/-a-/ REDUCTION PHENOMENA IN LUYIA

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A discussion of the complex segmental morphophonemics
of the distant past tense marker /-a-/ in OluTsootso.
Its interaction with other rules and conditions in the
language is placed in the perspective of unifying dis-
parate data, demonstrating the power of the paradigm,
and avoiding homophony.

1. Introduction

This paper is a discussion of the alternations involving the morpheme
/-a-/ , a distant past tense marker in the OluTsootso dialect of Luyia, a Ban-
tu language of Kenya.[1] This morpheme appears before the verbal root in cer-
tain past tense constructions, and also as the so-called "associative -a- "
in relative clause and possessive constructions. The more complex and there-
fore interesting alternations surround its use in the verbal paradigm, so only
occasional mention of the relative and possessive constructions will be made.

While there has been much discussion of segmental alternations in Bantu
languages of root-final segments when followed by the past tense suffix -ile
(see Kisseberth [1976] and Dalgish [1977] among many others), there has not
been much attention to segmental alternations involving root-initial non-nasal
elements and the prefixes causing such alternations. As this paper will show,
the alternations on that side of the root are every bit as complex and inter-
esting as root-final changes, especially when taken in the context of the en-
tire phonology of the language.

This paper will therefore attempt to provide a unified account of the data involving /-a-/ , unified in the sense that all the alternations involving /-a-/ will be treated together, while maintaining the integrity of the other rules and meta-conditions found to function in the rest of the phonology. In addition, the role of the paradigm, in a sense to be discussed later, turns out to be of crucial importance in understanding the motivation for the complixities of the /-a-/ rules. Finally, there will be an appeal to the principle of avoidance of homophony to account for the language's insistence on exceptions to some of the /-a-/ rules.

2. Background Rules

To appreciate the /-a-/ reduction rules, a brief look at contexts *not* involving this morpheme must precede. The alternations and rules for these data are motivated more fully in Dalgish [1976]; a few examples and a brief discussion and formulation should suffice for our purposes.

In certain contexts, a sequence of two underlying vowels surfaces unchanged:

(1)   /Ii-ar-nga/   →   Iiaraanga[2]
        cl.5 SM-split-T(ense)   'it splits'

      /βa-asamuI-nga/   →   βaasamuIaanga
        Cl.2 SM-sneeze-T   'they sneeze'

      /oxu-um-a/   →   oxuuma
        Cl.15-dry-T   'to dry'

Glide Formation and Compensatory Lengthening occurs regularly for sequences of /u-V/ (but not for /i-V/ as (1) shows), except when V is itself /u/ :

(2)   /oxu-iβ-a/   →   oxwiiβa
        Cl.15-steal-T   'to steal'

      /βu-akam-nga/   →   βwaakamaanga
        cl.14 SM-come to an end-T   'it comes to an end'

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[2]A vowel copy rule applies to insert a in these forms of the present tense. See Dalgish [1976].

/lu-eleel-nga/   →   lweeleelaanga
cl.11 SM-dangle-T   'it dangles'

/xu-um-nga/   →   xuumaanga
1pl. SM-dry-T   'we dry'

Vowel Coalescence occurs when underlying sequences of /a-V/ surface (note that we are not discussing the past tense /-a-/ here yet). If V is non-low, it becomes mid, and the preceding /-a-/ becomes mid as well. Contrast the second example in (1) with the examples below:

(3) /βa-iβ-nga/   →   βeeβaanga
     cl.2 SM-steal-T   'they steal'

     /ka-eleel-nga/   →   keeleelaanga
     cl.6 SM-dangle-T   'they dangle'

     /βa-um-nga/   →   βoomaanga
     cl.2 SM-dry-T   'they dry'

     /βa-or-nga/   →   βooraanga
     cl.2 SM-bask-T   'they bask'

A y is inserted to break up sequences of three vowels, as the following data with the reflexive (R) morpheme /-i-/ show.

(4) /li-i-el-nga/   →   liiyelaanga
     cl.5 SM-R-select-T   'it selects itself'

     /xu-i-ir-nga/   →   xwiiyiraanga
     1pl. SM-R-kill-T   'we kill ourselves'

     /βa-i-ononi-nga/   →   βeeyononiinjia[3]
     cl.2 SM-R-spoil-T   'they spoil themselves'

The examples below show that a rule inserting y- in initial position must be posited. This has been discussed elsewhere in Dalgish [1976] as part of a general condition to prevent sequences of word-initial VV from appearing. This will have significance in later discussion, but for now please note that both y-insertion rules may sometimes apply:

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[3]A vowel copy rule related to the one mentioned in footnote 2 applies to these forms as well. See Dalgish [1976].

(5)   /a-ar-nga/   →   yaaraanga
      Cl.1 SM-split-T   's/he splits'

      /a-um-nga/   →   yoomaanga
      cl.1 SM-dry-T   's/he dries'

      /a-i-ar-nga/   →   yeeyaraanga
      cl.1 SM-R-split-T   's/he splits her/him-self'

Before a nasal cluster, vowels are lengthened. Note that once a vowel is
lengthened word-initially, γ-Insertion must apply:

(6)   /βa-N-βaamb-nga/   →   βaambaambaanga
      cl.2 SM-1sg OM-sacrifice-T   'they sacrifice me'

      /a-N-ram-nga/   →   yaandamaanga
      cl.1 SM-1sg OM-defeat-T   's/he defeats me'

The following points emerge from this brief overview of the regular alter-
nations of vowel sequences. Generally, when a vowel is deleted (as in Glide
Formation) or its color changed (as in Coalescence), the number of underlying
vowel morae is superficially preserved (by Compensatory Lengthening in Glide
Formation and by allowing two morae to surface in Coalescence). When γ is
inserted, there is no change in vowel morae quantity. Up to now, only in Pre-
nasal Cluster Lengthening (PNCL) does the number of vowel morae change from
underlying to surface forms.

3. Alternations with /-a-/ .

We are now in a position to examine actual alternations with the morpheme
/-a-/ as past tense marker.

3.1. /-a-/ + Consonant. We will begin the discussion with forms in which
root-initial consonant is preceded by /-a-/ . Note the following alterna-
tions:

(7)   /li-a-fiimb-a/   →   lyafiimba
      cl.5 SM-a-cover-T/A   'it covered'

      /βa-a-fiimb-a/   →   βafiimba
      cl.2 SM-a-cover-T/A   'they covered'

      /xu-a-lum-a/   →   xwaluma
      1pl SM-a-bite-T/A   'we bit'

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/a-a-las-a/                    →    yalasa
cl.1 SM-a-sting-T/A                 'he stung'
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The first example in this set illustrates a pattern for all i-final pre-
fixes. Instead of the normal nondevocalization of i before a vowel (compare
(1)), a special devocalization of this vowel takes place before the /-a-/
past tense marker when a consonant follows /-a-/. In addition, Vowel Reduc-
tion must take place, as the second example βafiimba shows (compare (1)
again). Third, note that although devocalization of u takes place, there is
no apparent compensatory lengthening of the following /-a-/ (compare (2)).
Finally, the last example shows that y is inserted initially even though two
vowels do not surface, as long as the second underlying vowel is the past
tense /-a-/ (compare (5) and (6)).

These data indicate that we need special rules for the vowel sequences
arising with /-a-/ : special devocalization of i and a more general reduc-
tion of vowel sequences arising from V+ /-a-/. Since in so many other con-
texts certain generalizations concerning vowel sequences seem to hold up, it
seems more desirable to maintain as much as we can of the substance of these
generalizations in the formulation of any of the special rules needed by this
/-a-/ data. Thus, the special devocalization of i before /-a-/ will be
assumed to have Compensatory Lengthening accompanying it, since u is compen-
satorily lengthened whenever it is devocalized.[4] Since the examples with a-
final prefixes necessitate an /-a-/ Reduction rule, it will be assumed that
the same rule applies to any vowel sequences arising from V- + /-a-/ . The
rules are stated below and listed in the order guaranteeing correct output:

(8)

	Underlying	/li-a-fiimba/	/βa-a-fiimba/	/xu-a-luma/	/a-a-lasa/
	Glide Form. & Comp. Length.	ly-aa-fiimba	---	xw-aa-luma	---
	$\emptyset \rightarrow$ y /# __ VV	---	---	---	y-a-a-lasa
	/-a-/ Reduct.	ly-a-fiimba	βa-fiimba	xw-a-luma	ya-lasa
	Surface	[lyafiimba]	[βafiimba]	[xwaluma]	[yalasa]

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[4]Dalgish [1976] provides extensive documentation of the extent to which
devocalization is accompanied by compensatory lengthening.

Note that it is impossible to determine from these data which of the two under-
lying vowels have been deleted in sequences of V + /-a/ . As the data become
more complex, so does this question.

3.2. /-a-/ + Vowel. We now turn to cases where /-a-/ is followed by a vow-
el-initial morpheme, which in OluTsootso comprise two sets: /-a-/ followed
by a vowel-initial root or /-a-/ followed by the reflexive marker, /-i-/ .

    We begin this section in turn with the simplest cases, in which a-final
prefixes precede /-a-/ , followed by vowel-initial roots or the reflexive
marker /-i-/ .

(9) /βa-a-ar-a   ·   →   βaara
       cl.2 SM-a-split-T/A   'they split'

     /ka-a-or-a/   →   koora
       cl.6 SM-a-bask-T/A   'they basked'

     /βa-a-i-lum-a/   →   βeeluma
       cl.2 SM-a-refl-bite-T/A   'they bit themselves'

    If we consider first /βa-a-ar-a/ → βaara 'they split', we note that
/-a-/ Reduction has taken place, but it is impossible to determine which vowel
has in fact been deleted. The last form, /βa-a-i-lum-a/ → βeeluma 'they
bit themselves', shows that Coalescence applies, but it is not clear again
which vowel has been deleted.

    One possibility is that the /-a-/ morpheme first triggers Coalescence
with the following /-i-/ , changing /i/ to intermediate /e/ while /-a-/
retains its height. Then, /-a-/ is deleted, leaving the a of the subject
marker to coalesce with the newly created /e/ to produce superficial -ee- .
Another possibility is that Coalescence applies iteratively to produce an in-
termediate sequence of /βe-e-e-lum-a/ , which is subsequently shortened by
/-a-/ Reduction to βeeluma . We cannot yet determine which of these alterna-
tives is correct.

    Another set of alternations are those in which i-final subject prefixes
precede /-a-/ .

(10) /li-a-ar-a/   →   liara
        cl.5 SM-a-split-T/A   'it split'

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/βi-a-or-a/                    →    βiora
  cl.2 SM-a-bask-T/A                'they basked'

/tsi-a-i-lum-a/                →    tsieluma
  cl.10 SM-a-refl-bite-T/A          'they bit themselves'
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Recall our earlier statement about the devocalization of i before /-a-/ and a consonant (see the data in (7) and the following discussion.) That it- self was a special situation, since i does not devocalize unless surrounded by vowels. The examples here in (10) do not show devocalization of i , yet there has been /-a-/ Reduction. This special devocalization of /i/ before /-a-/ and a consonant would be correctly blocked in the forms in (10) if the rule is stipulated to apply before /-a-/ Reduction, since at that point a consonant does not follow /-a-/ . It will be recalled that Glide Formation of both /u/ and /i/ was posited as applying before /-a-/ Reduction for the forms of (8) as well, thus allowing us to maintain the same rule ordering for different data.

Glide formation and /-a-/ Reduction appear in data where /-a-/ is pre- ceded by u-final prefixes and followed by a vowel-initial root or by the re- flexive marker.

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(11)  /xu-a-ar-a/                 →    xwaara
        1pl. SM-a-split-T/A            'we split'

      /mu-a-or-a/                 →    mwoora
        2pl. SM-a-bask-T/A             'you basked'

      /lu-a-i-fiimb-a/            →    lweefiimba
        cl.11 SM-a-refl-cover-T/A      'it covered itself'
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In keeping with previous findings, it should be proposed that Glide Forma- tion (with Compensatory Lengthening) and Coalescence apply before /-a-/ Re- duction.

We may now summarize our discussion of the forms in 3.2 by proposing the following rule-orderings and derivations:

(12) Underlying   /βa-a-i-lum-a/   /li-a-ar�థ-a/   /mu-a-or-a/

     Glide Form. &   ---   ---   mw-aa-or-a
     Comp. Length.

     Coalescence   βe-ee-lum-a   ---   mw-oo-or-a

     /-a-/ Reduct.   βe-e-lum-a   li--ar-a   mw-o-or-a

     Surface   [βeeluma]   [liara]   [mwoora]

Note that similar rule-orderings will account for the data of 3.1 as well:

(13) Underlying   /xu-a-lum-a/   /li-a-ar-a/   /li-a-fiimb-a/

     Glide Form. &   xw-aa-lum-a   ---   ly-aa-fiimb-a
     Comp. Length.

     Coalescence   ---   ---   ---

     /-a-/ Reduct.   xw-a-lum-a   li--ar-a   ly-a-fiimb-a

     Surface   [xwaluma]   [liara]   [lyafiimba]

Finally, note that in all these forms, the rule of y Insertion ($\emptyset \rightarrow$ y /VV__V) never applies. If we order this rule after /-a-/ Reduction, the former will be correctly blocked from applying.

The rule of /-a-/ Reduction then will be understood to operate on identical sequences formed with /-a-/ , reducing such sequences by one vowel mora.

3.3. /nd-/ prefixed forms and /-a-/ Reduction. At this point it will be useful to present some data involving first person singular subject prefixes followed by /-a-/ . I consider the first person singular subject marker to be underlying /nd-/ .[5] This morpheme is the only consonant-final subject prefix in the language (the corresponding first person singular object marker, /N/ , is the only consonant-final object marker). As we shall see, this is a significant factor.

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[5]Another possibility is that this morpheme is /ndi-/ , which does in fact surface in other paradigms. The language is, however, riddled with alternative forms for first person singular subject, among them /ndi-/ , /eN/ , /e/ , so one more alternate isn't too unlikely. And even if /ndi-/ were to be posited underlyingly, we would still need special rules and conditions that would be peculiar to first person singular forms, the area in which exceptions proliferate. For the purposes of this paper, the postulation of /nd-/ or /ndi-/ makes very little difference.

The alternations with this morpheme and /-a-/ will seem surprising:

(14)   /nd-a-fiimb-a/   →   ndafiimba
       1sg SM-a-cover-T/A   'I covered'

       /nd-a-lum-a/   →   ndaluma
       1sg SM-a-bite-T/A   'I bit'

       /nd-a-ar-a/   →   ndaara
       1sg SM-a-split-T/A   'I split'

       /nd-a-or-a/   →   ndoora
       1sg SM-a-bask-T/A   'I basked'

       /nd-a-i-fiimb-a/   →   ndeefiimba
       1sg SM-a-refl-cover-T/A   'I covered myself'

These forms indicate that /-a-/ Reduction has not applied, since the underly-
ing number of vowel morae surface unchanged. Of course, the first two forms,
ndafiimba and ndaluma would not be expected to reduce their vowels, since
there is only one vowel, the /-a-/ itself, and we had formulated the rule of
/-a-/ Reduction to apply to identical vowel sequences formed with /-a-/ . It
is the last three forms that provide the puzzling results, since they might be
expected to produce *ndara , *ndora , and *ndefiimba respectively. Note
that Coalescence applies as expected in the last two forms but that there is
no reduction of the vowels.

    Since these forms are the only exceptions to the rule of /-a-/ Reduction,
and since they are, nevertheless, a significant set of exceptions (the first
person singular form occurs so frequently in discourse), they merit some dis-
cussion. It is here that we shall introduce the notion of the role of para-
digm pressure in forcing exceptions to /-a-/ Reduction.

    If we compare the /nd-/ prefixed forms with corresponding forms of the
same paradigmatic type—and by this we mean that /-a-/ is followed by the
same type of element, C-initial root or V-initial morpheme—we see that there
is good reason for /nd-/ prefixed forms to be exceptions to /-a-/ Reduction.

    Consider first instances in which consonants followed /-a-/ , as in (7)
earlier. There we saw forms like /li-a-fiimb-a/ surface as lyafiimba 'it
covered', /βa-a-fiimb-a/ appearing as βafiimba 'they covered', and /xu-a-

lum-a/ as xwaluma 'we bit'. In this paradigm, one vowel surfaces when /-a-/ is followed by a consonant. /nd-a-fiimba/ then fits right in when it surfaces as ndafiimba 'I covered' since only one vowel mora surfaces here, too.

Then, when /-a-/ is followed by a vowel, as in (9), we saw that /βa-a-ar-a/ appeared as βaara 'they split', while /ka-a-or-a/ surfaced as koora 'they basked', and /βa-a-i-lum-a/ became βeeluma 'they bit them-selves'. In this paradigm, two vowels surface when /-a-/ is followed by a vowel. Again, forms like /nd-a-ar-a/ → ndaara 'I split', /nd-a-or-a/ → ndoora 'I basked', and /nd-a-i-fiimb-a/ → ndeefiimba 'I covered myself' fit in, since they surface with two vowels as well. With such complicated se-quences of underlying vowels, there would seem to be good reason to maintain superficial similarity in the number of vowel morae, even at the cost of creat-ing an (important) set of exceptions to the rule of /-a-/ Reduction.

We will see that /nd-/ prefixed forms are exceptions throughout the /-a-/ Reduction forms, but in all cases, the power of the paradigm would seem to be a reasonable justification for such exceptions.

3.4. <u>Sequences of /-a-/ followed by two vowels</u>. When the underlying se-quence of subject marker /-a-/ , reflexive marker /-i-/ , and a vowel-initial root occur, we find evidence that /-a-/ Reduction occurs, and y Insertion, Glide Formation, and Coalescence take place as well:

(15)	Underlying	/βa-a-i-ar-a/	/xu-a-i-ar-a/	/li-a-i-ar-a/
	Coalescence	βe-ee-ara	xu-ee-ara	li-ee-ara
	Glide Formation & Comp. Length.	---	xw-eee-ara	---
	/-a-/ Reduction	βe-e-ara	xw-ee-ara	li-e-ara
	y Insertion (∅ → y /VV__V)	βee-y-ara	xw-ee-y-ara	li-e-y-ara
	Surface	[βeeyara]	[xweeyara]	[lieyara]
		'they split themselves'	'we split ourselves'	'it split itself'

Note that the special rule of Glide Formation for i- final prefixes that

was necessary earlier for forms in (7), that is, when /-a-/ was followed by
a consonant, does not apply here, since /-a-/ is followed by a vowel at the
time this special devocalization would apply. The rule orderings posited for
earlier data hold up here as well, with Glide Formation and Coalescence pre-
ceding /-a-/ Reduction, and γ Insertion following /-a-/ Reduction (cf. 3.2).

Forms with /nd-/ prefixes behave "exceptionally" as expected in this con-
text. From underlying /nd-a-i-ara/ comes surface ndeeyara , indicating
that, as before, /-a-/ Reduction does not apply. But notice again that as
with the other prefixes, when two vowels follow /-a-/ in underlying struc-
ture, two vowels surface after "a" , with γ inserted right where it belongs.
If /nd-/ prefixed forms were to "correctly" undergo /-a-/ Reduction, this
pattern would be destroyed.

3.5. <u>/-a-/ followed by nasal clusters</u>. We saw in (6) evidence that a rule
of Pre-nasal Cluster Lengthening (PNCL) applies. We now turn to the interac-
tion of the reduction rule of /-a-/ and the lengthening rule of PNCL.

The first person singular object marker /N/ appears after /-a-/ and be-
fore the root; no other prefix may intervene between them. Consider these un-
derlying and surface forms:

(16) /βa-a-N-βaamb-a/   →   βaambaamba
     cl.2 SM-a-1sg OM-sacrifice-T   'they sacrificed me'

     /li-a-N-ram-a/   →   liandama
     cl.1 SM-a-1sg OM-defeat-T   'it defeats me'

     /ku-a-N-chiing-a/   →   kwaanjiinga
     cl.3 SM-a-1sg OM-carry-T   'it carried me'

To account for these forms, the following derivations are proposed:

(17) | Underlying | /βa-a-N-βaamba/ | /li-a-N-rama/ | /ku-a-N-chiinga/ |
|---|---|---|---|
| PNCL | βa-aa-N-βaamba | li-aa-N-rama | ku-aa-N-chiinga |
| Glide Formation & Comp. Length. | --- | --- | kw-aaa-N-chiinga |
| /-a-/ Reduction | βa-a-N-βaamba | li-a-N-rama | kw-aa-N-chiinga |
| γ Insertion | --- | --- | --- |

Nasal Rules	βa-a-m-baamba	li-a-n-dama	kw-aa-n-jiinga
Surface	[βaambaamba]	[liandama]	[kwaanjiinga]

We have ordered the rule of Glide Formation to precede /-a-/ Reduction as was done in earlier contexts. Note again that the special devocalization of i is correctly blocked by this ordering, since once PNCL applies, /-a-/ is not directly followed by a consonant.

We have no opportunity to see what would happen if /nd-/ prefixed forms were to appear before /N/ . Since both elements refer to first person singular, the reflexivization rule would spell /N/ as /-i-/ , and there would be no environment for PNCL. Furthermore, there are no nasal-cluster initial roots before which /-a-/ could appear and interact with the rule of PNCL.

3.6. <u>Summary</u>. To reiterate, the rule of /-a-/ Reduction and the special exceptions that are necessary to accompany it have a unified purpose. /-a-/ Reduction is itself a special, morphologically conditioned rule that is unlike all other rules in the language involving vowel sequences (except PNCL) because it affects the number of vowel morae that surface; it is the only true deletion rule involving vowels. Yet, this rule has exceptions, or triggers the application of an exceptional rule, precisely when such exceptions contribute to a uniform paradigm. First, the exception to the rule of /-a-/ Reduction is all the /nd-/ prefixed forms, which, as it were, start off with fewer underlying vowel morae, because /nd-/ is the only C-final subject prefix in the language (and only subject prefixes and the reflexive marker appear before /-a-/). The failure of /-a-/ Reduction to apply to the /nd-/ prefixed forms ensures that all the forms of the same paradigm (where paradigm is definable in terms of the number of vowel morae following /-a-/) surface with the same number of vowel morae, albeit one less mora when /-a-/ Reduction has applied.

Secondly, the special rule of Devocalization of i when the sequence of /-a-/ + C follows also has the function of ensuring that an equal number of vowel morae surface within a paradigm. /-a-/ Reduction could not have applied to a form like /li-a-fiimba/ , because there would have been no sequences of identical vowels formed from /-a-/ to reduce. The resulting surface form

*liafiimba would have two superficial vowel morae, while the rest of the forms of that paradigm have only one. The chaos that would have resulted from such a situation has been avoided by the complication of rules and exceptions we have developed herein.

It turns out that /-a-/ Reduction and its exceptions work together to avoid homophony in certain other contexts. In the next section, we show how the principle of avoidance of homonyms is a factor affecting /-a-/ Reduction and exceptions.

4. Alternations with /-aa-/

This section discusses the morpheme /-aa-/ , a marker of one of the many perfect tenses in OluTsootso. This marker resembles strongly in form, function, and vocalic phenomena the /-a-/ morpheme discussed above. We shall have recourse once again to the notion of paradigm and also to the principle of avoidance of homophony for forms involving /-a-/ and forms involving /-aa-/ .

4.1. /-aa-/ + Consonant. In forms like the following, we see that /-aa-/ involves some sort of reduction:

(18) /li-aa-fiimb-a/   →   liafiimba
      cl.5 SM-aa-cover-T   'it has already covered'[6]

      /βa-aa-lum-a/   →   βaaluma
      cl.2 SM-aa-bite-T   'they have a. bit'

      /xu-aa-βaamb-a/   →   xwaaβaamba
      1pl SM-aa-sacrifice-T   'we have a. sacrificed'

It might first be thought that in fact we have simply underlying /-a-/ and no reduction in these forms rather than /-aa-/ and reduction. Two sets of data vitiate this claim. First, /li-aa-i-fiimb-a/ surfaces as lyayeefiimba 'it has a. covered itself'. This form and other related forms

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[6]The morpheme /-aa-/ appears here and in many additional tenses of the past and perfect. The glosses are approximate. I abbreviate "already" as "a." in remaining forms.

show surface a after the first y and show ee that can only have resulted
from the underlying sequence of /a+i/ . Secondly, /nd-aa-fiimb-a/ surfaces
as ndaafiimba 'I have a. covered' without reduction, clearly showing the
need for two underlying morae. Both sets of data will be discussed fully be-
low; the important point here is to justify the postulation of /-aa-/ under-
lyingly.

     To account now for the forms of (18), it is proposed that the following
derivations apply:

(19) Underlying   /li-aa-fiimb-a/   /βa-aa-lum-a/   /xu-aa-βaamb-a/

      Glide Formation &   ---   ---   xw-aaa-βaamb-a
      Comp. Length.

      /-a-/ Reduction   li-a-fiimba   βa-a-luma   xw-aa-βaamba

      y Insertion   ---   ---   ---
      (∅ → y /VV__V)

      Surface   [liafiimba]   [βaaluma]   [xwaaluma]

     Note that we do not see special devocalization of i in liafiimba . We
might claim that the first of the two underlying a's is the /-a-/ from the
previous section, and so when it is followed by a vowel, in this case the sec-
ond a , special devocalization is blocked.

     Rather than have a new reduction rule apply to forms involving /-aa-/ ,
it would seem to make more sense to claim that the regular rule of /-a-/ Re-
duction then applies, affecting sequences of two identical vowels involving
underlying /-a-/ . The rule of y Insertion is correctly blocked from apply-
ing to these forms, since it is ordered after /-a-/ Reduction.

     Note again that a paradigmatic structure of syllable structure emerges
from these data. When a consonant follows /-aa-/ , two vowel morae surface.

4.2. /nd-/ and /-aa-/ forms. This pattern emerges again when we consider
/nd-/ prefixed forms preceding /-aa-/ :

(20) /nd-aa-fiimb-a/   →   ndaafiimba
        1sg SM-aa-cover-T   'I have a. covered'

      /nd-aa-lum-a/   →   ndaaluma
        1sg SM-aa-bite-T   'I have a. bit'

The expected application of /-a-/ Reduction should no longer be expected
in light of our earlier discussion. If /-a-/ Reduction were to apply here,
the first person singular forms would be isolated from all the other forms of
this paradigm by having only one superficial vowel mora. One motivation then
for /-a-/ Reduction not to apply here is the same we saw earlier: the ten-
dency in the language to maintain paradigm uniformity overriding the regular
application of rules.

It is worthwhile to mention in passing that a second motivation for disal-
lowing the application of /-a-/ Reduction would be to prevent homophony. If
we compare the first two forms of (14) with those in (20), we see that if
/-a-/ Reduction had applied in (20), the forms in each set would be identical.
Avoidance of homonyms is a factor in many of the other forms in this discus-
sion.

4.3. <u>/-aa-/ + Vowel</u>. The situation becomes a little more complicated when we
consider sequences of vowels following the /-aa-/ marker. Consider first
the following instances of /-aa-/ followed by the reflexive marker /-i-/
and a C-initial root:

(21) /nd-aa-i-fiimb-a/   →   ndayeefiimba
      1sg SM-aa-R-cover-T   'I have a. covered myself'

      /li-aa-i-fiimb-a/   →   lyayeefiimba
      cl.5 SM-aa-R-cover-T   'it has a. covered itself'

      /βa-aa-i-lum-a/   →   βayeefiimba
      cl.2 SM-aa-R-bite-T   'they have a. bitten themselves'

      /xu-aa-i-lum-a/   →   xwayeeluma
      1pl SM-aa-R-bite-T   'we have a. bitten ourselves'

The first person singular form shows clearly that the rule of y Insertion
($\emptyset$ → y /VV__V) invoked earlier is not applicable, yet an extra y appears.
However, true to form, the first person singular forms do not exhibit evidence
of /-a-/ Reduction, since we do not have *ndayefiimba , with a single e .

Turning now to the surface form of lyayeefiimba , we see that special de-
vocalization of i has applied, a y has been inserted, coalescence and re-

duction have taken place. If we were to order y Insertion ($\emptyset \rightarrow$ y / VV__V)
before /-a-/ Reduction, we could have it apply to the underlying form and pro-
duce the right output, but this is not what we have found in earlier contexts,
where it was clear that y Insertion follows /-a-/ Reduction (cf. (13), (15),
and (17)). And we would still be unable to do anything about the /nd-/ pre-
fixed forms, since the phonetic environment for y Insertion is not even met.

We must invoke a special rule of y Insertion to apply to break up se-
quences involving /-aa-/ followed by a vowel. Such a rule is necessary for
/nd-/ forms and to maintain the rule orderings we have successfully motivated
elsewhere. This rule will than apply very early in the derivation, and will
account for all the forms of (21).

(22) Underlying
      /nd-aa-i-fiimba/   /li-aa-i/fiimba/   /βa-aa-i-luma/   /xu-aa-i-luma/
      Special y Insertion
       nd-a-y-a-i-fiimba li-a-y-a-i-fiimba βa-aya-i-luma   xu-aya-luma
      Coalescence
       nd-a-yee-fiimba   li-a-yee-fiimba   βa-a-yee-luma   xu-a-yeeluma
      Glide formation & Comp. Length.
            ---   ly-aa-yee-fiimba   ---   xw-aa-yee-luma
      /-a-/ Reduction
            ---   ly-a-yee-fiimba   βa-yee-luma   xwa-yee-luma
      y Insertion
            ---   ---   ---   ---
      Surface
      [ndayeefiimba]   [lyayeefiimba]   [βayeeluma]   [xwayeeluma]

Note that the special devocalization of i is properly triggered by the
intermediate form /li-a-y-a-i-fiimba/ created by Special y Insertion for se-
quences of /-aa-/ and a vowel. Once the y is there, special devocaliza-
tion and Compensatory Lengthening of the prefixal-final i can apply.

Lest it be thought that Special y Insertion is really just the regular
rule in disguise, there are forms which indicate that both rules have applied.
This occurs when /-aa-/ is followed by /-i-/ and a vowel-initial root:

(23) /nd-aa-i-ira/   → ndayeeyira
     1sg SM-aa-R-kill   'I have a. killed myself'

     /li-aa-i-ira/   → lyayeeyira
     cl.5 SM-aa-R-kill   'it has a. killed itself'

     /xu-aa-i-osia/   → xwayeeyosia
     1pl SM-aa-R-warm   'we have a. warmed ourselves'

     /βa-aa-i-umia/   → βayeeyumia
     cl.2 SM-aa-R-dry   'they have a. dried themselves'

The derivations of these forms would follow the same order as we saw earlier. Special y Insertion for sequences of /-aa-/ applies, yielding intermediate /nd-a-y-a-ira/ , /li-a-y-a-i-ira/ , /xu-a-y-a-i-osia/ , and /βa-a-y-a-i-umia/ , respectively. Coalescence applies to all the forms to give us the necessary -ee- sequences, and then glide formation with compensatory lengthening applies to /li-a-yee-ira/ and /xu-a-yee-osia/ to produce /ly-aa-yee-ira/ and /xw-aa-yee-osia/ . The rule of /-a-/ Reduction would then apply to all forms except the first person form /nd-a-y-ee-ira/ , producing /ly-a-yee-ira/, /xw-a-yee-osia/ , and /βa-yee-umia/ , respectively. The regular rule of y Insertion then applies, and we obtain [ndayeeyira] , [lyayeeyira] , [xwayeeyosia] , and [βayeeyumia] .

4.4. <u>/-aa-/ and PNCL</u>. When the first person singular object marker /N/ follows /-aa-/ , the environment for PNCL is met, and there is interaction of /-a-/ Reduction, PNCL, and Special y Insertion:

(24) /li-aa-N-chiinga/   → lyayaanjiinga
     cl.5 SM-aa-1sg OM-carry   'it has a. carried me'

     /ku-aa-N-chiinga/   → kwayaanjiinga
     cl.3 SM-aa-1sg OM-carry   'it has a. carried me'

     /βa-aa-N-rama/   → βayaandama
     xl.2 SM-aa-1sg OM-defeat   'they have a. defeated me'

Derivations are provided in (25):

(25)

Underlying	/li-aa-N-chiinga/	/ku-aa-N-chiinga/	/βa-aa-N-rama/
PNCL	li-aaa-N-chiinga	ku-aaa-N-chiinga	βa-aaa-N-rama
Special γ Insertion	li-ayaa-N-chiinga	ku-ayaa-N-chiinga	βa-ayaa-N-rama
Glide Formation & Comp. Length.	ly-aayaa-N-chiinga	kw-aayaa-N-chiinga	---
/-a-/ Reduction	ly-a-yaa-N-chiinga	kw-a-yaa-N-chinga	βa-yaa-N-ram
nasal interactions; Surface	[lyayaanjiinga]	[kwayaanjiinga]	[βayaandama]

With the addition of the Special γ Insertion for /-aa-/ , the data are accounted for, and previously motivated rules and rule orderings have been maintained.

5. /-aa-/ + Vowel-initial Roots

The discussion has deliberately bypassed a set of data that seem most anomalous and exceptional, the cases where /-aa-/ is directly followed by a vowel-initial root. These forms are exceptional, but as we shall see, without this exceptionality, an overwhelming amount of homophony would result.

5.1. Data. Initial data are presented in (26):

(26) /nd-aa-iβa/   →   ndayeβa
      1 sg SM-aa-steal   'I have a. stolen'

      /li-aa-ira/   →   lyayera
      cl.5 SM-aa-kill   'it has a. killed'

      /xu-aa-ula/   →   xwayola
      1pl SM-aa-arrive   'we have a. arrived'

      /βa-aa-ara/   →   βayara
      cl.2 SM-aa-split   'they have a. split'

The first problem is that the first person singular subject forms, like ndayeβa , seem to have undergone some reduction, a clear violation of all that has gone before, where all first person singular subject forms were exceptions to the reduction process. This includes cases where /-a-/ was followed by a vowel-initial root and when both /-a-/ and /-aa-/ were followed

by the reflexive marker /-i-/ (with or without yet another vowel following).

Secondly, there seems to be evidence from the last three examples that *two* kinds of reduction have taken place, since vowels on both sides of the inserted y are short. This, too, is not in keeping with what we have seen everywhere, since in all other cases reduction involved only one vowel (note (22) and (23)). Given derivations and rule orderings from earlier data, we may propose the following derivation for these forms:

(27)

Underlying	/nd-aa-iβa/	/li-aa-ira/	/xu-aa-ula/	/βa-aa-ara/
Special y Insertion	nd-aya-iβa	li-aya-ira	xu-aya-ula	βa-aya-ara
Coalescence	nd-aye-eβa	li-aye-era	xu-ayo-ola	---
Glide Formation & Comp. Length.	---	ly-aaye-era	xw-aayo-ola	---

At this point we see that the rule of /-a-/ Reduction should apply. In previous cases where /-a-/ Reduction applied with the marker /-aa-/, it was always the *first* [a] that was involved in the reduction, never the second (cf. (19), (21), (22), and (23)). We can salvage something if that generalization is maintained, as below:

(27) continued

/-a-/ Reduction	---	ly-aye-era	xw-ayo-ola	βa-ya-ara

We see on closer examination that the /nd-/ prefixed form can still be an exception to our "regular" rule of /-a-/ Reduction, but that is at least in keeping with what went before. What remains is to propose a special rule of reduction for sequences involving the *second* [a] of /-aa-/ when a vowel-initial root directly follows. This rule is special in that it now applies to /nd-/ prefixed forms, but it involves the second [a] of /-aa-/:

(27) continued

Special Reduction	nd-ayeβa	ly-ayera	xw-ayola	βa-yara
Surface	[ndayeβa]	[lyayera]	[xwayola]	[βayara]

Note that we were able to maintain our regularity about the exceptionality

of /-a-/ Reduction for /nd-/ prefixed forms, because that rule of reduction
still does not apply to these forms. Happily, the correct non-application of
that rule, combined with the special application of Special Reduction for
these forms, maintains a consistent profile for the forms of that paradigm.

5.2. <u>Avoidance of homophony</u>. Two sets of data suggest that an appeal to the
avoidance of homophony is appropriate for accounting for much of this excep-
tionality. The first set of data involves certain i-initial verb roots which
are homophonous with consonant-initial roots that are preceded by the reflex-
ive marker /-i-/ .

(28) <u>i-initial root</u>   <u>/-i/ + C-initial root</u>

    /ikul/   'open'   /i-kul/   'buy (for) self'

    /ilim/   'get dark'   /i-lim/   'cultivate self'

    /ir/   'kill'   /i-r/   'put self'

Other such forms are listed in Dalgish [1976]. If we examine some of
these verbs in the perfect tense with /-aa-/ , we can see that potentially
homophonous forms are kept distinct by Special Reduction, which applies to the
verbs in the left column (i-initial verbs), but not to the verbs in the right
(when reflexive /-i-/ precedes a consonant-initial root:

(29) a.   /βa-aa-ikula/   →   βayekula   'they have a. opened'

       /βa-aa-i-kula/ →   βayeekula   'they have a. bought themselves...

   b.   /nd-aa-ilima/   →   ndayelima   'I have a. gotten dark'

       /nd-aa-i-lima/ →   ndayeelima 'I have a. cultivated myself'

   c.   /li-aa-ira/   →   lyayera   'it has a. killed'

       /li-aa-i-ra/   →   lyayeera   'it has a. put itself'

The crucial difference between these forms is the length of the vowel
-e- . It is long if it is underlyingly the reflexive marker and short if un-
derlyingly root-initial i . The rule separating these vowels is Special Re-
duction.

The second set of data pointing toward the principle of avoidance of homo-
phony is certain y-initial roots vs. certain vowel-initial roots. In Olu-

Tsootso, there are a number of y-initial roots that differ from vowel-initial roots only in the length of the first vowel. Again, a more exhaustive list is provided in Dalgish [1976], but a few forms are listed in (30):

(30) y-initial roots   *vowel*-initial roots

    yaanz 'like'   anz 'arrange'

    yeel 'land, set'   el 'select'

    yeeng 'brew'   eng 'ripen'

Now, compare the y-initial verb roots in the distant past tense with the vowel-initial roots in the perfect tense:

(31) y-initials, /-a-/   vowel-initials, /-aa-/

    /li-a-yaanza/ → lyayaanza   /li-aa-anza/ → lyayanza
        'it liked'   'it has a. arranged'

    /ku-a-yeela/ → kwayeela   /ku-aa-ela/ → kwayela
        'it set'   'it has a. selected'

    /βa-a-yeenga/ → βayeenga   /βa-aa-enga/ → βayenga
        'they brewed'   'they have a. ripened'

Without Special Reduction affecting the second vowel of /-aa-/ before a vowel-initial root, the verbs in both columns would surface with long -ee- and be homophonous. In addition, a few other forms are dept distinct by this exceptional rule: compare /nd-a-yeexa/ → ndayeexa 'I leaned' and /nd-aa-ixa/ → ndayexa 'I have a. sat'. The exceptional reduction then has a clear and important function in reducing potential ambiguity resulting from homophony.

6. Conclusion

This paper has started with some of the more direct and simpler vocalic alternations, introduced the /-a-/ marker and the reduction rule necessary for its alternations, and concluded with a discussion of certain seemingly ad-hoc additional rules, exceptions, and conditions which turn out to be motivated by two important considerations: the power of the paradigm and the avoidance of homophony. We saw that /nd-/ prefixed forms were consistently exceptional to the rule of /-a-/ Reduction, but with good reason: all related

forms in the paradigm then surface with the same number of vowel morae. And
we had need for an additional, special rule of reduction for /-aa-/ and vow-
el-initial roots, which, it turned out, helped to prevent homophony between
forms in the same tense and certain other forms in different tenses. These
two forces in the language accompany and in some sense justify exceptions and
conditions to otherwise regular and complicated phenomena.

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