A GENERATIVE PHONOLOGY OF THE VERB IN BENA-BENA

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Ling 621
Term Paper

INTRODUCTION

The subject material for this paper is drawn from a New Guinea language of the Eastern Highlands, called Bena-bena. The data itself has been limited to what I have previously termed: the Primary Verb.[1] The term 'primary' here refers to the verb as it occurs sentence final as distinct from those forms which occur within the sentence (and sometimes referred to as 'sentence-medial verbs', or 'Secondary'[2]).

The verb in Bena-bena has been identified as a unit composed of a stem which obligatorily inflects for subject, tense and mood. The object of the analysis is to account for allomorphic alternation of the stem vowels when in combination with affixial, complex morphemes denoting person, number, tense etc. So that the problem comprises the discovery and formulation of rules that will apply to all sets of verbs and give explanation and predictability for alternation between stem vowels and affixes.

1 "The Primary Verb in Bena-bena"
Verb studies in Five N.G. Languages, S.I.L. Okla.

2. As above Footnote 1.

The problem stated

Bena-bena is a language which has its verbs sub-classified into 3 groups on the basis of the vowels involved for each group. Even a cursory glance at the verb paradigms would suggest that there must be phonological processes involved. But to find an adequate explanation and to even discover the process-es, is elusive and difficult. By a non-generative analysis, the alternatives are either 3 classes of verb stems with one set of affixes; or, one class of stems with 3 classes of affixes. This is a matter of segmentation in which the morpheme juncture is made to the left or right of the vowel. In my earlier analysis the former was chosen as being the more reasonable of the two. But which ever analysis is pursued, the classification either way is made on the interplay of the 5 vowel system which ought to be discoverable and explainable.

The base forms of the stem

In the following examples:

halube 'I will hit'; hilùbe 'I will do'; filube 'I will pierce'

the juncture can be made to give the stem as either:

CV -

or, C -

My rejection of choosing C - is on the following points:

1. That it would give lexically contrastive zero stems.

   alube 'I will come'

   ilube 'I will do/hit'

2. That it would result in a number of homophonous stems

3. There are verbs that begin CV_iCV_i - Eg. malalube 'I will put', and this would mean a CVC which contained a variable V:

   molo'ohube 'I put'

   mele'ehabe 'they put'

Therefore, I hold that the underlying verb stem is as follows:

V

CV

CV_iCV_i

The vowels of these stems assimilate under the influence of the vowels of contiguous affixes. This process involves all 5 of the system, 3 of them being posited as underlying forms implicit in the rules enumerated. The 5 are:

i u

e o

a

The underlying forms I assume are: i, a, u

I cannot accept an underlying form with an unspecified vowel because it is obvious that the vowel helps to differentiate meaning as in the examples given above (alube 'I will come' and ilube 'I will do/hit'). Note also the following stems: la 'burn', lu 'say', li 'take'.

The data presented is representative but not restricted; that is, the rules that apply to the three Primary verbs presented below apply to the whole inventory of verbs.

Base forms of crucial affixes.

There is an underlying set of stem prefixes which denote a focus on a kind of number, which I have termed 'monofocal' versus 'polyfocal' because they do not equate exactly with singular and plural respectively.[1]

These two morphemes are crucial to the phonological operations which effect the stem vowel. Their underlying forms are:

monofocal u-

polyfocal i-

Person-number suffixes are:

	Singular	Dual	Plural
1st	-u(be)	-u'i(be)	-u(ne)
2nd	-a(ne)	-a'i(be)	-a(be)
3rd	-i(be)	-a'i(be)	-a(be)

where bracketed items are mood morphemes and where the

glottal stop occurs in dual forms. These morphemes are crucial when contiguous to the stem because the initial vowel of these suffixes effects the stem vowel.

The future tense morpheme is:

$$-\left[\begin{matrix}\alpha\ \text{high}\\ -\ \text{back}\\ V\end{matrix}\right] l \quad (\text{i.e } -\left\{\begin{matrix}i\\ a\end{matrix}\right\} l\ )$$

This morpheme affixes directly to the stem and so, being contiguous, the initial vowel of this suffix effects the stem vowel.

The Present tense is zero, so in this tense the Person-number suffixes are contiguous to the stem.

The Imperative number suffixes are:

$-\emptyset$(bo) 'singular'

$-\left\{\begin{matrix}a\\ i\end{matrix}\right\}$li(yo) 'dual'

$-\left\{\begin{matrix}a\\ i\end{matrix}\right\}$(lo) 'plural'

The Operative prefix has the underlying form :na-

The Past tense has the suffixual morpheme -' $\left[\begin{matrix}+\text{low}\\ V\end{matrix}\right]$ followed by the Present tense form of the verb 'to be' (that is the form resultant from the appropriate application of phonological rules). Here the vowel of the Past tense morpheme is effected by the stem vowel, so this set of rules must be ordered after those rules which effect the stem.

Only vowels which are contiguous to the stem influence the stem vowel. Thus for suffixes an intervening C blocks assimilation, but for prefixes the stem C which intervene does not block assimilation.

Future tense paradigm

'hit'	'be/do'	'pierce'
1. halube	hilube	filube
2. halu'ibe	hilu'ibe	filu'ibe
3. halune	hilune	filune
4. halane	hilane	filane
5. halibe	hilibe	filibe
6. hala'ibe	hila'ibe	fila'ibe
7. halabe	hilabe	filabe

The following is a schemic view of the assimilation process that takes place in the verb stem when it is prefixed by the focus morpheme and suffixed by the future:

1-5	u + ha + al	u + hu + il	u + fi + il	
	a	i	i	
	uhaal	uhiil	ufiil	assimilation
	hal	hil	fil	deletion
6-7	i + ha + al	i + hu + il	i + fi + il	
	a	i	i	
	ihaal	ihiil	ifiil	assimilation
	hal	hil	fil	deletion

Here it is not obvious that the preceding focus morpheme has any effect upon the stem vowel, so the rules can be stated as:

Rule F 1: $u \dashrightarrow i \,/\, \_\_\_\, i$

F 2: $V \dashrightarrow \emptyset \,/\, \left\{\begin{array}{l} \#\_\_\_\, CV \\ V\_\_\_ \end{array}\right\}$

Rule F 1 can be formalized as:

$$F\ 1:\ \begin{bmatrix} +\text{high} \\ +\text{back} \end{bmatrix} \longrightarrow [-\text{back}] \,/\, \_\_\_\, [-\text{back}]$$

Imperative paradigm

8.	hobo	bubo	fibo
9.	haliyo	biliyo	filiyo
10.	halo	bilo	filo

The following is a schemic view of the assimilation that takes place in the verb stem when imperative suffixes are added:

8.	u + ha + ∅ (u →)	u + bu + ∅ (u →)	u + fi + ∅ (u →)	
	o	u	i	
	uho	ubu	ufi	assimilation
	ho	bu	fi	deletion
9,10	i + ha + a (i → ← a)	i + bu + i (i → ← i)	i + fi + i (i → ← i)	
	a	i	i	
	iha	ibu	ifi	assimilation
	ha	bu	fi	deletion

Here the preceding and as well as the following vowel appears to influence the stem. (Examples 9-10 ,i ha a, may possibly demonstrate that one vowel may block the influence of the other. Why doesn't a become e after i?).

Rules from this paradigm are as follows:

Rule I 1 a ------> o / u_____

I 2 u ------> i / i_____

I 3 V ------> Ø / {#_____CV, V_____}

Rule I 1 may be formalized as:

I 1 $\begin{bmatrix} +\text{low} \\ -\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{high} \\ +\text{round} \end{bmatrix} / \begin{bmatrix} +\text{high} \\ +\text{round} \end{bmatrix} \_\_\_\_\_$

Rule I 2 is similar to F 1 but the environment is inverted. It can be formalized as:

I 2 $\begin{bmatrix} +\text{back} \\ +\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{back} \end{bmatrix} / \begin{bmatrix} -\text{back} \\ \cdot \end{bmatrix} \_\_\_\_\_$

Rule I 3, the deletion rule is the same as F 2.

Present Tense paradigm

11.	hobe	hube	fube
12.	ho'ibe	hu'ibe	fu'ibe
13.	hone	hune	fune
14.	hane	hane	fine
15.	habe	hibe	fibe
16.	ha'ibe	ha'ibe	fi'ibe
17.	habe	habe	fibe

Below is a schemic view of the assimilation that occurs when the focus prefix and the person, number suffix are added to the verb stem:

11-13.	u + ha + u	u + bu + u	u + fi + u	
	o	u	u	
	uhou	ubuu	ufuu	assimilation
	ho	bu	fu	deletion
14.	u + ha + a	u + bu + a	u + fi + a	
	a	a	i	
	uhaa	ubaa	ufia	assimilation
	ha	ba	fi	deletion
15.	u + ha + i	u + bu + i	u + fi + i	
	a	i	i	
	uhai	ubii	ufii	assimilation
	ha	bi	fi	deletion
16-17.	i + ha + a	i + bu + a	i + fi + a	
	a	a	i	
	ihaa	ibaa	ifia	assimilation
	ha	ba	fi	deletion

Here again both preceding and following vowels appear to inter-act upon the stem vowel. Notice that the presence of [- round] in the context of i or a prevents assimilation to [+ round.]

The rules from this paradigm are:

Rule Pr 1 $\left\{\begin{matrix} a \dashrightarrow o \\ i \dashrightarrow u \end{matrix}\right\} / uC \_\_\_\_ u$

Pr 2 $u \dashrightarrow i / \_\_\_\_ i$

Pr 3 $u \dashrightarrow a / \_\_\_\_ a$

Pr 4 $V \dashrightarrow \emptyset / \left\{\begin{matrix} \#\_\_\_\_CV \\ V\_\_\_\_ \end{matrix}\right\}$

Notice that Rule Pr 4, the deletion rule, is the same as Rules I 3 and F 2.

Since u is the least resistant to change, it is not necessary to specify contextual elements both before and after as conditioning factors. - round in either position causes the u to assimilate.

Rule Pr 1 may be formalized as:

Pr 1 $\begin{bmatrix} -\text{round} \end{bmatrix} \dashrightarrow \begin{bmatrix} \alpha\text{ high} \\ +\text{round} \end{bmatrix} / \begin{bmatrix} \alpha\text{ high} \\ +\text{round} \end{bmatrix} C \_\_\_\_ \begin{bmatrix} \alpha\text{ high} \\ +\text{round} \end{bmatrix}$

Rule Pr 2 may be formalized as:

Pr 2 $\begin{bmatrix} +\text{back} \\ +\text{round} \end{bmatrix} \dashrightarrow \begin{bmatrix} -\text{back} \end{bmatrix} / \_\_\_\_ \begin{bmatrix} -\text{back} \end{bmatrix}$

Rule Pr 3 may be formalized as:

Pr 3 $\begin{bmatrix} +\text{high} \\ +\text{round} \end{bmatrix} \dashrightarrow \begin{bmatrix} -\text{high} \\ -\text{round} \end{bmatrix} / \_\_\_\_ \begin{bmatrix} -\text{high} \\ -\text{round} \end{bmatrix}$

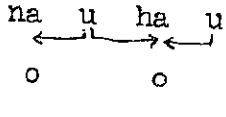
Operative paradigm

The operative prefix, with the underlying form, na-, attaches to verb stems in conjunction with the present tense and indicates that the action is in the actual process of taking place; or, that the action is customary.

18.	nohobe	nohube	nofube
19.	noho'ibe	nohu'ibe	nofu'ibe
20.	nohone	nohune	nofune
21.	nohane	nohane	nofine
22.	nohabe	nohibe	nofibe
23.	neha'ibe	neha'ibe	nefi'ibe
24.	nehabe	nehabe	nefibe

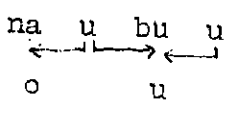
Below is a schemic view of the assimilation that occurs when the Operative prefix, na-, is added to the verb stem.

18-20.



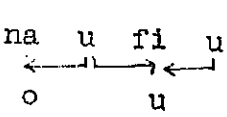
nouhou

noho



noubuu

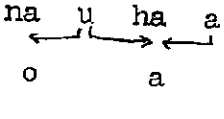
no u



noufuu assimil.

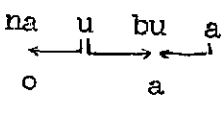
nofu deletion

21.



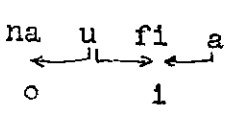
nouhaa

noha



noubaa

no a



noufia assimil.

nofi deletion

22.

na u ha i	na u hu i	na u fi i	
o a	o i	o i	
nouhai	nouhii	noufii	assimil.
noha	nohi	nofi	deletion

na i ha a	na i hu a	na i fi a	
e a	e a	e i	
neihaa	neihaa	neifia	assimil.
neha	neha	nefi	deletion

Here too both preceding and following environments are vital. Blocking is evident in that the presence of [- back] prevents a [- back] vowel from assimilating to back. The focus morpheme has a two directional influence influencing both the stem vowel and the contiguous vowel of the prefix which precedes it. .

Rules for this paradigm are:

Rule 0 1 a ---> o / uC ____u

#C ____u

0 2 a ----> e/#C ____i

0 3 u ----> a / ____a

0 4 u ---> i / ____i

0 5 u ----> i / uC____u

0 6 V ---> ø / V ____

The deletion rule O 6 is contained within the deletion rule previously stated (F 2,I 3, Pr 4).

All the rules except O 2 have been handled in formalizations already. O 2 formalizes as:

$$O\ 2 \begin{bmatrix} +\text{low} \\ +\text{back} \\ -\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{low} \\ -\text{back} \end{bmatrix} / C \_\_\_\_ \begin{bmatrix} +\text{high} \\ -\text{back} \end{bmatrix}$$

Past tense paradigm

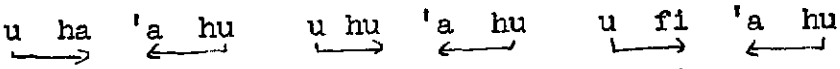
25	ho'ohube	hu'ohube	fi'ohube
26	ho'ohu'ibe	hu'ohu'ibe	fi'ohu'ibe
27	ho'ohune	hu'ohune	fi'ohune
28	ho'ahane	hu'ahane	fi'ahane
29	ho'ehibe	hu'ehibe	fi'ehibe
30	he'eha'ibe	hi'eha'ibe	fi'eha'ibe
31	he'ehabe	hi'ehabe	fi'ehabe

The past tense is formed in an unusual way: by linking the basic verb stem to another verb, hu- 'to be', by means of the past tense ligature morpheme, -'a (that is, -ʔa). The verb hu- 'to be' (see column 2) is already in its surface structured, present tense form. The components of the past tense are shown thus:

Focus Stem Ligature V 'to be'

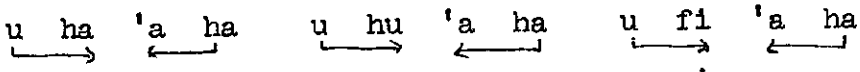
Below is a schemic view of assimilation that occurs with the elements just mentioned.

25-27.



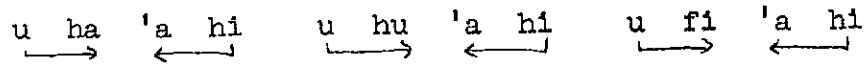
assimil.
deletion

28.



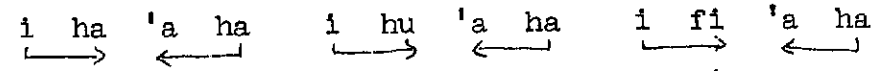
assim.
delet.

29.



assimil.
deletion

30-31.



assimil.
deletion

Here the glottal stop, being a non stem consonanat blocks assimilation influences of the vowels on either side of the glottal stop upon each other.

Rules for this paradigm are:

Rule Pt 1 a ----> o / u _____

Pt 2 a ----> e / i_____

Pt 3 u ----> i / i_____

Pt 4 V ----> ∅ / #_____CV

Pt 5 a ----> o / ' _____Cu

Pt 6 a ----> e / ' _____Ci

In this paradigm the vowel of the affixed stem influences the past tense morpheme vowel which precedes it. Rules Pt5 and Pt 6 produce this affixual assimilation. But the following stem has already undergone the rules, so strict ordering of rules is necessary here.

Object Prefixes

Direct Object prefixes are derived from the declension of the free forms of the presonal pronouns. They attach to the surface forms of the stem, and come between the Operative and the stem when the Operative is present. The form of the Operative is derived before the Object morpheme are inserted and does not influence the Object forms.

The base forms of the Object prefixes are:

	Singular	Dual	Plural
1st	na	le'a	la
2nd	ka	leta	lena
3rd	a	eta	ena

The final vowel of the Object prefix harmonizes the vowel of the stem, as expressed in the following rule:

DO 1 V ------ V_i C_____ CV_i $_{VS}$

The final vowel of the prefix deletes in the following situation:

DO 2 V------ $\emptyset$ _____ CV_{VS}

Notice that the deletion rule is very similar to one section of the deletion rule already presented.

The Resultant Rules

The rules enumerate three processes; the order of application is ordered:

STEM V ASSIMILATION

V DELETION

PREFIX V ASSIMILATION

The rules have been collapsed and formalized below. (It is very possible that further collapsing of the rules could have been made, but due to considerations of time, this has not been done).

1. u ---> { i/____i ; a/____a } (F 1, Pr 2, 04, Pr 3)

Formalized:

$$\begin{bmatrix} +\text{round} \\ V \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{round} \\ \alpha\,\text{high} \\ \alpha\,\text{back} \end{bmatrix} \Big/ \quad \underline{\quad} \begin{bmatrix} -\text{round} \\ \alpha\,\text{high} \\ \alpha\,\text{back} \end{bmatrix}$$

2. u ----> 1/i____ (I 2, Pt 3)

Formalized:

$$\begin{bmatrix} +\text{high} \\ +\text{back} \\ V \end{bmatrix} \longrightarrow [-\text{back}] \Big/ [-\text{back}] \underline{\quad}$$

3. a ---> { o/ u_____ (Pt 1, I 1) ; e/ i_____ (Pt 2) }

Formalized:

$$[+\text{low}_V] \longrightarrow [-\text{low} \; \alpha\,\text{back}] \Big/ [-\text{low} \; \alpha\,\text{back}] \underline{\quad}$$

4. { a ---> o ; i ----> u } / uC _____u (Pr I)

Formalized:

$$\begin{bmatrix} -\text{round} \\ \alpha\,\text{high} \\ U \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{round} \\ \alpha\,\text{high} \end{bmatrix} \Big/ [+\text{round}] \; C \; \underline{\quad} \; [+\text{round}]$$

5. $V \dashrightarrow \emptyset \,/\, \left\{ \begin{matrix} \#\_\_\_\#\ [CV]_{Vs} \\ V\ \_\_\_ \end{matrix} \right\}$ (F 2,I 3, O 6, Pt 4 DO 2)

6. $a \dashrightarrow \left\{ \begin{matrix} o\ /'\ \_\_\_\ [Cu]_{Vs} \\ e\ /'\ \_\_\_\ [Ci]_{Vs} \end{matrix} \right\}$ (Pt 5) (Pt 6)

Formalize:

$$\begin{bmatrix} +low \\ V \end{bmatrix} \dashrightarrow \begin{bmatrix} -low \\ \alpha back \end{bmatrix}' \_\_\_\_ \left[C \begin{bmatrix} -low \\ \alpha back \end{bmatrix}_V \right]_{Vs}$$

7. $V \dashrightarrow V_i \,/\, C\ \_\_\_\_\#\ [CV_i]_{Vs}$ (DO 1)

The unmarked value of Round for vowels in Bena-bena is probably [-round] since a feature [-round] in the environment prevents assimilation to [+round]. Note that even /u/ changes when [-round] is present, despite another /u/ in the environment.

The rules within any one process are not ordered but the processes are seen to be necessarily ordered.

In order to cover all types of verb stems, a labelled bracketing, with the stem consonant(s) in paretheses, could have been used. It is interesting to note that the verb stem behaves as if it had no consonants.

Conclusion

It has been recognised for some years that verb structures of the languages of the Eastern Highlands stock are grammatically complex. This paper demonstrates that Bena-bena at least (besides very probably others of the stock) has verb structures that are phonologically complex as well.

Previously verbs had been sub-classified for number (which I called 'monofocal' and 'polyfocal'because they did not equate exactly with singular and plural). One of the evidences of the fruitfulness of this generative analysis has been to confirm and strengthen this discovery. Phonological operations depend upon the assumption of two prefixual morphemes indicating number (i.e mono- and poly-focal).

This study shows that the verb system of Bena-bena draws on an underlying system of three vowels, despite a surface structure involving five. Intuitively, I feel, that the assumption of three underlying vowels may have a more general application in the language as a whole.