

THE NATURAL HISTORY OF MEINHOF'S LAW IN BANTU

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The paper presents a historical reconstruction of Meinhof's Law in terms of two functionally distinct stages of development. It is argued that in the first stage, the Law developed as a phonetic process involving assimilation internal to a voiced, prenasalized stop. This assimilation was restricted to environments in which a second prenasalized segment occurred in the succeeding syllable; however, this part of the environment functioned as a catalyst, and not an active cause of the change. In the proposed second stage of development of Meinhof's Law, the environment of the Law generalized from "following prenasalized segment" to "any following nasal segment." It is argued that this development was a consequence of a historical restructuring involved in the shift from a phonetic process to a morphophonemic rule.

1. Introduction

Much of the interest in recent historical reconstruction has been focused on finding functional motivations for the sound changes that have been observed in various languages. In this paper, I propose to apply the principles of Stampe's [1973] theory of Natural Phonology in providing a functional explanation for the development of the sound change known as Meinhof's Law in Bantu. The key feature of Stampe's theory which figures in the analysis is the distinction between the innate and automatic phonetic *processes* of a language, and the morphophonemic *rules* which are learned in association with specific morphemes. In this paper, I apply the rule/process distinction to a historical interpretation of the different attested forms of Meinhof's Law in Bantu phonology. Specifically, I argue that Meinhof's Law developed in two stages. In the first stage, the Law operated as an assimilatory reduction process affecting voiced, prenasalized consonants, with the environmental condition, "before a prenasalized consonant in the following syllable" acting as a catalyst for the application of the process. In the second stage of development (affecting some

but not all of the languages evidencing Meinhof's Law), the environment of the Law generalized from "a following prenasalized consonant" to "any following nasal." This change took place because speakers had come to interpret the "hyper-nasality" of certain forms affected by the Law as a redundant category signal, and extended this redundancy to other forms containing nasal consonants. Thus, the main idea I wish to defend is that the effects of inert phonetic processes (which constitute the regular sound changes of a language) are learned by new generations of speakers as morphophonemic alternations affecting particular morphological categories. When a process changes in this way to a rule, it may undergo restructuring which ignores the phonetic basis for the alternation, but is sensitive to functional motivations related to paradigm structure.

A similar approach to the question of sound change has been previously presented in Hooper [1974]. Hooper argues on the basis of data from various Spanish dialects that early morphologization of phonetic processes is a natural development in historical change. For example, she demonstrates that in Granadense (the dialect of Granada, in the eastern half of Andalusia) an alternation in vowel tenseness which was originally motivated by a word-final /s/ (weakened to [h]) took on morphological significance as a marker of the noun category "plural", even before the phonetic motivation for the alternation had been completely lost in the language (through loss of word-final [h]).

2. Meinhof's Law, Stage One: The Phonetic Basis

Meinhof's Law is attested in several different forms in the Bantu languages.¹ The effect of the Law is to change a voiced, prenasalized consonant ([^mb], [ⁿd], [^ɲj], [^ŋg]) to a long nasal (or in some languages, a simple nasal), when followed in the next syllable by another prenasalized consonant (in some languages, any following nasal C). The three major at-

¹For a broader survey of the data related to Meinhof's Law, and a review of the literature on this topic, see Herbert [1977].

tested forms of the Law are summarized in Table I below,² with representative examples from Ganda, Kikuyu and Swahili, respectively.

Table 1: Attested Forms of Meinhof's Law

1. ${}^nC_{vd} > N: / _ V (V) N$
2. ${}^nC_{vd} > N / _ V (V) N$
3. ${}^nC_{vd} > N / _ V (V) {}^nC$

Examples:

Common Bantu	*N-gombe	*N-jumba [†]	*N-goma	*N-dimi
	'cattle'	'house'	'drum'	'tongues'
Ganda	ŋgombe	nnyumba	ŋgoma	nnimi
Kikuyu	ng'ombe ^{††}	nyūmba	---	nTmT
Swahili	ng'ombe	nyumba	ngoma	ndimi

[†]I have followed a suggestion in Meeussen [1972:9-10] in rejecting a *j/*y contrast for Proto-Bantu. This is the only starred form which deviates from Guthrie.

^{††}orthographic ng' = [ŋ]

From evidence presented in Meeussen [1962], and discussed more recently in Herbert [1977], it appears that Meinhof's Law is a very old development, which may have been active as a phonetically motivated sound change as early as the Proto-Bantu period. The evidence for this supposition includes (a) the fact that the Law is attested in almost all of the Bantu field, although often only in relic form, and (b) the fact that it is no longer a productive rule in any form in any language; for example, it does not apply to loan-words in Ganda, one of the languages in which the Law is still apparent in morphophonemic alternations. A third consideration is

²Another apparent variation in the form of the Law is that in some languages, it affects only prenasalized consonants of a certain position, e.g. velars. See Meeussen [1962] for some discussion. This variation does not affect the points to be made in this paper.

the fact that the Law is post-dated by various other historical developments. For example, in Kikuyu, prenasalized voiceless stops have developed into voiced stops, in forms such as ndumbT 'piece of log; wooden head rest', from Proto-Bantu $*\text{-tymbi}$ (7/8) 'stool'. (Starred forms are from Guthrie [1967-71]; data from Kikuyu and other Bantu languages is given in orthographic form, which provides an adequate representation of the Bantu consonants.) If the Law had been still productive when the change $*\text{nt} > \text{nd}$ took place, then the Kikuyu word ndumbT would have been subject to it, yielding the unattested $**\text{numbT}$. Some examples of a parallel development for prenasalized voiceless consonants in Luyia are indama 'cheek' $< *\text{-tama}$; and tsimbeni 'lightening' $< *\text{-penj}$. (Luyia otherwise evidences the application of Meinhof's Law before a simple nasal, as in ing'oma 'drum' $< *\text{-goma}$.)³

In the earliest discussion of Meinhof's Law, it was considered to be a case of *dissimilation* of consonants in successive syllables (at least, where two prenasalized consonants happened to be involved). I believe, however, that the active phonetic principle behind the Law was in fact a case of *assimilation within* the segment affected. That is, a voiced stop with prenasalization became a nasal consonant by means of a simple assimilation to its "prenasal" component. The resulting long nasal segment subsequently reduced to a simple nasal in all languages other than Ganda (the retention of a long nasal in Ganda was undoubtedly related to the development of geminate consonants from other sources, cf. Mould [1977]). This view of the essential phonetic form of Meinhof's Law (henceforth, to be denoted ML_1) may be schematized as follows:

ML_1 : Meinhof's Law as a phonetic process

${}^n\text{C}_{\text{vd}} \rightarrow \text{N}$:

(Subsequently: $\text{N} : \rightarrow \text{N}$ in most languages)

³Even more dramatic evidence in Luyia for loss of productivity is the diminutive form axa-moni 'little eye', from imoni 'eye' ($< *im-\beta\text{oni}$; based upon $-\beta\text{ona}$ 'see'). I am indebted to the anonymous reviewer for pointing out this fact.

The fact that the process represented as ML_1 applied only in the case of a prenasalized consonant in the succeeding syllable can be explained on this account as follows. Stampe has argued that phonetic reduction processes, such as ML_1 , are universally available to children as an aid in mastering the pronunciation of sounds in their respective languages. These processes are gradually "suppressed" in the acquisition of a language, as the child's speech gradually approximates the adult standard. Failure to suppress these processes, on the other hand, leads to historical innovation and sound change. My proposal concerning the historical origin of Meinhof's Law is that it reflects the reduction of a voiced prenasalized stop to a long nasal, a reduction process which was suppressed in every environment *except* the case of two prenasalized stops in successive syllables. In the latter case, the reduction process applied to the first prenasalized segment in the string. Thus, the environmental condition, "when followed by another prenasalized stop", functioned only as a catalyst for the application of ML_1 but did not itself constitute the cause of the development. This account of the data seems to me a plausible one, since it is obvious that an inherently difficult segment such as a prenasalized consonant presents considerably greater problems for the language learner when it happens to recur in rapid succession.

A recent alternative proposal concerning the phonetic interpretation of Meinhof's Law has been made in Herbert [1977]. Herbert also views the Law as a case of phonetic assimilation, but of a quite different sort. Herbert claims that at the underlying level of representation, Bantu prenasalized segments are to be analyzed as homorganic nasal *clusters*, with the nasal element functioning in the preceding syllable and the stop consonant in the following syllable. Meinhof's Law can then be explained as a case of the spread of the feature [+nasal] to the only non-nasal segment in an otherwise "hyper-nasal" environment. This interpretation of Meinhof's Law is formalized as follows:

$$\begin{bmatrix} +\text{cons} \\ +\text{voice} \\ -\text{cont} \end{bmatrix} \rightarrow [+nasal] / \begin{bmatrix} +\text{cons} \\ +\text{nas} \end{bmatrix} \text{ — } \begin{bmatrix} +\text{voc} \\ +\text{nas} \end{bmatrix} \begin{bmatrix} +\text{cons} \\ +\text{nas} \end{bmatrix}$$

One disadvantage of Herbert's proposal (over my own) is that it requires independent acceptance of the analysis of prenasalized segments as underlying nasal clusters. However, I do not consider this a major difficulty, since Herbert's case is well-argued. A more serious objection is that the analysis depends upon a further assumption concerning vowel nasalization processes, namely, "If a language has a process or processes nasalizing underlying oral vowels and has nasal compounds, any vowel preceding a nasal compound will be systematically nasalized" [Herbert 1977:349]. This generalization is needed to account for the hypothesized nasality of any vowel before a prenasalized consonant in Proto-Bantu (but not necessarily before a simple vowel). In addition, we must assume that Proto-Bantu did possess a phonological process of vowel nasalization, an assumption that Herbert has not supported in any specific detail. My own analysis depends only upon the overt phonetic form of prenasalized consonants in Bantu, plus the general claims of Natural Phonology.

The question of which phonetic analysis of Meinhof's Law is the more persuasive does not affect the argumentation in the next section of this paper. In what follows, I attempt to show that the emergence of a second conditioning environment for Meinhof's Law (namely, "when followed by any nasal segment in the succeeding syllable") was a product of the historical process of morphologization.

3. Meinhof's Law, Stage Two: The Evidence for Restructuring

In this section of the paper, I wish to defend the view that those languages in which Meinhof's Law operates in the environment of any following nasal consonant (and not just a following prenasalized consonant) represent cases of historical restructuring associated with the change from a process to a rule. This restructuring took place as follows. Meinhof's Law in its first stage tended to affect two morphological constructions: noun stems taking the class 9/10 nominal prefixes, the so-called "nasal classes" of Bantu; and verb stems preceded by the first person, singular subject marker *nǝ-, which tended to reduce to a homorganic nasal in many languages. My proposal concerning the second stage of Meinhof's Law is that, relative to these specific morphological categories, the Law underwent a restructuring in which the environment of the Law generalized to "any following nasal". The form of Meinhof's Law thus became the rule

given below.

ML₂: Meinhof's Law as a morphophonemic rule

$${}^nC_{vd} \rightarrow N(:)^* / ___V (V) N$$

*Whether a long or short nasal results depends upon the specific language.

The idea behind this formulation is that the spread of nasality to the voiced stop in this form of the rule reflects the role of the feature [nasal] as a morphological, rather than a phonetic, redundancy.

The best supporting evidence for my analysis is the *absence* of evidence for Meinhof's Law ever having applied in the case of the Bantu verbal extensions *-am- (Stative) and *-an- (Reciprocal). If the environment of Meinhof's Law had been "any following nasal" during the productive, non-morphologized stage of the rule, it should have affected stems ending in a prenasalized consonant followed by *-am- or *-an-. Yet of twenty-two original Bantu stems in Kikuyu, for example, which have the shape ...CVNC..., none of these has an extended form with -an- which has undergone Meinhof's Law. Nevertheless, some of these forms have specialized meanings, which suggests that they are rather old word-formations. Moreover, there are Class 9 nominal derivatives of the same stems which do show the effects of Meinhof's Law (on the nominal prefix). Some examples are presented in Table II. (see p.268)

To the above it might be objected that levelling has perhaps affected extensions with -an-, and that this would account for the absence of evidence for the application of Meinhof's Law. Even so, we would expect to find relic formations where extensions such as *-am- have been incorporated into a root and do show the effects of the Law. Kikuyu does have two candidates for such relic evidence, and again, ML₂ has not affected these words. The forms are *kingima* 'be stupid; stand still' < *-king- (*-kingam-) 'lie across'; and *hindima* 'be morose' < *-pɪnd- 'remain silent'. These facts contrast with the present status of Dahl's Law in Kikuyu, as described in Bennett [1967]. Dahl's Law is another apparent case of consonant dissimilation in Kikuyu, since its effect is to change

Table 2: Extended Verbs With -an- in Kikuyu

-amba	'stretch, peg out'	
-ambana	(formerly with reference to Ithuika ceremony) 'peg anti-social persons to ground covering them with heaps of dry grass and rubbish prior to burning them to death'	
-umba	'mould, shape'	
-umbania	(causative reciprocal) 'mould anyhow'	
-thamba	'be cleaned by a medicine-man'	
-thambania	'(1) clean, wash others, one another; (2) take a deceased man's widow to wife'	
-gunda	'be discoloured (of teeth); rot (of calabashes); be depressed (of people)'	
-gundana	'become stained entirely'	
-runga	'straighten, put straight'	
-rungana	'straighten each other, others; deal with each other favourably, give others a fair deal'	
-gamba	'make a sound; ring (of bells); bang (of gun); etc.'	
-gambania		
ciana ikTgambania nyūmba tu		'the children poured into the house'
rugambi, ng'ambi		'a small bell used as ornament or carried by medicine man'
-genda	'travel'	
-gendanira	(associative)	
rugendo, ng'endo		'journey; trading expedition to Masai country'
-amba	'begin, start, be the first'	
-ambana	(esp. of a quarrel, fight) 'start to do something to others, each other; start a row, go at each other'	
-enda	'want, like, love'	
-endana	'love or like one another, love or like somebody'	
wendani		'mutual affection'
wendano		'affection'
rūendano, nyendano		'extreme favouritism'

[k] to [g] whenever a voiceless stop or [ð] (< *c) follows in the succeeding syllable; for example, k^u-genda 'to travel' vs. g^u-tanda 'to cut'. Dahl's Law no longer affects verb stems constructed with the verbal extension -ik- ; for example, we find gwakika 'become built', based upon the root gwaka 'build'. However, where this extension has been directly incorporated into a root, there is evidence that the Law did apply at one time to stems with verbal extensions ending in [k]. For example, g^uūka 'to be dislodged, pulled out', incorporating the reversive-stative suffix -ūk- vs. k^uūra 'to pull out, uproot', with the transitive suffix -ūr- . In light of this, it would be difficult to explain forms such as kingima and hindima (rather than **king'ima and **hinima), except by our assumption that the generalization of the environment of Meinhof's Law was part of the process of morphologization.

The Kikuyu example just cited is by no means an isolated instance of the failure of the more general form of Meinhof's Law to apply in certain morphological contexts. In his *Comparative Bantu*, Guthrie gives examples of eleven Common Bantu stems of the shape ...CVNC..., which are said to be osculant with stems of the shape ...CVNVCVN... . "Osculance" here can be interpreted to mean that in some languages, the reflex of the Proto-Bantu verb root does not occur independently of some verbal extension of the form -VN- . What is interesting about these eleven cases is that in those languages affected by Meinhof's Law, none give evidence of the Law having applied in these instances of verb roots with incorporated extensions (at least, not in the reflexes cited by Guthrie). The eleven Common Bantu stems involved in this example are given in Table III. (see p.270)

The data in Table III thus provide further evidence that the emergence of Meinhof's Law as an alternation conditioned by "any following nasal" was the consequence of restructuring through morphologization.

4. Conclusion

In this paper, I have tried to show that it is possible to give a detailed reconstruction, with functional motivations, for the history of Meinhof's Law, by interpreting the historical facts with reference to the principles of Natural Phonology. Thus, an interpretation of Meinhof's Law was offered which involved two major theoretical claims: (a) that the Law

Table 3: Common Bantu Stems Incorporating a Suffix of the Shape -VN-

284a	-cangam-	'meet (someone)'
285a	-cangan-	'assemble'
286a	-cangan-	'become mixed'
286b	-canganj-	'mix, mix up'
319b	-cendam-	'become leaning'
584a	-dingan-	'become equal'
711a	-dungam-	'become straight/fitting'
1070a	-kingam-	'lie across'
1485a	-pengam-	'become bent'
1716a	-tengam-	'become leaning'
2083b	-yɪŋgin	'come (or go) in'

(The numbers in this table are the numbers assigned to each in Guthrie 1967-71.)

underwent two stages of historical development, corresponding to the difference between a phonetic process and a morphologically conditioned rule in Natural Phonology; and (b) that each stage had a different functional motivation in Bantu grammar. Hopefully, this functional approach to historical change can be expanded to give increasingly explanatory descriptions of the historical evolution of the Bantu family.

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