

Actes du  
3<sup>e</sup> Congrès Mondial de Linguistique Africaine  
Lomé 2000

édité par

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2003

## SONORANT NASALIZATION IN YORUBA DEVERBAL NOUNS<sup>1</sup>

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### 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.<sup>2</sup>

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

<sup>1</sup> 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 Bamgbose, Nick Clements, and Ahmadu Kawu 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/Denasalization

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 [r̄, w̄, ȳ, h̄] respectively, before nasal vowels (Data from Pulleyblank 1988: 259).

- (2)
- |           |   |           |            |
|-----------|---|-----------|------------|
| / r̄ ī / | → | [ r̄ ī ] | 'walk'     |
| / w̄ ī / | → | [ w̄ ī ] | 'lend'     |
| / ȳ ǔ̄ / | → | [ ȳ ǔ̄ ] | 'dispense' |
| / h̄ ũ̄ / | → | [ h̄ ũ̄ ] | 'weave'    |

We will call this process "sonorant nasalization".

The other aspect of sonorant nasalization/denasalization 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:
- |     |        |                    |
|-----|--------|--------------------|
| nù  | [nũ]   | 'feed (with food)' |
| ní  | [nī]   | 'have'             |
| òṅṅ | [òṅṅ̄] | 'road'             |
| nṳ  | [nṳ̄]  | 'spend'            |
- (b) [l] is found only before oral vowels:
- |     |                |
|-----|----------------|
| là  | 'break / open' |
| ilú | 'town'         |

<sup>2</sup> The examples are given in Yoruba standard orthography, unless enclosed in square brackets in which case they are given in standard IPA symbols.

### 2. THE GREAT DIVIDE

While there is little controversy about the sonorant nasalization process in (2), the [l]/[n] alternation in (3) has been analyzed in two ways. On the one hand are those scholars who see the l/n alternation as a phonetic alternation as in the /r, w, y, h/ → [r̄, w̄, ȳ, h̄] (sonorant nasalization), so it must in fact be the same rule. We can refer to this process as l-nasalization, first proposed by Ladefoged (1964). This analysis is shared by Awobuluyi (1964); Bamgbose (1966, 1969, 1990); Clements and Sonaiya (1989); Courtenay (1968); Oyebade (1985); and others.<sup>3</sup> The essence of this analysis is that [n] is a non-contrastive segment in Yoruba, just as [r̄, w̄, ȳ, h̄] are non-contrastive. The usual "rule" given is the one in (4).

#### (4) l - nasalization (informal)

/l/ → [n] / \_\_\_\_\_ V  
[+nasal        ]

On the other hand are those scholars who see the [l]/[n] alternation as a morphophonemic (or morphosyntactic) alternation. /n/ becomes [l] before oral vowels (except [i]) 'across morphemes. We can call this process n-denasalization. This view is shared by Siertsema (1958); Abraham (1958:438); Oyelaran (1971, 1976); Pulleyblank (1988); Awobuluyi and Oyebade (1995); and others. The relevant examples are given in (5).

- (5)
- |        |   |      |                              |
|--------|---|------|------------------------------|
| ní owó | → | lówó | "have money"                 |
| ní aḵ  | → | láfḵ | "have clothes"               |
| ní ɔkɔ | → | lókɔ | "have a husband/ be married" |
- but ní ilé        →        nílé        "have a house"

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

#### (6) n - denasalization (informal)

/n/ → [l] / \_\_\_\_\_ V  
[-nasal]

It is not always clear from most of the proponents of the denasalization approach whether they regard [l] as a variant of /n/, or whether they regard the two segments as phonemic. One thing is

<sup>3</sup> Clements and Sonaiya (1989) separate "sonorant nasalization" (the rule responsible for [r, y, w] nasalization) from "nasal spread" (the rule which converts [l] to [n] 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 n/l 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

wí	wíwí	say; saying
wì	wíwì	roast; roasting
dì	dídì	tie; tying

##### (b) high round base vowel

ḍú	dídù	dúḍù	scramble; scrambling
dú	dídú	dúdú	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 (a) high nonround base vowel

(Orthographic in = [ĩ]; un = [ũ]. Some examples from Yiwola Awoyale, personal communication.)

sín	sísín	sínsín	sneeze; sneezing
sin	sísín	sínsín	bury; burying
kín	kíkín	kínkín	brush / wipe; wiping
ḍín	ḍídín	ḍíndín	fry in oil; frying
fin	ffín	finfin	spray / inscribe / decorate; spraying
gbín	gbígbin	gbíngbin	moan / groan / growl; moaning
pín	pípín	pínpín	divide / share out; dividing
wín	wíwín	wínwín	borrow / lend; borrowing
rín	rírín	rínrín	walk; walking
yín	yíyín	yínyín	gouge out the seeds from cobs; gouging

##### (b) high round base vowel

dùn	dídùn	dúndùn	be sweet / painful / hurtful; being sweet
kún	kíkún	kúnkún	be full; being full
sun	sísun	súnsun	roast in fire; roasting
gún	gígún	gúngún	pound / stab; pounding
gùn	gígùn	gúngùn	tall / long; being tall
bùn	bíbùn	búnbùn	donate / give off; giving off
rùn	rírùn	rúnrùn	give out an odour; giving out an odour
hun	híhun	húnhun	weave, weaving
yún	yíyún	yúnnyún	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 <sup>4</sup>
*kinkun	*kukun
*dindun	*dudun
*tintun	*tutun
*sinsun	*susun
*gingun	*gugun
*gingun	*gugun
*binbun	*bubun
*rinrun	*rurun
*hinhun	*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

fɔ	fɪfɔ	* fúfɔ	wash; washing
sɔ	sɪsɔ	* súsɔ	speak; speaking
gbà	gbɪgbà	* gbúgbà	accept, accepting

(b) Nonhigh nasal base vowels

fɔ̃n	fɪfɔ̃n	* fɪnfɔ̃n	* fúfɔ̃n	* fɔ̃nfɔ̃n	blow; blowing
tàn	títàn	* títàn	* tútàn	* tántàn	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.

<sup>4</sup> Professor Ayo Bamgbose has informed me that some of the forms in which rounding alone is copied (e.g. \*tutun) are acceptable in the Ijebu dialect. I have found this to be the case when the output is adjectival, which suggests that another process may be in operation here. More importantly, there is no situation in which nasality *alone* may be copied in any dialect.

For our present purposes, the moral of the above description is that **nasality** copies onto the prefix vowel if and only if the stem vowel is high, and it copies with the other vowel features in that case. If the stem vowel is nonhigh, its nasality **does not** transfer to the prefix (and neither does any other feature). So, if the prefix vowel is nasalized when the stem has a nonhigh vowel the source of the nasality must lie elsewhere, not in the stem. In the next section we will identify such a case.

### 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 with the examples in (10b). Thus, the prefix consonant and vowel are oral.

(11) Nasality is not stable in other sonorants

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

rán	rírán	[r í r̃ ɔ̃]	*rínrán	*[r̃ í r̃ ɔ̃]	sew, sewing
wón	wíwón	[w í w̃ ɔ̃]	*wínwón	*[w̃ í w̃ ɔ̃]	be costly / dare
yán	yíyán	[y í ỹ ɔ̃]	*yínyán	*[ỹ í ỹ ɔ̃]	yawn, yawning
hàn	híhàn	[h í h̃ ɔ̃]	*hínhàn	*[h̃ í h̃ ɔ̃]	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 /l/.

(12) Nasality is stable in [n]

ní	níní	[n í n í]	*líní	have, having
ná	níná	[n í n ɔ̃]	*líná, *náná	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 deverbial noun prefixes in both forms are underlyingly oral.)

- (13) /lí - lá /           licking       (lílá)  
      /ní - nǒ /           spending     (níná)

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 deverbial 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 deverbial 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

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

rán	rírán	[r í ǐ ǒ]	*rínrán	*[r í ǐ ǒ]	sew, sewing
wón	wíwón	[w í w̃ ǒ]	*wínwón	*[w í w̃ ǒ]	be costly / dare
yán	yíyán	[y í ỹ ǒ]	*yínyán	*[y í ỹ ǒ]	yawn, yawning
hàn	hínhàn	[h í h̃ ǒ]	*hínhàn	*[h í h̃ ǒ]	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	níní	[n í n í]	*líní	have, having
ná	níná	[n í n ǒ]	*líná, *náná	spend, spending

Simultaneous hypothetical derivations of ná → níná [n í n ǒ] "spending" (from 15); and rán → rírán [r í ǐ ǒ] "sewing" (from 14):

- (16) **Derivation A:** Reduplication before Nasalization: This order predicts the right output for [rírǒ], but not for [nínǒ].

Inputs	/lǒ / (→ [nǒ])	/r ǒ /
reduplication	lílǒ	rírǒ
Sonorant nasalization	*[línǒ] ×	[r í ǐ ǒ] ✓

- (17) **Derivation B:** Nasalization before Reduplication: This order predicts the right output for [nínǒ], but not for [rírǒ].<sup>5</sup>

Inputs	/lǒ / (→ [nǒ])	/r ǒ /
Sonorant nasalization	nǒ	r ǒ
Reduplication	[nínǒ] ✓	*[r í ǐ ǒ] ×

Note that this ordering paradox does not arise if /l/ contrasts with /n/ as proposed in this paper, as seen in the deverbial 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.

<sup>5</sup> On this derivation, Clements and Sonaiya (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 /l/ and /n/: This order predicts the right output for both [rírǎ] and [nínǎ].

<b>Inputs</b>	/ nǎ /	/ rǎ /
reduplication	nínǎ	rírǎ
Sonorant nasalization	[nínǎ] √	[r í rǎ] √

### 5. CONCLUSION

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

### APPENDIX

#### Formal Derivation of Deverbial 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 deverbial 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 deverbial noun prefix is a high tone vowel [ í ]. The basic idea is that deverbial 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 deverbial 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<sub>HIGH</sub> >> MAX-BR >> IDENT-BR<sub>LAB</sub>, IDENT-BR<sub>NAS</sub>

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<sub>HIGH</sub> >> 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.

Nonhigh stem vowel: fò "jump"  
 Two hypothetical outputs: f<sub>3</sub> fo<sub>3</sub>; f<sub>3</sub> fo<sub>4</sub> "jumping"

f<sub>3</sub> fo<sub>3</sub> : **MAX-BR** prefers this because it only cares about maximizing correspondence. But this correspondence is ruled out because the two vowels are not both high. (There is no featural identity.)

f<sub>3</sub> fo<sub>4</sub> : **IDENT-BR<sub>HIGH</sub>** prefers this. Since there is no correspondence, there is no pressure for featural identity. If there is pressure for featural identity, it will be trivially satisfied.

For **IDENT-BR<sub>HIGH</sub>**, if two things correspond then they both have to be high. Features have to be identical to have correspondence. We must assume that **IDENT-BR<sub>HIGH</sub>** dominates **MAX-BR**.

(b) There is correspondence between high vowel of the stem and a high vowel of the reduplicant.

**MAX-BR** >> **IDENT-BR<sub>LAB</sub>**, **IDENT-BR<sub>NAS</sub>**: The remaining part of the hierarchy expresses the generalization that if you are co-indexed then you are identical in everything else.

High stem vowel: dù "scramble"

Four hypothetical outputs: (i) d<sub>3</sub> du<sub>3</sub> (ii) d<sub>3</sub> du<sub>4</sub> (iii) du<sub>3</sub> du<sub>3</sub> (iv) du<sub>3</sub> du<sub>4</sub> "scrambling"

(i) d<sub>3</sub> du<sub>3</sub> ; (iii) du<sub>3</sub> du<sub>3</sub> : **MAX-BR** prefers both candidates. **IDENT-BR<sub>LAB</sub>** picks (iii).

(ii) d<sub>3</sub> du<sub>4</sub> ; (iv) du<sub>3</sub> du<sub>4</sub> : **IDENT-BR** prefers both. They are ruled out because they are not correspondents, when it is in fact possible to be correspondents.

#### Illustrations

The constraint \*#V̥, which forbids absolute word initial high tone vowels, forces copying of the initial consonant of the verb stem.

#### (1) Basic Deverbal prefixation in Yoruba

/RED + í + bú/	MAX <sub>IO</sub>	*#V̥	MORPHDIS	MAX <sub>BR</sub>	DEP <sub>BR</sub>
a. <i>☞ bí</i> -bú			*	*	
b. bú-bú	*!				
c. í-bú		*!		**	

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 **MAX-IO**, as indicated by the subscripted prefix.

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

/RED+ i <sub>3</sub> + fo/	IDENT- IO <sub>LAB</sub>	IDENT BR <sub>HIGH</sub>	MAX-BR	IDENT- BR <sub>LAB</sub>
a. fú <sub>3</sub> fo <sub>3</sub>	*!	*		
b. fú <sub>3</sub> fo <sub>4</sub>	*!		*	
c. f <sub>3</sub> fo <sub>3</sub>		*!		*
d. <i>☞</i> f <sub>3</sub> fo <sub>4</sub>			*	

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.

/RED+ i <sub>3</sub> + t <sub>5</sub> /	IDENT-IO <sub>LAB</sub> IDENT-IO <sub>NAS</sub>	IDENT BR <sub>HIGH</sub>	MAX-BR	IDENT- BR <sub>LAB</sub>	IDENT- BR <sub>NAS</sub>
a. t <sub>13</sub> t <sub>53</sub>		*!		*	*
b. t <sub>13</sub> t <sub>54</sub>			*		
c. f <sub>13</sub> t <sub>53</sub>	*!	*		*	
d. f <sub>13</sub> t <sub>54</sub>	*!		*		
e. t <sub>13</sub> t <sub>53</sub>	*!	*			*
f. t <sub>13</sub> t <sub>54</sub>	*!		*		
g. t <sub>13</sub> t <sub>53</sub>	*!	*			
h. t <sub>13</sub> t <sub>54</sub>	*!		*		

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.

/RED+ i <sub>3</sub> + du/	MAX-IO IDENT- IO <sub>LAB</sub>	IDENT BR <sub>HIGH</sub>	MAX-BR	IDENT- BR <sub>LAB</sub>
a. dú <sub>3</sub> du <sub>3</sub>	*!			
b. dú <sub>3</sub> du <sub>4</sub>	*!		*	
c. dí <sub>3</sub> du <sub>3</sub>				*
d. dí <sub>3</sub> du <sub>4</sub>			*!	

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

/RED+ i <sub>3</sub> + du/	IDENT BR <sub>HIGH</sub>	MAX-BR	IDENT- BR <sub>LAB</sub>	MAX-IO IDENT- IO <sub>LAB</sub>
a. dú <sub>3</sub> du <sub>3</sub>				*
b. dú <sub>3</sub> du <sub>4</sub>		*!		*
c. dí <sub>3</sub> du <sub>3</sub>			*!	
d. dí <sub>3</sub> du <sub>4</sub>		*!		

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 /l/ contrasts with /n/.

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