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THE PHONOLOGY OF BORORO VERB,  
POSTPOSITION, AND NOUM PARADIGMS

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The Phonology of Bororo Verb, Postposition, and  
Noun Paradigms

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1. Overview

Bororo verbs, postpositions, and inalienably possessed nouns are obligatorily inflected for person and number by means of prefixes. The three classes of words are inflected in exactly the same way, therefore in the rest of the paper I will usually refer simply to 'words' except where there is some reason to distinguish which word class is being referred to.

The functional categories which these prefixes manifest are for verbs, the subject or preverbal object; for postpositions, the object of the postpositions; and for nouns, the possessor. The three paradigms below illustrate the way in which prefixes join with stems to form words. In paradigms to follow I will use only the numbers which accompany the forms below rather than always giving the labels for person and number. Plurals are indicated by double numbers; 11 is first plural inclusive, 12 is first plural exclusive, R is reflexive. For most glosses I will give only the first singular form.

Verbs

1. i-codu 'I go'

2. a-codu 'you go'

3. codu 'he, she, it goes'

Reflexive tu-godu 'he, she, it goes, they go'

11. pa-godu 'we (inclusive) go'

12. xe-godu 'we (exclusive) go'  
 22. ta-godu 'you (pl.) go'  
 33. e-codu 'they go'  
 mako 'speak'
1. i-mago 'I speak'  
 2. a-mago  
 3. mako
11. pa-mago  
 12. xe-mago  
 22. ta-mago  
 33. e-mago

Postposition

- bogai 'for'
1. i-wogai 'for me'  
 2. a-wogai  
 3. bogai  
 R. tu-wogai  
 11. pa-wogai  
 12. xe-wogai  
 22. ta-wogai  
 33. e-wogai

Possessed Noun

- bai 'house'
1. i-wai 'my house'  
 2. a-wai  
 3. bai  
 R. tu-wai  
 11. pa-wai  
 12. xe-wai  
 22. ta-wai  
 33. e-wai

Before proceeding, a few remarks about Bororo grammar are in order. First, there is no grammatical gender in the language; an animate-inanimate distinction is made in the third person prefix forms with some postpositions and nouns. The category which I call 'reflexive', for lack of a better name,

has an analog in the English reflexive, but takes in other things as well. Any second mention of a noun which is subject in a near preceding context receives a reflexive form. I have not yet clearly defined 'near preceding context.' It can take in several sentences before. No number distinction is made in reflexive.

Reflexive appears in a number of places where rules for English such as Equi NP Deletion and Reflexive operate to delete NP's or make them reflexive. In the examples below, the first mention of third person 'he' receives the third person singular prefix i-, whereas the second mention has tu- 'reflexive'.

Imedu i-tu-re                      tu-wai-to.

Man he-go-realized his-house-to

The man went to his house.

Imedu i-tu-re                      tu-maragodu-vo.

Man he-go-realized he-work-purpose.

The man went in order (for him) to work.

As may be seen (for the most part) in the paradigms and examples above, the prefix set for verbs, postpositions, and nouns is:

1. i-
2. a-
3.  $\emptyset$  ~ u- ~ bo-
- R. tu- ~ xe

- 11. pa
- 12. xe
- 22. ta
- 33. e-

Prefix alternation in 3. and in R. will be explained shortly.

Within paradigms, as exemplified by the four cited for 'go', 'speak', 'for', and 'possession', there is also strength alternation involving the first and second consonants of the stems (not prefixes). The base form for all paradigms is found in the third singular form. Strength alternation involves a rule of consonant voicing (voiceless C → voiced C) as well as a rule of glide formation (b → w and j → y). Three more paradigms are given here to illustrate strength alternation. The same alternation may also be seen in the paradigms cited previously.

	butu	'fall'		joki	'over'
1.	i-wadu	'I fall'	1.	i-yogi	'over me'
2.	a-wudu		2.	a-yogi	
3.	butu		3.	joki	
R.	tu-wudu		R.	tu-yogi	
11.	pa-wudu		11.	pa-yogi	
12.	xe-wudu		12.	xe-yogi	
22.	ta-wudu		22.	ta-yogi	
33.	e-wudu		33.	e-yogi	
	tugo	'arrow'			
1.	i-tugo	'my arrow'			

- 2. a-tugo
- 3. tugo
- R. tu-dugo
- 11. pa-dugo
- 12. xe-dugo
- 22. ta-dugo
- 33. e-tugo

Bororo consonants are m, n, r, w, (**b**), y, p, t, k, b, d, g. Bilabial fricative b and w are in complementary distribution. w occurs before -front vowels a, o, and u, and b before +front vowels i and e.

Each of the examples given thus far has had a consonant initial stem. In vowel initial stems a thematic consonant is added after the prefix. For example, before i-initial stems a -k- which alternates with -g- is inserted.

- iye 'name'
- 1. i-k-iye 'my name'
- 2. a-k-iye
- 3. iye X
- R. tu-g-iye
- 11. pa-g-iye
- 12. xe-g-iye
- 22. ta-g-iye
- 33. e-k-iye

In broad outline then the rule is  $\emptyset \rightarrow$  thematic consonant / prefix vowel \_\_\_ vowel initial stem.

In the discussion to follow I will treat the rules needed for describing the thematic consonants found with vowel initial stems, consonant strength alternation within words, and also some alternations occurring with only limited sets of words.

## II. Thematic Consonants

Bororo has five vowels, a, e, i, o, u. There are verbs, postpositions, and inalienably possessed nouns which begin with a, o, and i. None begin with u or e.

In paradigms of vowel initial stems (stem = word minus prefix) a thematic consonant is inserted between the person prefix and the stem. This breaks up the VV sequence brought about by the prefixes, all of which end with a vowel, being added to vowel initial stems. The following chart matches prefixes with thematic consonants.

<u>Prefix</u>	<u>Thematic Consonant</u> / <u>_____ vowel initial stem</u>
1. i-	k ~ t ~ (n)
2. a-	k
3. Ø ~ (u- ~ bo-)	Ø
R. tu- ~ xe--	g ~ Ø
11. pa-	g
12. xe-	g ~ d ~ (n)
22. ta-	g
33. e-	k ~ t ~ (n)

iwogu 'steal'

1. i-k-iwogu 'I steal'

2. a-k-iwogu

iwogu

- R. tu-g-iwogu or x-∅-iwogu > xiwogu
11. pa-g-iwogu
12. xe-g-iwogu
22. ta-g-iwogu
33. e-k-iwogu

ore 'children'

1. i-t-ore 'my children'
2. a-k-ore
3. ore
- R. tu-∅-ore > t-ore
11. pa-g-ore
12. xe-d-ore
22. ta-g-ore
33. e-t-ore

The thematic consonant is k or its voiced counterpart g in all cases except in 1, 12, and 33 (the prefixes of which end in i or e), in words where the first stem vowel is a or o, such as in ore 'children', which is given above. In these cases the thematic consonant is t (in 1 and 33) or its voiced alternate d (in 12). Voicing alternation is explained in section III.

The rules for thematic consonant insertion are

- a. ∅ → k / # (C) V + \_\_\_ V
- b. k → t / # (C) {e / i} + \_\_\_ {o / a}



In feature notation the rules are

$$a. \quad \emptyset \rightarrow \begin{bmatrix} -\text{anterior} \\ -\text{coronal} \\ -\text{voice} \end{bmatrix} / \# ( [-\text{syllabic}] ) [+syll] + \_\_\_ [+syll]$$

$$b. \quad \begin{bmatrix} -\text{anterior} \\ -\text{coronal} \\ -\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{ant.} \\ +\text{cor.} \\ -\text{voice} \end{bmatrix} / \# ( [-\text{syll}] ) \begin{bmatrix} +\text{syll} \\ -\text{back} \end{bmatrix} + \_\_\_ \begin{bmatrix} +\text{syll} \\ +\text{back} \end{bmatrix}$$

Third singulars in all instances and reflexives in some do not take a thematic consonant. Third singular never has a thematic consonant because vowel initial stems (the only environment for thematic consonants) never have person prefixed in third singular and therefore do not present a VV sequence to be broken up by a thematic consonant. Only about a dozen consonant initial stems take third singular prefix u- and two, bo-wadu 'play' and bo-wada 'fishhook' take bo-.

Reflexives with i- initial stems such as iwogu 'steal', given above, take either thematic consonant g, following prefix tu- or no thematic consonant at all. In the latter case the reflexive prefix is xe- rather than tu-. With the stems beginning with any other vowel besides i, such as ore 'children' given in the paradigm above, the prefix is always tu- and there is no thematic consonant. Furthermore, in reflexive forms which have no thematic consonant, the vowel of the prefix is deleted by way of a general process which operates throughout the language and which among other things, eliminates the first vowel of  $\{ \overset{u}{i} \}$ -V sequences in unstressed syllables.

An i- initial stem such as iyē 'name' may have either xe-∅-iyē, giving x-iyē, or tu-gi-iyē 'his name'. o- initial

ore 'children' may only have tu-∅-ore, giving t-ore 'his children'.

Reflexives or consonant initial stems take the prefix tu- in all words except redo 'pour', which, for some unknown reason, appears as both xe-redo and tu-redo 'he pours'.

Another thematic consonant, -n-, occurs in nine words in those same contexts in which thematic t occurs. Most of these words have to do with the mouth or actions pertaining to the mouth. The words are inogwa 'my mouth', inogwage 'I eat', inoja 'my mouth cavity', inojagu 'I whistle', inago 'I say', inogiyegi 'I tell a story'. There are a number of other words pertaining to speech which do not take the thematic consonant -n-, but instead follow the normal rules for thematic XXX k or t. Other -n- words which have nothing to do with speech or mouth are inoxe 'to be mine', inoika 'my anxiety', and inai 'to or for me'. I have no explanation for why these words take -n- rather than -t- as thematic consonant.

### III. Consonantal Strengthening

Rules of consonant strengthening apply to the consonants p, t, k, b, d, g, y, and w, (i.e. all consonants except m, n, and r). The consonants affected may be thematic consonants inserted by the rules described in section II, or may be either the first or second consonant of the verb, noun, or postposition root. With regard to consonantal strengthening, no distinction is made between thematic consonants and any other consonants.

There are two strengthening rules, Glide Formation and Voicing. The Glide Formation rule is

$$\left\{ \begin{array}{l} j \rightarrow y \\ b \rightarrow w \end{array} \right\} / \# (C) V + \underline{\quad}$$

or in feature notation

$$\left\{ \begin{array}{l} \left[ \begin{array}{l} +\text{delayed release} \\ +\text{voice} \end{array} \right] \rightarrow \left[ \begin{array}{l} -\text{anterior} \\ -\text{consonantal} \end{array} \right] \\ \left[ \begin{array}{l} +\text{anterior} \\ -\text{coronal} \\ +\text{voice} \end{array} \right] \rightarrow \left[ \begin{array}{l} +\text{anterior} \\ -\text{consonantal} \end{array} \right] \end{array} \right\} / \# ([-\text{syll}] ) [+syll] + \underline{\quad}$$

The effect of this rule is to change stem initial j's and b's to y's and w's respectively whenever a prefix is added. Prefixes are added, as stated before, in all but third singular (and in a few cases, in that form as well). In 1, 2, and 33 the prefix has no consonant; in the other forms it does. Therefore the rule applies to either a word's first consonant (in 1, 2, and 33) or second consonant (all other forms).

	jura 'bone'		bure 'foot'
1.	i-yura 'my bone'	1.	i-wure 'my foot'
2.	a-yura	2.	a-wure
3.	jura	3.	bure
R.	tu-yura	R.	tu-wure
11.	pa-yura	11.	pa-wure
12.	xe-yura	12.	xe-wure
22.	ta-yura	22.	ta-wure
33.	e-yura	33.	e-wure

The rule applies only to segments immediately following a morpheme boundary. The + in the rule prevents incorrect derivations such as e-kawi, rather than the actually occurring

e-kabi 'they wash' from kabi 'wash'.

The second of the strengthening rules, Voicing, is

$C \rightarrow [+voiced] / \# (C) V (CV) \underline{\quad}$

Condition: Either (C), (CV), or both must be chosen.

Voicing applies to the second and third consonants of a word. This rule differs from Glide Formation in several ways. First, it may not apply to a word's first consonant, hence the condition. Glide Formation, on the other hand, applies to the first consonant of a word in 1, 2, and 33, which are the forms with consonantless prefixes. This means that the initial consonant of a base form like kodu 'go' is voiced only in those forms whose prefixes have a consonant. Following a prefix containing a consonant, a stem initial consonant meets the structural description of the rule and is voiced. The paradigm for kodu 'go' is as follows:

kodu 'go'

1. i-kodu 'I go'

2. a-kodu

3. kodu

R. tu-godu

11. pa-godu

12. xe-godu

22. ta-godu

33. e-kodu

Further examples here demonstrate the voicing of second and third consonants of words as well as Glide Formation  $b \rightarrow w$  in bataru 'word'.

	mako	'speak'	rixo	'grow'	bataru	'word'
1.	i-mago	'I speak	i-rijo	'I grow'	i-wadaru	'my word'
2.	a-mago		a-rijo		a-wadaru	
3.	mako		rixo		bataru	
R.	tu-mago		tu-rijo		tu-wadaru	
11.	pa-mago		pa-rijo		pa-wadaru	
12.	xe-mago		xe-rijo		xe-wadaru	
22.	ta-mago		ta-rijo		ta-wadaru	
33.	e-mago		e-rijo		e-wadaru	

Because of one set of words the voicing rule must be allowed to apply twice. This is the small group (I know of only seven) of vowel initial stems in which the first consonant is voiceless. In these both the thematic consonant and the stem initial consonant must be voiced in accordance with the rule, i.e. when they are the second or third consonant in the word. ikabe 'shout' is one of these words.

ikabe 'shout'

1. i-k-igabe 'I shout'
2. a-k-igabe
3. igabe
- R. tu-g-igabe
11. pa-g-igabe
12. xe-g-igabe
22. ta-g-igabe
33. i-k-igabe

In all situations other than that just described, the rule need apply only to either the word's second or third consonant

(not both). The reason for this is that there are no base forms in which both of the initial consonants are voiceless.

Only one word is an exception to the Voicing rule, joku 'eye'.

joku 'eye'

1. i-yoku
2. a-eku
3. joku
- R. tu-yoku
11. pa-eku
12. xe-eku
22. ta-eku
33. e-eku

According to the Voicing rule, k should become g in all except 2 and 33. There is, in fact, a homonymous word joku 'pity' which does follow the rules perfectly. Its paradigm is given later. As is explained there, joku is odd in other ways as well.

One further rule applies to a small number of words, that is, i-initial stems. In third plural, the thematic consonant k is inserted. This k creates the environment for the voicing of the initial consonant of stems in which the first consonant is voiceless, such as ikabe 'shout', third plural e-k-igabe 'they shout'. The actual form, however, is eigabe 'they shout'. The third plural form of iye 'name' likewise is not e-k-iye, as expected (and as is given on page 5) but instead is eiye 'their name'.

The voicing of the first consonant of a stem such as ikabe 'shout' is strong evidence that the thematic consonant was once there and later deleted, rather than simply positing no thematic consonant for third plural of i- initial stems. In this case there would be no explanation for why the first consonant of a stem such as ikabe is voiced in 33. Further reason for believing that there was once a thematic consonant is that stems beginning with o or a do in fact always have a thematic consonant in third plural, e.g. ore 'children' e-t-ore 'their children'.

The way in which Glide Formation and Voicing are formulated correctly accounts for how consonantal strength alternation is, in fact, less complicated than it might be. Restrictions in these rules as to what consonants may be strengthened and in what positions account for the simplification. The alternating consonants, with the strong alternants listed above their weak counterparts, are as follows:

y w  
j b d g  
x p t k

The discussion here centers around the two sets of three on the left, i.e. y j x and w b p.

The crucial paradigmatic forms under consideration here are 1, 2, and 33, the only prefixed forms with no consonant in their prefixes. In the paradigms for different words, the first consonant following the prefix may be weak in all these three forms or strong in all three. The first consonant

following a prefix with a consonant is always strong, for this reason these forms are not of interest here.

In paga 'wait' the initial consonant is weak in 1, 2, and 33.

- paga 'wait'
- 1. i-paga 'I wait'
- 2. a-paga
- 33. e-paga

In bataru 'word' the initial consonant is strong in each of the forms.

- bataru 'word'
- 1. i-wadaru 'my word'
- 2. a-wadaru
- 33. e-wadaru

It is important to note, however, that there are no prefixed forms in which a b or a j is the first consonant. That is, j and b occur as the first consonant only in base forms; they never occur stem-initially as strengthened forms of x and p in prefixed forms. This is accounted for by the strengthening rules, which allow no first consonant to be strengthened except j and b (to y and w, respectively). This prevents the occurrence of forms such as:

- 1. \*i-ba
- 2. \*a-ba
- 33. \*e-ba

from a base form pa 'place'. These would be generated by rules allowing other consonants to be strengthened in initial position. Rules which permit only glide formation in first



position correctly generate from pa

1. i-pa 'my place
2. a-pa
33. e-pa

with no strengthening of stem initial p.

Furthermore strengthening (by way of Glide Formation) of j or b is obligatory when one of them is the first consonant of a word. This prevents the generation of forms such as:

1. \*i-ba
2. \*a-ba
33. \*e-ba

from a base form ba 'egg'. From a base ba, the forms may only be:

1. i-wa 'my egg'
2. a-wa
33. e-wa

Without the rules being formulated as they are, all the possibilities mentioned above, both the correct and the incorrect, would be generated. Exactly the same situation exists for forms with x y j.

For second and third consonants of words, the situation is the reverse of that described above. Here only Voicing is involved, not Glide Formation. This correctly predicts that there are no cases such as a base rabu → e-rawu or a base raju → e-rayu.

In summary, the prefixless base form, as seen in third singular, with two strengthening rules, correctly account for

the unique derivation of all forms.

#### IV. Limited Alternations

The consonant initial stems shown in paradigms thus far combine with prefixes to produce words in a straightforward manner. There is, however, one set of stems, those with initial je or ji, in which complications arise. The paradigm for jemaru 'search', given below, illustrates how the stem initial j is deleted in all instances where it follows a prefix ending in a or e (i.e. 2, 11, 12, 33) and precedes i or e, i.e.

$j \rightarrow \emptyset \begin{Bmatrix} a \\ e \end{Bmatrix} \text{---} \begin{Bmatrix} i \\ e \end{Bmatrix}$ . This rule is not overly natural, to be sure, but for now, at least, it is all I have to offer. The juxtaposed vowels left after j is deleted are elided. The paradigm for jura 'bone' shows that j is not deleted when it is followed by anything except e or i.

jemaru 'search'	jura 'bone'
1. i-yemaru 'I search'	i-yura 'my bone'
2. a-emaru	a-yura
3. jemaru	jura
R. tu-yemaru	tu-yura
11. pa-emaru	pa-yura
12. xe-emaru	xe-yura
22. ta-emaru	ta-yura
33. e-emaru	e-yura

A further change is seen in six jo- initial words: joku 'eye', jokae 'in the sight of', jorudu 'see', joru 'fire', jorubo 'medicine', jorubada 'godfather'. In these words o is

replaced by e when it follows a prefix ending in a or e. This is exactly the same preceding, but not following, context as is necessary for the j deletion rule given above.

There are two words beginning in jo in which this o → e change does not occur, joto 'walking stick' and joku 'pity'. Note that joku 'pity' is a homonym of joku 'eye'. In the former, there is no o → e process, whereas in the latter there is. Under these circumstances I see no possibility for a strictly phonological explanation without going to some very abstract solution. The paradigms for joku 'pity' and joku 'eye' are:

joku 'eye'	yoku 'pity'
1. i-yoku 'my eye'	i-yogu 'I pity'.
2. a-eku	a-yogu
3. joku	joku
R. tu-yoku	tu-yogu
11. pa-eku	pa-yogu
12. xe-eku	xe-yogu
22. ta-eku	ta-yogu
33. e-eku	e-yogu

It may have some bearing on e → o changes that all of the words in which the change occurs are in the semantic areas of sight, fire, and medicine. The connection of godfather with medicine, the only relation which is not apparent, is quite plausible in the cultural context.

There is one further thing which may or may not have significance here. There is o - e alternation seen in the

words joru 'fire' and jerigi 'firewood', which suggests that possibly there was once some kind of ablaut relationship regarding e and o between related words as well as within single paradigms. These two words are however, the only pair in which I see such alternation, so that admittedly this is a straw in the wind.

	joru 'fire'	jerigi 'firewood'
1.	i-yoru 'my fire'	i-yerigi 'my firewood'
2.	a-eru	a-erigi
3.	joru	jerigi
R.	tu-yoru	tu-yerigi
11.	pa-eru	pa-erigi
12.	xe-eru	xe-erigi
22.	ta-eru	ta-erigi
33.	e-eru	e-erigi

All paradigms in the language act in accordance with the rules found in this paper except for the two paradigms for possessed nouns of other than the inalienably possessed type. These differ from all others in that there is alternation only in the prefix, not in the stem. The paradigm for kogariga 'chicken' represents the possession paradigm for domesticated animals and tori 'stone' the paradigm for everything other than domesticated animals or inalienably possessed items.

	kogariga	'chicken		tori	'stone'
1.	inago-kogariga	'my chicken'		ino-tori	'my stone'
2.	akago-kogariga			ako-tori	
3.	ako-kogariga			o-tori	
R.	tugago-kogariga			to-tori	
11.	pagago-kogariga			pagago-tori	
12.	xenago-kogariga			xeno-tori	
22.	tagago-kogariga			tago-tori	
33.	enago-kogariga			eno-tori	