tone is a property of syllable nucleus, this assumption is not unusual. Besides representing weight, moras define syllable nucleus in moraic theory. Mapping tones to moras captures the natural intuition that tone is phonetically realized on syllable nuclear elements (For evidence supporting mapping tones to moras, see Peng [1992].

To account for low tones, I assume that there is a floating low tone prefixed to monosyllabic nouns, following Ansre [1961] and Stahlke [1971]. This L tone undergoes Low Tone Link, which maps L onto the following mora. In (5), I use the left bracket to mark the prefix boundary.

(5) Low Tone Link[3]



These rules are too general. To constrain their applications, I propose that High Tone Insertion is governed by [If H, then not +vd], a condition that expresses the known phonetic incompatibility between voicedness and high pitch. Low Tone Link is subject to [If L, then +vd], a condition based on the well-established phonetic correlation between voicedness and low pitch [Lehiste and Peterson 1961, Lea 1973, Hombert 1977, and Hombert, Ohala, and Ewan 1979].

Following Archangeli and Pulleyblank [1994], I call these conditions *path conditions*, so called because *path conditions hold of a representation only if relevant features are on a path. Path* is defined as:

(6) There is a path between α and ß iff
   a. α and ß belong to a linked set Σ of nodes /features, and
   b. in the set Σ , there is no more than one instance of each node/feature.

Invoking [If H, then not +vd] on High Tone Insertion explains in a principled manner why a voiced onset blocks a H tone if H links to an immediately following vowel, but not if H links to the second vowel following the onset.

Consider High Tone Insertion for a moment. Inserting H on the mora in (7a) yields a path between H and [+vd]; note that H is linked to [+vd] (6a) and H is linked to [+vd] with no more than one instance of each node/feature (6b). Once [If H, then not +vd] is invoked on High Tone Insertion, H will be blocked from linking in (7a) because H cannot be on a path with [+vd], as required by the path condition.

However, H is not blocked by [If H, then not +vd] from linking to the second mora in (7b). Inserting H in (7b) never results in a path between H and [+vd] because they are linked through two instances of mora. Consequently, [If H, then not +vd], even though invoked, does not block High Tone Insertion in (7b).

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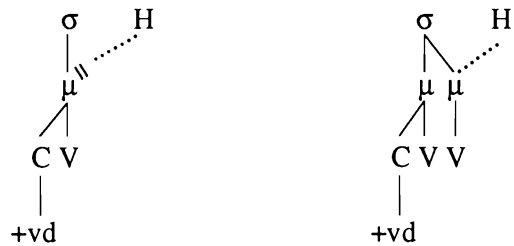
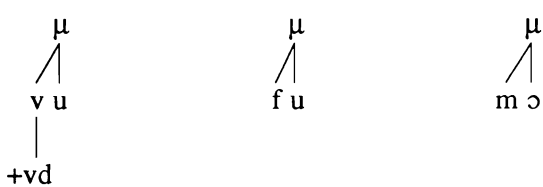
[3] Following Kubozono [1989] and Katada [1990], I assume that onsets are mapped onto moras.

(7) a. monomoraic pattern b. bimoraic pattern



In (8) below, I show the derivations for monomoraic nouns with surface low or high tones: *vù* 'fight', *fú* 'bone', and *mɔ́* 'road'. In (8a), monomoraic nouns have no underlying tone. [+vd] is specified underlyingly on obstruents, which is consistent with treating [+vd] as the active value. In (8b), High Tone Insertion takes place. This rule is blocked by [If H, then not +vd] from applying to *vu~* 'fight'. Prefixing the floating L and Low Tone Link are shown in (8c). Recall that [If L, then +vd] is invoked on Low Tone Link, which requires that L be on a path with [+vd]. This condition prevents Low Tone Link from applying to *fú* 'bone' and *mɔ́* 'road'. /f/, being voiceless, and /m/, being redundantly voiced, have no [+vd] specification at the application of Low Tone Link.

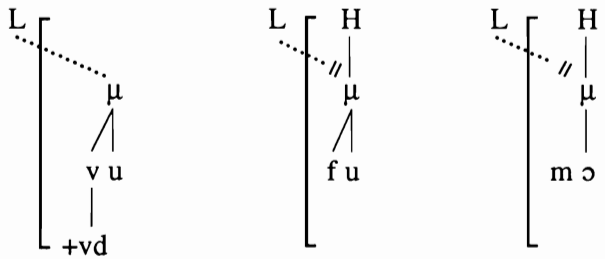
(8) a. underlying representation



b. high tone insertion

blocked by
if H, then
not +vd

c. prefixation and low tone link

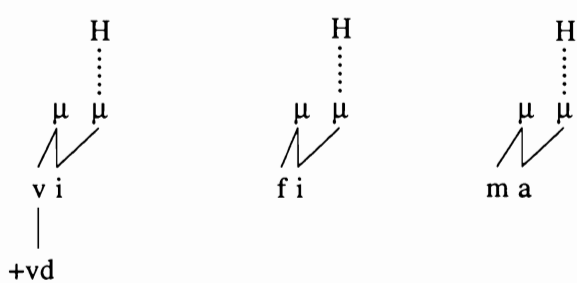


These forms surface as *vù*, *fú*, and *mɔ́*, matching what we observed in (2). Floating L tones that remain in front of a voiceless or sonorant-initial noun undergo stray erasure when they appear in isolation.[4]

To derive monomoraic nouns with mid tones *fu* 'sea' and *mo* 'face', I propose that they are marked extratonal in underlying representation: *f<u>* and *m<o>*. Extratonality renders these forms invisible to High Tone Insertion and Low Tone Link. When these forms cease to be on the periphery at the postlexical stratum, extratonality is erased. They surface as mid tones (See Pulleyblank [1986] for a similar use of extratonality in Margi).

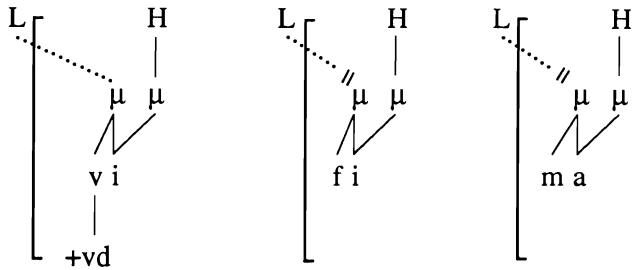
Bimoraic nouns are derived in (9). High Tone Insertion applies in (9a), successfully landing a H tone on the second mora in all three forms.

(9) a. high tone insertion



[4] When these forms appear in a sentence context, floating as well as linked low tones, as in *vu~*, trigger a postlexical rule of Low Tone Assimilation in Ewe. This is one of the three reasons for treating the L tone as a prefix. In principle, the low tone of *vu~* can be derived by a low tone insertion rule that is governed by [If L, then +vd]. The only difference then is that floating L tones will never be part of the representations for *fú* and *mɔ* because low tone insertion is simply blocked from applying to these forms. As floating L tones are required for Low Tone Assimilation, treating the L as a prefix is motivated (See Stahlke [1971] and Peng [1992] for additional arguments).

b. prefixation and low tone link



Note that [If H, then not +vd] does not block High Tone Insertion from applying to *vìí* 'child', even though the condition is invoked. H never forms a path with [+vd] if it links to the second mora. In (9b), [If L, then +vd] blocks Low Tone Link from targeting *fíí* 'digging stick' and *maá* 'greens'. The derived *vìí*, *fíí*, and *maá* match the observed data noted in (3).

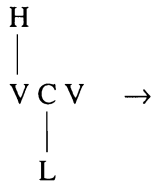
This analysis in terms of path conditions explains the tonal patterns in (2) and (3). Specifically, it explains the asymmetric effect of voice on High Tone Insertion, that is, the restriction between the onset and the tone on the immediately following vowel as opposed to the apparent lack of restriction between the onset and the tone on the second vowel.

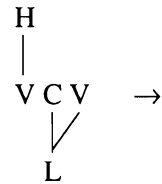
This tonal asymmetry is consistent with the phonetic studies on the impact of consonantal voice on fundamental frequency F_0: acoustic measurement of tone. For instance, Lehiste and Peterson [1961] and Lea [1973] show that [±vd]-induced F_0 perturbations are restricted to the first 100 ms of the following vowel in English. Hombert [1977] shows that F_0 changes caused by onset voicing last 60 ms into the following vowel in Yoruba (See Hombert, Ohala and Ewan [1979] for evidence in other languages). As an average vowel lasts anywhere from 180 to 240 ms, these phonetic studies suggest that onset voicing can never affect the tone on the second vowel of a bimoraic syllable. This is entirely consistent with the phonological patterns of tone-voice interactions found in Ewe.

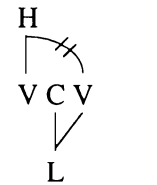
3. Problems with voice asymmetry

Lieber [1987] proposes a purported "general" theory of tone-voice that relies on three mechanisms: i) specifying tones on consonants; ii) spillover; and iii) the Duplicate Feature Filter (DFF). Consider Lieber's account of the typical blocking of high tone spread by a voiced onset. In (10a) the voiced onset is specified for a low tone. This tone undergoes spillover, which is formally stated as "Prolong tone features of consonantal onset onto following vowels". High tone spread is blocked by the DFF, which forbids simultaneous specification of two conflicting

values of a single feature, that is, H and L.

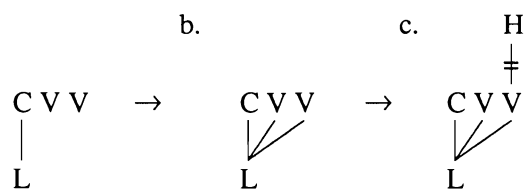
(10) a. 

→ b. 

→ c. 

Unfortunately, Lieber incorrectly predicts that onset voice can affect tone on the second vowel of a bimoraic syllable. Spillover, as formulated by Lieber, allows consonantal tones to be prolonged to both vowels of a bimoraic syllable, as shown in (11b). High Tone Insertion, as required by Ewe, is predicted to be blocked by the DFF, as in (11c).

(11) a. b. c.



Even though Lieber can in principle stipulate that spillover is noniterative, her proposal still leaves open the possibility of an iterative consonantal tone spreading, predicting that onset can affect a tone that is not linked to an immediately following vowel. This possibility is phonologically inconsistent with Ewe and phonetically implausible considering the crosslinguistic fact that onset voice affects F_0 only within the first 100 ms of the following vowel (See Peng [1992] for additional arguments against Lieber's proposal).

To summarize, this study reveals that tone-voice cooccurrence restrictions are highly limited and found only between an onset and a tone on an immediately following vowel. To the best of my knowledge, this limited impact of voice on tone has gone unnoticed in phonological studies of tone-voice interactions. Thus, an important empirical contribution of this study is to bring to light facts such as Ewe so that they can be taken into account in theory construction.

In addition, this study provides support for the path condition approach advocated by Archangeli and Pulleyblank [In press]. By invoking path conditions on tonal operations, this study provides a principled explanation of the asymmetry of voice in Ewe. In contrast with Lieber [1987], this analysis does not have to resort to specifying tones on consonants and consonantal tone spreading, both of which are specifically invoked to explain tone-voice interactions.

Robert Botne. *A Lega and English Dictionary*. East African Languages and Dialects Series, Volume 3. Köln, Germany: Rüdiger Köppe Verlag, 1994. Pp. xviii, 138, 2 maps. $28.50 [paper].

Lega (or KelEga) is a Bantu language spoken in eastern Zaire (Guthrie's D.25). This dictionary includes approximately 1800 Lega head words and 1400 English headwords. Entries are marked for tone and vowel length, and indicate grammatical information, historical proto-Bantu source, and whether the word has been borrowed. An index to the Proto-Bantu roots constitutes the third part of the dictionary. A guide to the dictionary presents general grammatical information on the language. Five appendices contain information on kinship relations and terminology, pronoun and demonstrative paradigms, numbers, place names, and verbs of perception.

Denis Creissels. *Aperçu sur les structures phonologiques des langues négro-africaines, Deuxième édition.* Grenoble: ELLUG. 1994, Pp. 321. 130 FF.

This is the 2nd edition of a book by the same title (announced in *Studies in African Linguistics* 20/2). [Adapted from the book announcement]: As for the first edition of this work, the objective is to present the most notable features of black African languages in a elementary and general way. ... Compared to the first edition, the range of data is considerably expanded in order to take into account languages (notably Comorian, Tswana, Zarma, the Sara languages) on which the author has had the opportunity to work during recent years and which make a particularly interesting contribution to the discussion of certain problems, notably in the domains of prosody and syllabic structure. In addition, the second edition makes an effort to integrate recent developments in phonological theory whereby association of segmental units and tonal units to "skeletal positions" organized into syllables gives a way to surmount difficulties that a strictly linear phonological representation had to confront.

Dymitr Ibriszimow. *Towards a Common Chadic Lexicon*. Prace Językoznawcze, Zeszyt 102. Kraków: Nakladem Uniwersytetu Jagiellońskiego, 1990. Pp. 122. zl 2400,—.

The purpose of this work is to reconstruct 13 proto-Chadic roots on the basis of sound correspondences worked out through a broader and better distributed range of data than in previous comparative works. Chapter 1 reviews the three main comparative works on lexical reconstruction for Chadic (Newman and Ma [1966], Newman [1977], Jungraithmayr and Shimizu [1981]), pointing out the deficiences in source data. Chapter 2 summarizes known and accepted sound changes established within Chadic. Chapter 3 outlines the purpose of the present work, and Chapter 4 lists languages consulted. Chapter 5 provides the reconstructions in tabular form for the roots 'head', 'hair', 'body', 'tooth/bone/egg', 'neck', 'limb', 'stomach', 'sun/fire/ashes', 'moon', 'thorn', 'mud', 'scorpion', 'sharp tool'. Chapter 6 summarizes the results, with particular reference to the reconstruction of labials and labialization. Chapter 7 concludes the book with remarks on diversity in Chadic and directions in both phonetic and semantic change.

Stahlke, H. 1971. "Topics in Ewe Phonology." Ph.D. Dissertation, UCLA.

Steriade, D. 1990. "Moras and other slots." In D. Meyer, S. Tomioka, and L. Zidani-Erog‹lu (eds.), *Proceedings of the First Meeting of the Formal Linguistics Society of Midamerica* , pp. 254-280.

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[Received December 17, 1993;
revision received March 16, 1994;
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