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Kézié K. Lébikaza

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SONORANT NASALIZATION IN YORUBA DEVERBAL NOUNS

AKINBIYI AKINLABI

1. INTRODUCTION
There are two pieces to the puzzle of Yoruba sonorant nasalization that I wish to discuss in this paper. The first is the process of deverbal noun formation in Yoruba, and second is sonorant nasalization or denasalization. Both pieces are interconnected, but they are independent of each other and they need to be separated. I will begin by separating them.

1.1 Deverbal noun formation
As in several Benue Congo languages deverbal nouns are formed from verbs in Yoruba by prefixing a copy of the first consonant of the verb and the vowel [i] to the verb base (Akinlabi 1985, 2000; Pulleyblank 1986, Ola 1995, and others). Following Akinlabi (2000), I assume that the fixed vowel [i] is a prefix, separate from the consonant. That is, the input to the deverbal noun in Yoruba is (RED + i + verb stem). I will not discuss the motivation here, but the reader is encouraged to see Akinlabi (2000, in progress) for details. In the forms in (1), the deverbal noun prefix is separated from the base with a dash, and it is bolded for visual clarity.

(1) gbóná   gbé-gbóná    be warm, hot; warmth, heat
    je    jí-je    eat; act of eating
    dára   dí-dára    be good; goodness
    gbé    gbí-gbé    take; act of taking
    rí    rí-rí    see; act of seeing
    mu    mlí-mu    drink; drinking
    wón    wí-wón    be expensive; dearness

1 This paper represents a section of a chapter of a larger piece or work in progress. It is completely informal, so that I can be fair to earlier writers. The formal analysis is available in the larger work (Akinlabi 2000, in progress), and in sketchy form in the appendix. I would like to thank Ayo Bamgbuse, Nick Clements, and Ahmadu Kauw for comments received at WOCAL 3, Oluseye Adesola for general comments on this subject, and Yiwola Awoyale for most of the crucial examples. Hubert Truckenbrodt deserves special thanks for extensive discussions of the formal account presented here and elsewhere.
Note crucially that in the vowel [i] is of the deverbal noun prefix is oral even when the stem vowel is nasalized, as in the last example.

1.2 Sonorant Nasalization/Denusalization
Oyelaran (1971), Pulleyblank (1988:258f), etc. note that a sonorant will always be nasalized when tautosyllabic to a nasal segment in Yoruba. Therefore the segments \( /r, w, y, h/ \) become \([r, w, y, h]\) respectively, before nasal vowels (Data from Pulleyblank 1988: 259).

\[
\begin{align*}
/ r \widehat{t} / & \rightarrow [r \widehat{t}] \ 'walk' \\
/w \widehat{i}/ & \rightarrow [w \widehat{i}] \ 'lend' \\
/y \widehat{u}/ & \rightarrow [y \widehat{u}] \ 'dispense' \\
/h \widehat{u}/ & \rightarrow [h \widehat{u}] \ 'weave' \\
\end{align*}
\]

We will call this process "sonorant nasalization".

The other aspect of sonorant nasalization/denusalization in Yoruba involves the alternation between \([l]\) and \([n]\). It has long been noted that \([l]\) and \([n]\) alternate in Yoruba, such that \([l]\) occurs before oral vowels and \([n]\) occurs before nasal vowels (see Ward 1952 and Oyelaran 1971, among others). Examples of this distribution are given in (3).

\[(3) \ n/l\ distribution:\]

(a) \([n]\) is found only before nasal vowels:
- nà [nà] ‘feed (with food)’
- ní [nì] ‘have’
- lún [lùn] ‘road’
- nú [nù] ‘spend’

(b) \([l]\) is found only before oral vowels:
- là ‘break / open’
- ilù ‘town’

On the other hand are those scholars who see the \([l]/[n]\) alternation as a morphophonemic (or morphosyntactic) alternation. \(\text{\textit{/n/}}\) becomes \([l]\) before oral vowels (except \([i]\)) across morphemes.

We can call this process n-denusalization. This view is shared by Siertsma (1958); Abraham (1958:438); Oyelaran (1971, 1976); Pulleyblank (1988); Awobuluyi and Oyebade (1995); and others. The relevant examples are given in (5).

\[(5) \ ni\ owó \rightarrow lówó “have money”
- ni afo \rightarrow láfo “have clothes”
- ni ñko \rightarrow lsko “have a husband/ be married”

but ni ilé \rightarrow nilé “have a house”

The n-denusalization "rule", first proposed by Oyelaran (1971:87), is given in (6).

\[(6)\ n - \text{denusalization (informal)}\]
\[
/ n / \rightarrow [l] / \ _ _ _ \ V
\]

\([	ext-[nasal}\]

It is not always clear from most of the proponents of the denusalization approach whether they regard \([l]\) as a variant of \(\text{\textit{/n/}}\), or whether they regard the two segments as phonemic. One thing is

\[\footnote{The examples are given in Yoruba standard orthography, unless enclosed in square brackets in which case they are given in standard IPA symbols.}

\[\footnote{Clements and Sonaiya (1989) separate "sonorant nasalization" (the rule responsible for \([r, y, w]\) nasalization) from "nasal spread" (the rule which converts \([i]\) to \([e]\) in their analysis.}]}
clear: people have avoided the use of the word "contrastive". This is the word that I am going to be using here.

The proposal
This paper examines two types of asymmetry in sonorant nasalization in deverbal noun formation in Yoruba: asymmetry with high vowel bases and asymmetry in nasal stability. Based on these asymmetries in deverbal nouns, I propose that the l/n alternation is an alternation between two contrastive segments. Therefore, the n-denasalization rule is morphophonemic.

I will show that the l-nasalization rule (4) is unworkable in deverbal noun formation, and I will conclude there is no such rule as l-nasalization in Yoruba.

3. **TWO ASYMMETRIES**
Two asymmetries are observable in Yoruba deverbal nouns. First, the deverbal noun prefix shows variation based on whether the verb base has a high vowel or a nonhigh vowel. The second asymmetry is that whereas nasality is more stable in the v/n alternation, it is less stable in the other sonorants. This section examines each of these asymmetries in some detail.

3.1 **Asymmetry within the deverbal "fixed" segment**
In the introduction, I noted that the vowel of the deverbal noun prefix is always [i]. However, there may be variation in this vowel depending on the vowel of the verb stem. If the verb stem vowel is high, then the prefix vowel optionally copies the stem vowel completely.

(7a)  **high nonround base vowel**
\[
\begin{array}{c|c}
\text{wà} & \text{wàwà} \\
\text{wù} & \text{wùwù} \\
\text{dù} & \text{dùdù} \\
\end{array}
\]
\text{say; saying}
\text{roast; roasting}
\text{scramble; scrambling}
\text{be black / dark; black, dark}

(7b)  **high round base vowel**
\[
\begin{array}{c|c}
\text{dù} & \text{dùdù} \\
\text{dù} & \text{dùdù} \\
\end{array}
\]
\text{be black / dark; black, dark}

The data in (7) tells us little about variation. The prefix in (7a) may be due to the fixed [i], or may result from copying. The data in (7b) on the other hand can be interpreted as copying the rounding of the base vowel rather than complete copying that I am suggesting here.

The nasalized base vowels are however more revealing. If the base vowel is high and nasalized, then the prefix vowel is optionally high and nasalized, as the examples in (8) show. In the forms in (8) the second column consists of forms with the fixed [i], while third column has the forms with the complete copy. All the forms have the fixed high tone on the prefix.

(8)  **high nonround base vowel**
(Orthographic in = [i]; un = [u]. Some examples from Yiwola Awoyale, personal communication.)
\[
\begin{array}{c|c|c}
\text{sin} & \text{sìsin} & \text{sìnśın} \\
\text{sin} & \text{sìsin} & \text{sinśin} \\
\text{kin} & \text{kìkin} & \text{kìkin} \\
\text{dìn} & \text{dìdin} & \text{dìnđìn} \\
\text{fìn} & \text{fìfin} & \text{fìfin} \\
\text{gìn} & \text{gìgbìn} & \text{gìgbìnbìn} \\
\text{pin} & \text{pìpipìn} & \text{pìpin} \\
\text{wìn} & \text{wìwìn} & \text{winwını} \\
\text{rin} & \text{rìrin} & \text{rinrin} \\
\text{yìn} & \text{yìyìn} & \text{yìnyìn} \\
\end{array}
\]
\text{sneeze; sneezing}
\text{bury; burying}
\text{brush / wipe; wiping}
\text{fry in oil; frying}
\text{spray / inscribe / decorate; spraying}
\text{mama} / \text{groan} / \text{growl} / \text{moaning}
\text{divide / share out; dividing}
\text{borrow / lend; borrowing}
\text{walk; walking}
\text{gouge out the seeds from cobs; gouging}
\text{be sweet / painful / hurtful; being sweet}
\text{be full; being full}
\text{roast in fire; roasting}
\text{pound / stab; pounding}
\text{tall / long; being tall}
\text{donate / give off; giving off}
\text{give out an odour; giving out an odour}
\text{weave, weaving}
\text{dispense, dispensing}
If the base vowel is nasalized (and high), so is the prefix vowel (8a). If the base vowel is nasalized and round, so is the prefix vowel (8b). In the forms in (8), we must assume that the base vowel is copied completely. This fact is confirmed by the forms in (8b), where both rounding and nasality are copied. Copying either nasality alone or roundness alone from the base vowel is forbidden, as the examples in (9) demonstrate.

9(a) Nasality only (b) Roundness only

*kin kunk
*dindun *du dun
*tintun *ti tun
*sisun *su sun
*gin gung
*gin gung *gugun
*bin bun *bubun
*rinrun *run run
*hin hinun *huhun

The variation described above for stems with high vowels is however not seen in stems with nonhigh vowels. If the stem vowel is nonhigh, neither nasality nor rounding can be copied in the prefix, as the forms in (10) illustrate.

10 (a) Nonhigh nonnasal base vowels

 só *só *só wash; washing
*sá *sá *sá speak; speaking
gbá *gbágbá *gbágbá accept, accepting

(b) Nonhigh nasal base vowels

fin fòn *fin fòn *fin fòn blow; blowing
*títàn *tí tàn *tí tàn deceive; deceiving

The overall descriptive generalization is that the prefix copies the initial CV of the verb stem completely if the stem has a high vowel, otherwise the prefix /i/ is retained.

3.2 Asymmetry in Nasal Stability

The second asymmetry in the deverbal noun prefix is that whereas nasality is more stable in the n/l alternation, it is less stable in the other sonorants. In deverbal noun formation, regardless of whether the verb stem has a high or nonhigh vowel, the consonant [n] of the verb stem is always copied, whereas this is not so with any other sonorant (Pulleyblank 1992).

In the forms in (11), when the consonant of the verb stem is [r, w, y, h] and it occurs before a nasalized nonhigh stem vowel, the consonant is nasalized. We illustrated this process independently with the forms in (2). However, this nasality is never transferred to the prefix, and it should not, given our arguments above, be retained in the prefix consonant and vowel.

11 Nasality is not stable in other sonorants

([5] is transcribed as [5] after labials, and as [ɓ] elsewhere.)

rán rían [r ɓ ɓ] *rín rín *rű rű sew, sewing
wán wínwán [w ɓ ɓ] *wů wín *wű wů be costly / dare
yán yín yán [y ɓ ɓ] *yû yû *yû yû yawn, yawning
hán hín hán [h ɓ ɓ] *hin hín hín show, showing

In the contrary, when the stem consonant is [n], the nasality carries over to the prefix. Thus nasality is stable if the verb stem consonant is [n], whether the stem vowel is high or nonhigh. This is completely unexpected if the underlying form of the verb has an /i/.

12 Nasality is stable in [n]

ní níní [n í n í] *liní have, having
ná níná [n í n ɓ] *liná, *liná spend, spending

As we have already seen clearly from (10), the nasality of the vowel [i] of the prefix cannot be from transferring the nasality of the nonhigh base vowel, because nasality does not transfer in
these cases. The nasality of the vowel [i] of the prefix has to be from the preceding [n]. The question is, why is nasality stable here? The answer is that it has to be underlying.

We are now in a position to provide the elusive contrast between /l/ and /n/ in Yoruba, as in (13). The forms in parenthesis are the orthographic forms. (The vowel /i/ of the deverbal noun prefixes in both forms are underlyingly oral.)

(13) /li - lá/ licking (llâ)
/ni - ná/ spending (niná)

We conclude that the l/n alternation in Yoruba must be one that operates between two contrastive segments, rather than one between variants of a segment. In the next section, I argue that it is impossible to derive the /n/ from an input /l/ in the deverbal noun formation, in the traditional serial derivation.

4. THE FAILURE OF THE L - NASALIZATION RULE

The data in (11), repeated below as (14), confirms that nasality is not transferred to the deverbal noun prefix when the consonant of the verb stem is one of the other Yoruba sonorants [r, w, y, h], and the stem vowel is nonhigh.

(14) Nasality is not transferred in other sonorants

([5] is transcribed as [5] after labials, and as [ã] elsewhere.)

rân rîrân [ɾ i ɾ ʃ ə] *rîrân *[ɾ ʃ ə] sew, sewing
wôn wiwôn [w i w ʃ ə] *wiwôn *[w ʃ ə] be costly, dare
yân yiyan [y i ʃ ə] *yiyan *[y ʃ ə] yawning
hân hîhân [h i h ʃ ə] *hîhân *[h ʃ ə] show, showing

For the data in (14) to be accounted for in a rule-based framework, we must assume that reduplication takes place before nasalization, so that nasalization is excluded from being copied. However, for the data in (12) (repeated below as (15)) to be accounted for, we must assume that nasalization took place before reduplication, for nasalization to be involved in reduplication. This results in an ordering paradox.

(15) Nasality "transfers" in [n]

ní nînî [n ʃ n i] *lînî have, having
ná nîná [n ʃ n ə] *lnîn, *nâná spend, spending

Simultaneous hypothetical derivations of ná → nîná [n ʃ n ə] "spending" (from 15); and rân → rîrân [ɾ i ɾ ʃ ə] "sewing" (from 14):

(16) Derivation A: Reduplication before Nasalization: This order predicts the right output for [rîrâ], but not for [nînâ].

Inputs /1 ʃ /*[n ʃ ]
reduplication lîlî
Sonorant nasalization *lînî ʃ
[r i ɾ ʃ]√

(17) Derivation B: Nasalization before Reduplication: This order predicts the right output for [nînâ], but not for [rîrî].

Inputs /1 ʃ /*[n ʃ ]
Sonorant nasalization n ʃ
Reduplication [nînî]√ *[r i ɾ ʃ]×

Note that this ordering paradox does not arise if /l/ contrasts with /n/ as proposed in this paper, as seen in the deverbal noun prefixes. The only relevant rule then is the sonorant nasalization rule, which applies to the output of reduplication, in this framework. The following derivation confirms the point.

On this derivation, Clements and Sonaiyia (1989) have two rules, "nasal spread" which converts [l] to [n], and "sonorant nasalization" which nasalizes other sonorants, such as [r]. "Nasal spread" applies lexically in their analysis, before reduplication. By the definition of this rule as a "lexical" rule, it CANNOT derive the [l]/[n] alternation, since these segments are not contrastive in their analysis and lexical rules are expected to be "structure preserving".
(18) Derivation C: Reduplication before Sonorant Nasalization, with contrastive /u/ and /a/: This order predicts the right output for both [riri5] and [nin5].

<table>
<thead>
<tr>
<th>Inputs</th>
<th>/ natorial /</th>
<th>/ ratorial /</th>
</tr>
</thead>
<tbody>
<tr>
<td>reduplication</td>
<td>nin5</td>
<td>rir5</td>
</tr>
<tr>
<td>Sonorant nasalization</td>
<td>[nin5]</td>
<td>[riri5]</td>
</tr>
</tbody>
</table>

5. CONCLUSION
Since the ordering paradox cannot be fixed in any way that I know, I must conclude that nasalization cannot be a rule of Yoruba, since it is unworkable in deverbal noun formation. /u/ and /a/ in fact contrast in deverbal nouns, and therefore the alternation between them is morphophonemic and not allophonic. Finally the alternation is one that denasalizes /a/ to [i], and not the other way round.

APPENDIX

Formal Derivation of Deverbal Nouns in Yoruba.
Since the debate on the sonorant nasalization has taken place in the rule based serial framework, the above discussion has been presented in that model to avoid the appearance of "hiding behind theory". In this appendix, I present a formal derivation of deverbal noun formation in Yoruba, in the Optimality theoretic framework (Prince and Smolensky 1993). This formal account is sketchy for reasons of space. For fuller details the reader is referred to Akinlabi (2000, in progress).

Formal proposal
The proposal is that the deverbal noun prefix is a high tone vowel [i]. The basic idea is that deverbal noun reduplication takes place because Yoruba disallows a word that begins with a high tone vowel. A copy of the stem consonant protects the prefix vowel from deletion.

The formal proposal presented here makes the following assumptions:
(i) With a non-high stem vowel, there is no correspondence between the vowel of the verb stem and the vowel of the prefix, the prefix vowel [i] is simply a deverbal noun morpheme (see tableaux 1&2).

(ii) The prefix vowel corresponds both to the input morpheme and verb stem vowel when the stem vowel is high. So it is both a reduplicant (i.e. a copy of the stem) and an input morpheme at the same time.

(iii) Max constraints and Ident constraints interact in a crucial way.

Formal System: Ident-BR_HIGH >> Max-BR >> Ident-BR_LAB, Ident-BR_NAS

An explanation of the system: High stem vowel versus nonhigh stem vowel

(a) There is no correspondence between the nonhigh vowel of the verb stem and the high vowel of the prefix.

Ident_Br_HIGH >> Max-BR: This ranking, representing the first half of the "formal system", expresses the generalization that if you are identical in height, then you are coindexed.
SONORANT NASALIZATION IN YORUBA DEVERBAL NOUNS

(1) Basic Deverbal prefixation in Yoruba

<table>
<thead>
<tr>
<th>/RED + i + bù/</th>
<th>MAXIO</th>
<th>*#yw</th>
<th>MORPHDIS</th>
<th>MAXBR</th>
<th>DEPBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. fù-bù</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. bù-bú</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ì-bù</td>
<td>*!</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

With a verb stem that has a non-high vowel, there cannot be any correspondence between the prefix vowel and the stem vowel. The only possible correspondence is Input-Output. So the prefix vowel remains [i]. In the next two tableaux I will assume that all the candidates satisfy MAXIO, as indicated by the subscripted prefix.

(2) Verb stem with a nonhigh (oral) vowel.

<table>
<thead>
<tr>
<th>/RED+ i + fo/</th>
<th>IDENT-IOLAB</th>
<th>IDENT-BRHIGH</th>
<th>IDENT-BRLAB</th>
<th>MAX-BR</th>
<th>IDENT-BRLAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. fù3 fo3</td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. fù3 fo4</td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. fù3 fo3</td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d. fù3 fo4</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

With a verb stem that has a nonhigh back nasalized vowel, the optimal form is selected based on faithfulness (IDENT-IO) to the input /i/ in the prefix. The prefix vowel cannot be a copy of the vowel of the base vowel. However, wherever it (IDENT-IO) is ranked it will still do the job.
(3) Verb base with a nonhigh (nasal) vowel.

<table>
<thead>
<tr>
<th>/RED + i3 + t3/</th>
<th>IDENT-IO&lt;sub&gt;LAB&lt;/sub&gt;</th>
<th>IDENT-IO&lt;sub&gt;NAS&lt;/sub&gt;</th>
<th>IDENT-BR&lt;sub&gt;HIGH&lt;/sub&gt;</th>
<th>MAX-BR</th>
<th>IDENT-BR&lt;sub&gt;LAB&lt;/sub&gt;</th>
<th>IDENT-BR&lt;sub&gt;NAS&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. t₁₁ t₃₃</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. ³ t₁₁ t₃₃</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. f₁₁ t₃₃</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>d. f₁₁ t₄₄</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>e. t₁₁ t₅₃</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>f. t₁₃ t₃₄</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>g. t₁₃ t₅₃</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>h. t₁₃ t₄₄</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

With a high base vowel, the situation is different. If as assumed above the Input-Output constraints dominate the Base-Reduplicant constraints, then we will still get [i]. However, if the opposite ranking is in effect, then we get a complete copy of the base surfaces. This is indicated in the next two tableaux by moving the I-O constraints from the top to the bottom of the hierarchy.

(4) Verb base with a high vowel.

<table>
<thead>
<tr>
<th>/RED + i3 + du/</th>
<th>MAX-IO&lt;sub&gt;B&lt;/sub&gt;&lt;sub&gt;HIGH&lt;/sub&gt;</th>
<th>IDENT-IO&lt;sub&gt;LAB&lt;/sub&gt;</th>
<th>MAX-BR</th>
<th>IDENT-BR&lt;sub&gt;LAB&lt;/sub&gt;</th>
<th>IDENT-IO&lt;sub&gt;NAS&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. d₁₃ du₃</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. d₁₃ du₄</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ³ d₁₃ du₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. d₁₃ du₄</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5) If the BR- constraints are dominant, then the high vowel is an exact copy of the verb base vowel.

<table>
<thead>
<tr>
<th>/RED + i3 + du/</th>
<th>IDENT-BR&lt;sub&gt;HIGH&lt;/sub&gt;</th>
<th>MAX-IO&lt;sub&gt;B&lt;/sub&gt;&lt;sub&gt;LAB&lt;/sub&gt;</th>
<th>MAX-BR</th>
<th>IDENT-IO&lt;sub&gt;NAS&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ³ d₁₃ du₃</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. d₁₃ du₄</td>
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<td>*!</td>
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<td>c. d₁₃ du₃</td>
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<td>*!</td>
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<tr>
<td>d. d₁₃ du₄</td>
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</table>

The essential point in either case is that when the verb base vowel is high the prefix vowel is faithful to both the input /i/ as well as to the verb base /i/.

Finally, note that the formal derivations provided in the Optimality theoretic framework above is consistent with the proposal that /i/ contrasts with /a/.
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