Phonological Asymmetries of Bantu Nasal Prefixes

Jonathan Choti

1. Introduction

In Bantu, two kinds of nasal prefixes are observed: bilabial /m/ and underspecified /N/ (or /n/). The two prefixes are diachronic relics of Pro-Bantu syllables /mu/ and /ni/, respectively (Meinhof 1932). The bilabial nasal prefix /m/ occurs as the marker for noun classes 1, 3, and 18 while /N/ may occur as the marker for class 9/10, 1SG subject, 1SG object, focus, and negation. Besides distribution, the two nasal prefixes also differ in their phonological behavior in that /m/ is relatively stable, always syllabic, and conditions limited segmental and prosodic alternations. Some of the segmental alternations triggered by /m/ occur in Matuumbi (Odden 1996) and Yao (Ngunga 2000). Bantu /N/ is generally non-syllabic and triggers a series of segmental and prosodic alternations.[1] This paper focuses on the realization of the Bantu underspecified nasal prefix /N/. Bantu /N/ exhibits a variety of asymmetries in its realization such that its behavior in a single language may not reveal the full range of its phonological properties. Thus, this study explores some of the crosslinguistic phonological asymmetries of Bantu /N/. Some previous accounts of /N/ attribute its variations to phonetic adjustments (e.g. Herbert 1986, Steriade 1993, Hubbard 1995a). In this paper, I examine some of the asymmetries of /N/ and argue that they are conditioned mainly by language-specific phonology. The arguments presented in this paper are based on a number of phonological processes: prenasal vowel epenthesis, prenasal vowel lengthening, prenasal vowel shortening, postnasal nasalization, postnasal (de)voicing, and nasal deletion. The specific factors that condition the behavior of Bantu /N/ include its moraic status, phonemic status of vowel length, location of /N/ in a word, size and grammatical category of stem, quality of stem-initial consonant, and consonant cluster licensing in particular languages.[2] The analysis of /N/ in this paper is based on two models: moraic theory (Hyman 1985, Hayes 1989, Topintzi 2006) and Element-based Dependency (Botma 2004). The properties of /N/ examined in this paper are also crucial in understanding the nature of interaction between nasal manner, other manner types, place, and laryngeal modification in processes such as postnasal (de)aspiration, nasal place assimilation, postnasal (de)affrication, postnasal de-implosion, postnasal hardening, postnasal consonant insertion/deletion, tone assignment, and reduplication. This study also gives insights about the nature of interface between morphosyntax and phonology in human languages.

This paper is organized as follows. Section 2 discusses the asymmetry of Bantu /N/ in the context of prenasal vowel epenthesis and prenasal vowel lengthening. In section 3 I discuss variations associated with /N/ according to its location in the host stem. Section 4 discusses asymmetries of /N/ in postnasal nasalization and (de)voicing while section 5 deals with variations involving /N/ deletion. The conclusion of this paper is given in section 6.

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[1] Bantu /N/ does surface syllabic in monosyllabic stems to enable such stems attain the two-mora minimal size requirement for nominals and verbs in Bantu (see Park 1995 for a discussion of this principle in Swahili).

[2] This study assumes that the nasal and obstruent in Bantu NCs surface as tautosyllabic clusters.

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2. Asymmetry of Bantu /N/ in prenasal vowel epenthesis and lengthening

2.1. Prenasal vowel epenthesis

In a number of Bantu languages, pre-consonantal /N/ surfaces preceded with an epenthetic vowel in word-initial position. In such languages, when the epenthetic vowel is not realized, /N/ surfaces as a syllabic homorganic nasal instead. The most frequent epenthetic vowels in this context are /i/ and /u/. In Bantu prenasal vowel epenthesis occurs in languages where /N/ is treated as moraic, e.g. Lungu (Bickmore 2007), Gusii (Cammenga 2002, Nash 2011), Kuria (Cammenga 2004), and Rwanda (Kimenyi 1979).[3] In these languages, word-medial /N/ is preceded by a lengthened vowel (see §2.2). In Gusii the vowel /i/ is inserted optionally word-initially before /N/ when followed by a consonant (1a-e) but not when followed by a vowel (1f). The variation of /N/ before a consonant vs. a vowel affirms that /i/ is indeed epenthetic, as in (1) where /N/ occurs as the focus marker (Nash 2011:138):[4]

(1) Prenasal vowel epenthesis in Gusii

a.	/N-to-a-róm-a/	→	[(ì)-n-tw-áà-róm-á]	'we bit'
b.	/N-ko-a-róm-a/	→	[(ì)-ŋ-kw-áà-róm-á]	'you sg. bit'
c.	/N-mo-a-róm-a/	→	[(ì)-m-mw-áà-róm-á]	'you pl. bit'
d.	/N-βa-a-róm-a/	→	[(ì)-m-báà-róm-á]	'they bit'
e.	/N-na-a- róm-a/	→	[(ì)-n-ná-à-róm-á]	'I bit'
f.	/N-a-a- róm-a/	→	[n-a-a-róm-á]	's/he bit'

In (1), the underlying forms have /N/ as the initial segment but the surface forms in (1a-e) have an optional epenthetic vowel [i] initially. However, no such epenthetic vowel occurs in (1f). The homorganic nasals (1a-e) would surface syllabic in the absence of the epenthetic vowel. This implies that in nasal-initial stems (1c-d), the epenthetic vowel alternates with the first half of the geminate.

Word-initial prenasal vowel epenthesis in Bantu correlates with contrastive vowel length. Bantu languages that allow initial prenasal vowel epenthesis have contrastive vowel length and /N/ is treated as moraic, either underlyingly or by rule (e.g. Clements 1986, Downing 1996, Odden 1996, Bickmore 2007, Nash 2011). In Bantu, /N/ is moraic in a number of languages some of which will be further cited below, for example, Gusii (Nash 2011), Kuria (Cammenga 2004), Lungu (Bickmore 2007), and Rwanda (Kimenyi 1979). The data in (2-3) below illustrate contrastive vowel length in two example languages, Gusii and Rwanda (Kimenyi 1979:1-2):[5]

(2) Contrastive vowel length in Gusii

a.	/a/ vs. /aa/:	[tacha]	'step on'	vs.	[taacha]	'tap water'
b.	/ɛ/ vs. /ɛɛ/:	[tɛma]	'cut down a tree'	vs.	[tɛɛma]	'try'
c.	/ɔ/ vs. /ɔɔ/:	[kɔnya]	'mix carelessly'	vs.	[kɔɔnya]	'help'
d.	/u/ vs. /uu/:	[ßuta]	'stop bearing'	vs.	[ßuuta]	'spend time at'
e.	/i/ vs. /ii/:	[rina]	'refuse to give'	vs.	[riina]	'climb up'

(3) Contrastive vowel length in Rwanda

a.	/i/ vs. /ii/:	[gusiβa]	'to erase'	vs.	[gusiiβa]	'to be absent'
b.	/e/ vs. /ee/:	[gusega]	'to climb a tree'	vs.	[guseega]	'to beg'
c.	/u/ vs. /uu/:	[kuvura]	'to foam'	vs.	[kuvuura]	'to cure'
d.	/a/ vs. /aa/:	[gutaka]	'to scream'	vs.	[gutaaka]	'to ornate'
e.	/o/ vs. /oo/:	[isóko]	'market'	vs.	[isóoko]	'source'

The data in (2-3) show that vowel length is contrastive in Gusii (2) and Rwanda (3). Both languages allow prenasal vowel epenthesis initially and /N/ is moraic. The facts (2-3) prove that prenasal vowel

[3] The names used in this paper to refer to Bantu languages do not contain the class prefix and/or (augment..

[4] Nash (2011), and other sources, uses the alveolar nasal /n/ but in this paper I use the underspecified nasal /N/.

[5] Any undocumented data from Gusii and Swahili is provided by the author who is a native speaker of both languages.

epenthesis correlates with contrastive vowel length in languages where /N/ is moraic such as Ganda (Clements 1986), Jita (Downing 1996), Matuumbi (Odden 1996), Yao (Ngunga 2000), and Lungu (Bickmore 2007). Prenasal vowel epenthesis results from the demorification of /N/ in these languages.

The strongest evidence that prenasal vowel epenthesis in Bantu arises from the demorification of /N/ comes from Babole.[6] In Babole the epenthetic vowel occurs before both voiced and voiceless NÇs. However, Babole epenthetic /i/ is nasalized in NÇs following nasal deletion before voiceless obstruents. The Babole facts attest that the epenthetic vowel occurs so as to recover the mora and nasality of /N/ after it undergoes deletion or is syllabified as onset. In the Babole forms (4) /N/ occurs as the class 9 prefix (Leitch 2003:397):[7]

(4) Initial prenasal vowel epenthesis in Babole

a.	/N-pàkó/	→	[ĩ.pà.kó]	'stubbornness'
b.	/N-bésé/	→	[i.^{m}bé.sé]	'turtle (species)'
c.	/N-tɛhì/	→	[ĩ.tɛ.hì]	'saliva'
d.	/N-dèŋgà/	→	[i.^{n}dè.^{ŋ}gà]	'unmarried person'
e.	/N-tsɛtsí/	→	[ĩ.tsɛ.tsí]	'the ripping apart of something'
f.	/N-dzɔmbɔ/	→	[i.^{n}dzɔ.^{m}bɔ]	'species of large eel'
g.	/N-kɛtì/	→	[ĩ.kɛ.tì]	'anger'
h.	/Ngɔndɔ/	→	[i.^{ŋ}gɔ.^{n}dɔ]	'chimpanzee'
i.	/N-sáèlò/	→	[ĩ.sáè.lò]	'downstream'

In (4) Babole epenthetic [i] occurs before /N/ whether or not /N/ surfaces. /N/ is retained before voiced obstruents /b/ (4b), /d/ (4c), /dz/ (4f), and /g/ (4h) but is deleted before voiceless obstruents /p/ (4a), /t/ (4c), /ts/ (4e), /k/ (4g), and /s/ (4i). Thus, in Babole, the epenthetic vowel is oral when /N/ is retained but nasal when /N/ is deleted.

Bantu word-initial prenasal vowel epenthesis is not observed in languages that do not have contrastive vowel length. Moreover, in these languages /N/ is not moraic. Examples of such languages include Swahili, Konde/Nyakyusa, and Kongo (Meinhof 1932). In these languages no epenthetic vowel appears before pre-consonantal /N/, as the Swahili (5) and Kongo (6) forms show (Meinhof 1932:159) (In Swahili (5) /N/ occurs as the class 9/10 prefix whereas in Kongo (6) /N/ is the 1SG subject marker):

(5) Realization of /N/ in Swahili

a.	/N-gumu/	→	[ŋgumu]	'9/10-hard'
b.	/N-baya/	→	[mbaya]	'9/10-bad'
c.	/N-bao/	→	[mbao]	'9/10-wood'
d.	/N-dogo/	→	[ndogo]	'9/10-small'

(6) Realization of /N/ in Kongo

a.	/N-kemi/	→	[ŋkemi]	'I have squeezed'
b.	/N-tumini/	→	[ntumini]	'I have sent'
c.	/N-ʋeni/	→	[mpeni]	'I have given'
d.	/N-lendi/	→	[ndendi]	'I have followed'

The forms in (5-6) show that word-initial Swahili (5) and Kongo (6) /N/ surfaces without a preceding epenthetic vowel. The absence of an epenthetic vowel in Swahili and Kongo coincides with two other properties shared by the two languages: vowel length is not contrastive and /N/ is not moraic. These facts apply to Nyakyusa as well. The Swahili and Kongo data endorse the idea that prenasal vowel epenthesis in Bantu correlates with contrastive vowel length and moraic /N/. The correlation between

[6] This paper treats each language synchronically, and does not get into the details of determining whether the synchronic interpretations exactly mirror the diachronic origins and changes.

[7] The available data does not show what happens when the stem begins with a nasal or vowel.

initial prenasal vowel epenthesis and contrastive vowel length and moraic /N/ suggests that the asymmetry observed in these contexts is dependent on language specific phonology. Prenasal vowel epenthesis occurs in languages with contrastive vowel length and a moraic /N/, and vice versa. In §2.2 I examine the asymmetry of /N/ in prenasal vowel lengthening.

2.2. Prenasal vowel lengthening

The asymmetry of Bantu /N/ in prenasal vowel lengthening provides additional evidence that its behavior is regulated by language-specific phonology. In a number of Bantu languages, the realization of /N/ is accompanied by lengthening in the vowel immediately preceding /N/. This process occurs whether /N/ is prefixed before another nasal, obstruent, or vowel. Bantu languages that exhibit prenasal vowel lengthening include Jita (Downing 1996, 2005), Kuria (Cammenga 2004), Gusii (Nash 2011), Matuumbi (Odden 1996), Lungu (Bickmore 2007), Yao (Ngunga 2000), and Rwanda (Kimenyi 1979). In these languages evidence suggests that /N/ is moraic and vowel length is contrastive. In (7) prenasal vowel lengthening involves vowel-initial stems in Kuria (Cammenga 2004:114-15):

(7) Pre-N+V vowel lengthening in Kuria

a.	/o-N-ɔk-er-i/	→	[uuɲokiíyi]	‘you have lit for me (today)’
b.	/o-N-eβ-er-er-e/	→	[uuɲeβeré]	‘you have forgotten me (today)’
c.	/o-N-aɣ-er-er-e/	→	[uuɲaɣeéye]	‘you have weeded for me’
d.	/e-N-aNɣ-o/	→	[iiɲááŋgo]	‘9a-quick’

In (7) the Kuria augment occurs as a short vowel underlyingly but surfaces as a long vowel before /N/ of 1SG object (7a-c) and class 9a (7d). In Kuria, prevocalic /N/ is realized as a palatal nasal [ɲ]. Choti (2014) shows that Bantu /N/ is realized consistently as a back nasal, varying between the palatal [ɲ] and velar [ŋ] nasals before vowels (and sometimes before glides).[8] The Jita data (8) show prenasal vowel lengthening before 1SG object /N/ in stems with nasals and oral consonants as initial segments (Downing 1996:23):

(8) Pre-N+C and pre-N+N vowel lengthening in Jita

a.	/o-ku-N-té:ker-a/	→	[oku:ntu:kéra]	‘to cook for me’
b.	/o-ku-N-jing-a/	→	[oku:nji:nga]	‘to surround me’
c.	/o-ku-N-síndik-a/	→	[oku:nsi:ndíka]	‘to push me’
d.	/o-ku-N-mír-a/	→	[oku:míra]	‘to swallow me’
e.	/o-ku-N-nénesy-a/	→	[oku:nénesya]	‘to make me fat’

In (8) Jita prenasal vowel lengthening occurs before /N/ when followed by an obstruent (8a-c) and a nasal (8d-e). In the Jita N+N sequence (8d-e) only one nasal is realized, implying nasal degemination. Prenasal vowel lengthening in Kuria and Jita stems from the demorification of /N/ when it is syllabified as onset (or part of onset).

Prenasal vowel lengthening is not attested in all Bantu languages. Some Bantu languages do not allow prenasal vowel lengthening. These languages include Swahili (Meinhof 1932), Kongo (Meinhof 1932), Babole (Leitch 2003), and Konde (Meinhof 1932). In these languages vowel length is not contrastive nor is /N/ moraic. The data in (9) shows that Kongo /N/ of 1SG object does not trigger prenasal vowel lengthening (Meinhof 1932:159):

[8] See Hyman and Katamba (1999) for a discussion of the structure of Bantu verbal roots especially regarding initial segments.

(9) Absence of prenasal vowel lengthening in Kongo

a.	/ba-N-land-a/	→	[bandanda]	'they followed me'
b.	/ba-N-tum-il-e/	→	[bantumini]	'they have sent me'
c.	/ba-N-ʋen-i/	→	[bampeni]	'they have given me'
d.	/ba-N-keŋg-i/	→	[baŋkeŋgi]	'they have bound me'

The preceding data sets (7-9) show that Bantu prenasal vowel lengthening occurs only in languages with contrastive vowel length and a moraic /N/ (the Babole data available to me did not confirm whether or not vowel length is contrastive and /N/ is moraic). If this generalization is correct, then the asymmetry of /N/ in initial prenasal vowel epenthesis (§2.1) and prenasal vowel lengthening (§2.2) are conditioned by language-specific phonology. Thus, Bantu prenasal vowel lengthening and prenasal epenthesis are predicted to occur only in languages with contrastive vowel length and /N/ is moraic.

In moraic theory prenasal vowel lengthening is treated as compensatory lengthening (CL) (Hayes 1989, Topintzi 2006). Moraic theory predicts that CL will occur in languages with contrastive vowel length whenever a moraic segment is demorified (Hayes 1989). Given the correlation between Bantu prenasal vowel lengthening and contrastive vowel length, it is compelling to view this process as CL that results from the demorification of /N/ in specific languages. The other process considered CL in moraic theory is vowel lengthening after glide formation. Postglide vowel lengthening is ubiquitous in Bantu. In some Bantu languages, when an underlying non-low vowel is followed by a vowel of a different quality, the non-low vowel becomes a glide, triggering lengthening in the postglide vowel:

(10) Postglide vowel lengthening in Gusii

a.	/ri-ɣuari/	→	[riɣw**a:**ri]	'12-zebra'
b.	/o-mo-ɔɣɔ/	→	[omw**ɔ:**ɣɔ]	'3-cassava'
c.	/ru-an-a/	→	[rw**a:**na]	'fight'
d.	/e-ri-oßa/	→	[ery**o:**ßa]	'5-sky'

In the Gusii data (10), morpheme internal /u/ (10a) and across-morpheme /u/ (10c) surface as [w] when followed by /a/, triggering CL of the postglide vowel /a/ to [a:]. In (10b) across-morpheme /o/ becomes [w] before /ɔ/, causing the latter to lengthen to [ɔ:]. A similar pattern is observed in (10d) when /i/ alternates to a glide [y] before /o/ that lengthens to [o:]. As predicted in moraic theory, postglide CL in Bantu is attested in languages with contrastive vowel length such as Gusii (Nash 2011), Kuria (Cammenga 2004), Rwanda (Kimenyi 1979), Jita (Downing 1996), Matuumbi (Odden 1996), Yao (Ngunga 2000), and Lungu (Bickmore 2007). The table below summarizes the asymmetry of Bantu /N/ in prenasal and postglide CL, and their correlation with contrastive vowel length:

Table 1: Correlation between prenasal and postnasal CL and contrastive vowel length in Bantu

Language	Contrastive vowel length	Prenasal CL	Postglide CL
Bemba	yes	yes	yes
Gusii	yes	yes	yes
Jita	yes	yes	yes
Kuria	yes	yes	yes
Lungu	yes	yes	yes
Nyamwezi	yes	yes	yes
Rwanda	yes	yes	yes
Shona	no	no	no
Swahili	no	no	no
Yao	yes	yes	yes
Zulu	yes	yes	yes

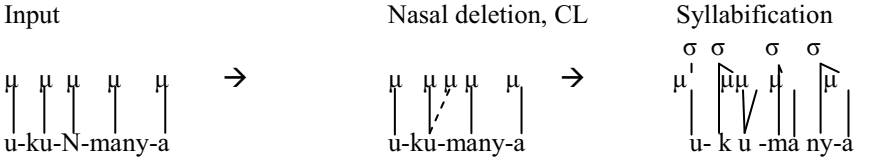
('yes' = attested, 'no' = unattested

In the table "yes" indicates that the phenomenon is attested and "no" that it is unattested. The results in Table 1 show that prenasal and postglide CL are observed only in languages with contrastive vowel length. These processes are unattested in languages without contrastive vowel length. These results corroborate the argument that the asymmetry of Bantu /N/ in CL depends on the phonology of individual languages, that is, whether or not vowel length is contrastive and /N/ is moraic. We saw in §2.1 that prenasal vowel epenthesis also correlates with contrastive vowel length and moraic /N/. Thus, these processes may best be explained within moraic theory that accounts for syllable length distinctions.

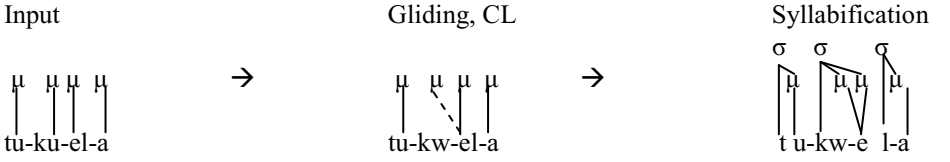
In moraic theory prenasal CL, postglide CL, and prenasal vowel epenthesis may be attributed to the demorification of /N/ with each alternation occurring to preserve the mora vacated by /N/ after it deletes or is syllabified as onset (Hayes 1989). The three alternations are predicted to occur in languages with contrastive vowel length and a moraic /N/ but not those in which vowel length is not contrastive and /N/ is not moraic. The representations in (11) show the derivation of prenasal CL, postglide CL, and prenasal vowel epenthesis in moraic theory:

(11) Representation of prenasal CL, postglide CL, and prenasal vowel epenthesis in Bantu

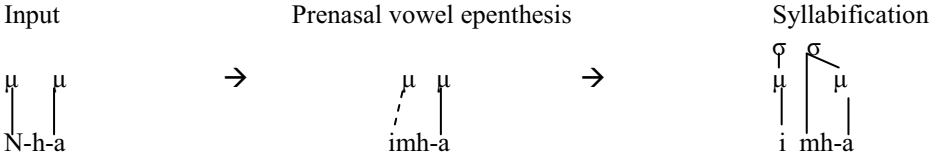
a. Prenasal CL in Lungu: /ú-ku-N-many-a/ → [úkúúmányá] 'to know me' (Bickmore 2007:51)



b. Postglide CL in Lungu: /tú-ku-el-a/ → [túkwéélà] 'we are winnowing' (Bickmore 2007:47)



c. Prenasal vowel epenthesis in Rwanda: /N-h-a/ → [imha] 'give me' (Kimenyi 1979:31)



In (11a), /N/ and short vowels are each assigned a mora underlyingly. /N/ deletes before another nasal, triggering CL in the preceding vowel /u/ that becomes [u:]. In (11a) the deletion of /N/ before stem-initial /m/ leaves its mora unassociated. The 'orphaned' mora is then re-associated to the preceding vowel /u/, triggering CL. The re-association of the abandoned mora to the preceding vowel fills the empty prosodic position that is then syllabified and thus maintaining the mora count of the input. The prenasal vowel then surfaces as bi-moraic or heavy syllable. In (11b) an underlying /u/ surfaces as a glide, setting its mora free. The freed mora is then re-associated to the following vowel /e/, inducing CL in the postglide vowel. The derived glide is syllabified as onset and the postglide vowel /e/ is realized as a bimoraic syllable [e:]. In (11c) the epenthetic vowel claims the mora vacated by /N/ when it surfaces as onset.[9] In the next section I address the asymmetry of /N/ in prenasal vowel shortening.

[9] This paper does not address the question whether or not the Bantu moraic pre-consonantal nasal prefix /N/ is a tone-bearing unit; for a discussion of this question see Hyman and Ngunga (1992).

3. Asymmetry of Bantu /N/ according to its location in stem

We noted in §2.2 that Bantu vowels that occur before /N/ in languages with contrastive vowel length may undergo lengthening. The data used to demonstrate this fact consisted of only stems with word-medial /N/. This was intentional given that Bantu prenasal vowel lengthening may be blocked word-initially due to a vowel shortening rule active in this context (Hyman 2003). Thus, prenasal vowel lengthening in Bantu may be neutralized word-initially, limiting its application to medial contexts only. Bantu vowel shortening is also active word-finally (Kimenyi 1979, Hyman & Katamba 1999, Ngunga 2000, Hyman 2003, Bickmore 2007, Nash 2011). In this regard, vowel shortening in Bantu appears to be targeting word edges. Thus, due to Bantu Initial Vowel Shortening (IVS), languages that permit prenasal vowel lengthening (and postglide vowel lengthening) medially may fail to exhibit this process initially (and word finally for postglide vowel lengthening). Hence, Bantu language in which IVS takes precedence over prenasal CL may not exhibit the latter process initially, leading to the variation of /N/ in CL. Nevertheless, some languages (e.g. Gusii) do allow initial prenasal CL in certain situations. Variations of Bantu /N/ in triggering prenasal CL (initial vs. medial) are observed in languages such as Rwanda (Kimenyi 1979), Lungu (Bickmore 2007), and Gusii (Nash 2011). The Rwanda data below (12) shows medial prenasal CL while (13) shows the absence of initial prenasal CL due to the overriding initial vowel shortening (Kimenyi 1979:25-26):

(12) Rwanda prenasal CL word-medially

a.	/ku-N-gaya/	→	[kuuŋgaya]	‘to despise me’
b.	/mu-N-ßona/	→	[muumbona]	‘you see me’
c.	/ku-N-meɲ-a/	→	[kuumeɲa]	‘to know me’
d.	/ßa-N-nanir-a/	→	[ßaananira]	‘they tire me’
e.	/ßa-N-aaka/	→	[ßaaɲaka]	‘they ask me’
f.	/ku-N-íißa/	→	[kuûɲißa]	‘to robe me, to steal me’

(13) Absence of prenasal CL due to Initial Vowel Shortening in Rwanda

a.	/iN-da/	→	[inda]	‘pregnancy, stomach’
b.	/iN-zu/	→	[inzu]	‘house’
c.	/u-N-gur-ir-a/	→	[uŋgurira]	‘you buy for me’
d.	/a-N-ßon-a/	→	[ambona]	‘he sees me’

In (12), Rwanda vowels that occur before /N/ are lengthened in word-medial position in three contexts: N+C (12a-b), N+N (12c-d) and N+V (12e-f). However, in (13) prenasal CL fails to occur initially due to Initial Vowel Shortening in Rwanda. In this case, the surface realization of prenasal short vowels word-initially in Rwanda is due to the Initial Vowel Shortening that takes precedence over prenasal CL. A similar variation is noted in other Bantu languages that allow prenasal CL word-medially.

Bantu Initial Vowel Shortening is also observed in Gusii (Nash 2011). Similar to Rwanda, Gusii prenasal vowels undergo CL medially (14) but surface short initially due to Initial Vowel Shortening (15). In (14-15) Gusii /N/ occurs as the class 9 prefix while the initial vowels are the preprefix:

(14) Gusii prenasal CL word-medially

a.	/a-ka-N-ßori/	→	[aka:mbori]	‘small goat’
b.	/a-ka-N-choɣu/	→	[aɣa:nchoɣu]	‘small elephant’
c.	/a-ka-N-ɣɔkɔ/	→	[aka:ŋgɔkɔ]	‘small chicken’
d.	/a-ka-N-tuuɣa/	→	[aɣa:ntuuɣa]	‘small termite’

(15) Absence of prenasal CL due to Initial Vowel Shortening in Gusii

a.	/e-N-ßori/	→	[embori]	‘goat’
b.	/e-N-choɣßu/	→	[enchoɣu]	‘elephant’
c.	/e-N-ɣɔkɔ/	→	[eŋgɔkɔ]	‘chicken’
d.	/e-N-tuuɣa/	→	[entuuɣa]	‘termite’

In (14) the Gusii prenasal vowel of class the 12 prefix /ka-/ is underlyingly short but becomes long medially. Similar lengthening is expected in (15) in the preprefix vowel /e/ that precedes /N/ of class 9 but this vowel surfaces short. Apparently, the presence (medially) vs. absence (initially) of prenasal CL in languages such as Rwanda and Gusii is conditioned by the location of /N/ in the stem. Hyman and Katamba’s (1999) constraint *VV appears to be relevant in this situation. However, there is still need for a principled explanation why VV structures in Bantu must be marked word-initially and finally. Moreover, in Gusii Initial Vowel Shortening is blocked in short stems, as shown in (16) where prenasal CL triumphs over Initial Vowel Shortening (/N/ is the class 9 prefix):

(16) Gusii prenasal CL word-initially

a.	/e-N-ßu/	→	[e:mbu]	‘trait, character’
b.	/e-N-ɣɔ/	→	[ɛ:ŋgɔ]	‘leopard’
c.	/e-N-ßi/	→	[e:mbi]	‘testicle’
d.	/e-N-se/	→	[e:nse]	‘earth, world’
e.	/e-N-ki/	→	[e:ŋki]	‘fly’
f.	/e-N-su/	→	[e:nsu]	‘fish’

In (16) the augment vowel /e/ before class 9 prefix /N/ undergoes CL word initially in monosyllabic stems. We saw in (15) that initial prenasal CL is generally prohibited in Gusii polysyllabic stems. Hence, the forms in (16) disobey Initial Vowel Shortening in order to build heavy syllables word-initially. The variation between the Gusii data in (15) and that in (16) implies that in Gusii the size of a stem plays a role in determining the (non-)occurrence of prenasal CL.

The grammatical category of the stem hosting /N/ also appears to condition prenasal vowel lengthening in Bantu. Consider the variation of prenasal CL the Gusii examples below (17):[10]

(17) Asymmetry in prenasal CL in Gusii

a.	[a:nse]	‘s/he start’	vs.	[anse]	‘s/he be sweet’
b.	[e:mbe]	‘9-bad’	vs.	[imbɛ]	‘I be’
c.	[a:nche]	‘s/he like’	vs.	[inche]	‘I’
d.	[e:nsu]	‘9-fish’	vs.	[inse]	‘down, low’
e.	[e:nda]	‘9-stomach’	vs.	[ende]	‘9-another’

In (17), the forms on the left exhibit prenasal CL initially while those on the right show the absence of prenasal CL initially. In (17a) vowel length appears to be contrastive initially. In (17b) and (17d-e) class 9 /N/ triggers prenasal CL initially. However, no such lengthening occurs before 1SG /N/ in the verb to-be [imbe] (/N-β-e/), lexical /N/ of the adverb [inse] “down, low”, and /N/ of the personal pronoun [inche] “I”. The behavior of /N/ in (17) is quite confusing; I thus set this data aside for further scrutiny. The next section considers variations of Bantu /N/ in postnasal nasalization and (de)voicing.

[10] Vowel length appears to be contrastive word-initially in Gusii (e.g. a:ka ‘hit’ vs. aka ‘rub, apply’) but this conclusion needs to be investigated further.

4. Asymmetry of Bantu /N/ in postnasal nasalization and (de)voicing

The asymmetry of Bantu /N/ in postnasal nasalization and postnasal (de)voicing provides more support to the claim that the asymmetry of /N/ depends on language-specific phonology. Postnasal nasalization in Bantu is observed in a number of languages some of which exhibit Meinhof's Law (ML). In ML, an underlying voiced NC surfaces as a short or geminate nasal as a result of nasal harmony with a non-contiguous stem-internal NC or nasal (Herbert 1975, 1977, 1986, Johnson 1979, Katamba & Hyman 1991, Kula 2002). In most cases, the trigger and target of ML are voiced although in some languages voiceless units are involved. The role and realization of /N/ in ML varies both within and across Bantu. The two main variations relate to the realization of the target NC: it surfaces as either a short or geminate nasal and the fact that /N/ may or may not induce ML. Bantu postnasal nasalization in ML occurs in languages such as Ganda (Ashton et al. 1954), Kikuyu (Barlaw 1951), Bemba (Kula 2002), Kwanyama (Tirronen 1977a), Yao (Ngunga 2000), Nyamwezi (Maganga & Schadeberg 1992), and Lamba (Doke 1922). There are also cases of postnasal nasalization in Bantu that do not involve ML; these, too, are language specific. In Bantu, /N/ is also known to trigger postnasal voicing and devoicing; however, voicing appears to be more frequent than devoicing. Let us now examine in turn the asymmetry of Bantu /N/ in postnasal nasalization and (de)voicing.

4.1. Asymmetry of /N/ in postnasal nasalization

The asymmetry associated with Bantu /N/ in postnasal nasalization is noted in ML (Meinhof 1913). In ML, the NÇ containing /N/ may surface unaltered or as a geminate or short nasal. In (18) Ganda ML is induced by stem-internal lexical NÇs [nd] (18a, c) and [mb] (18b) and a plain nasal [m] (18d). Due to ML, Ganda voiced stem-initial consonants /g, b, l/ undergo nasalization after /N/. Since Bantu /N/ always assimilates the place of articulation of the following obstruent, postnasal nasalization in Ganda produces initial geminate nasals. Postnasal nasalization in Ganda eliminates the oral consonant that intervenes between /N/ and the stem-internal lexical nasal, thus "clearing the path" for nasal harmony between the two nasals (intervening vowels are transparent to nasal harmony) (Ashton 1954:156):

(18) Postnasal nasalization in Ganda

a.	/N-ge:nd-a/	→	[ŋŋe:nd-a]	'I go'
b.	/N-bomb-a/	→	[mmomb-a]	'I escape'
c.	/e-N-gend-o/	→	[eŋŋend-o]	'journey'
d.	/N-limi/	→	[nnimi]	'tongues'
e.	/e-N-beŋg-o/	→	[emmeŋg-o]	'grinding stone'

Postnasal nasalization due to ML in Bemba is similar to that of Ganda except that Bemba ML is triggered by NÇs only and in vowel -initial stems the velar nasal /ŋ/ is inserted between the vowel and /N/, thus creating a geminate nasal, similar to Ganda. In Bemba ML, the interacting NÇs must be separated by a vowel (19a-c). Thus, in (19d) ML is blocked since the two NÇs are separated by a CV. In (19e) ML is blocked because the target NÇ contains a voiceless obstruent /p/. Note that Bemba postnasal nasalization does not target voiceless obstruents (Kula 2000:70):

(19) Postnasal nasalization in Bemba

a.	/N-βó:mbel-e/	→	[mmó:mbel-e]	'I have worked'
b.	/N-la:ndil-e/	→	[nna:ndil-e]	'I have spoken'
c.	/N-ó:ndel-e/	→	[ŋŋó:ndel-e]	'I have become thin'
d.	/N-βéle:ŋgel-e/	→	[mbéle:ŋgel-e]	'I have read'
e.	/N-pá:ŋgil-e/	→	[mpá:ŋgil-e]	'I have made'

In Kikuyu postnasal nasalization under ML yields short nasals from NÇ inputs. Similar to Ganda, Kikuyu ML is triggered by both plain nasals (20a-c) and preconsonantal nasals (20d). In (20), Kikuyu ML causes nasal substitution in which stem-initial voiced consonants /ɣ/ and /r/ surface as homorganic nasals. As a result, initial NÇs surface as short homorganic nasals. However, as in other ML languages, Kikuyu /N/ fails to trigger postnasal nasalization in the absence of a stem -internal lexical nasal or NÇ (20e-f). Hence, /N+r/ surfaces as [nd] (20e-f) (Barlaw 1951:7, Herbert 1975):

(20) Postnasal nasalization in Kikuyu

a.	/N-ɣan-eet-ɛ/	→	[ŋaneetɛ]	'I had recounted'
b.	/N-rem-eet-ɛ/	→	[nemeetɛ]	'I had cultivated'
c.	/N-rema/	→	[nema]	'defeat'
d.	/N-roond-eet-e/	→	[noondeeete]	'I had thrown down'
e.	/N-rað-e/	→	[ndaðe]	'Am I to shoot?'
f.	/N-reki-e/	→	[ndekie]	'Am I to go'

Kwanyama ML does not cause postnasal nasalization; thus, the plosive preceded by /N/ appears unaltered. However, the lexical pre-consonantal nasal undergoes effacement. Although Kwanyama ML fails to trigger postnasal nasalization, it simplifies one of two NÇs found in successive syllables. Kwanyama ML resembles what Blust (2012) treats as dissimilation in Australian and Austronesian languages where an NCVNCV is altered to NCVCV, making the adjacent syllables disharmonious in their onsets. In Kwanyama, ML brings close together two oral consonants separated by a vowel; this establishes what I may call oral harmony in the segments in bold (Adapted from Tirronen 1977a):

(21) Meinhof's Law in Kwanyama

a.	/o-N-ga<u>n</u>du/	→	[oŋ**g**a**d**u]	'crocodile'
b.	/o-N-go<u>m</u>be/	→	[oŋ**g**o**b**e]	'beast'
c.	/o-N-ba<u>m</u>bi/	→	[om**b**a**b**i]	'steenbuck'
d.	/o-N-ba<u>ñ</u>dje/	→	[om**b**a**dj**e]	'jackal'
e.	/o-N-dja<u>m</u>bi/	→	[oñ**dj**a**b**i]	'reward'

Unlike the ML languages, there is a category of Bantu languages that allow postnasal nasalization of voiceless obstruents, as in Hehe (Odden & Odden 1985) and Luyana (Gívón 1970b). In both languages /N/ replaces stem-initial voiceless stops in a process known in the literature as "nasal substitution".[11] In Bantu nasal substitution, underlying NÇs surface as short homorganic nasals. In Hehe (22a-b) the affected stops are /t/ (22a) and /k/ (23b) while in Luyana the targets are /p/ (22c), /t/ (22d), and /k/ (22e). Bantu nasal substitution helps to get rid of NÇs in the relevant languages:

(22) Nasal substitution in Hehe and Luyana

a.	Hehe:	/N-teefu/	→	[neefu]	'red mats'
b.	Hehe:	/N-kaanzi/	→	[ŋaanzi]	'walls'
c.	Luyana:	/N-poko/	→	[moko]	'arm, knife'
d.	Luyana:	/N-tabi/	→	[nabi]	'prince'
e.	Luyana:	/N-kuku/	→	[ŋuku]	'chicken'

The asymmetric behavior of Bantu /N/ in postnasal nasalization may be extended to include languages that do not allow postnasal nasalization such as Swahili (Meinhof 1932), Lungu (Bickmore 2007), Rwanda (Kimenyi 1979), Gusii (Nash 2011), Zulu (Doke 1926), Shona (Fortune 1955), and Xhosa (Podile 2002). The Zulu (Doke 1926:66), Xhosa (Podile 2002:105), and Shona (Fortune 1955) data (23) show that postnasal nasalization is not allowed in these languages (note that stem-initial implosive stops undergo de-implosion to surface as plosives postnasally):

[11] Nasal substitution is characterized as the replacement of a root-initial voiceless obstruent by a homorganic nasal (Pater 1999).

(23) Lack of postnasal nasalization in Zulu, Xhosa and Shona

a.	Zulu:	/iN-ɓú:zi /	→	[imbú:zi]	'9-goat'
b.	Zulu:	/ezi-N-ɓí:li/	→	[èzimbí:li]	'9-two'
c.	Xhosa:	/iN-ɓeko/	→	[imᵬeko]	'9-reverence'
d.	Xhosa:	/iN-ɓali/	→	[imᵬali]	'9-story, history'
e.	Shona:	/N-ɓerek/	→	[mbereko]	'9-cradle skin'

4.2. Asymmetry of /N/ in postnasal (de)voicing

Bantu /N/ is also asymmetric in its interaction with voiced and voiceless consonants. It triggers postnasal voicing in stem-initial consonants in languages such as Kikuyu (Barlaw 1951), Konde (Meinhof 1932), and Yao (Ngunga 2000). However, it fails to do so in other languages. In (24) /N/ causes Konde /k/ to surface as [g] (24a), Kikuyu /t, k/ as [d, g] (24b-c), and Yao /p, t, k/ as [b, d, g] (24d-f):

(24) Postnasal stop voicing in Konde, Kikuyu, and Yao

a.	Konde:	/iN-kuku/	→	[iŋguku]	'9-fowl'
b.	Kikuyu:	/N-tem-e/	→	[ndeme]	'Am I to cut?'
c.	Kikuyu:	/N-ken-e/	→	[ŋgene]	'Am I to rejoice?'
d.	Yao:	/ju-N-pat-il-e/	→	[juumbatile]	's/he got me'
e.	Yao:	/ju-N-tiis-il-e/	→	[juundiisile]	's/he ran away from me'
f.	Yao:	/ju-N-kam-il-e/	→	[juuŋgamile]	's/he milked me'

Contrary to what we see in (24), some Bantu languages do not permit postnasal voicing while others permit postnasal devoicing instead. Languages in which voiceless consonants remain unchanged after /N/ include Gusii (Nash 2011), Lamba (Doke 1922), Lungu (Bickmore 2007), and Ganda (Ashton at al. 1954). The data in (25) indicate that Lamba /p, t, c, k/ surface unaltered after /N/ while /N/ becomes homorganic, as is the case in other Bantu languages (Doke 1922):

(25) Unaffected postnasal voiceless stops in Lamba

a.	/N-pape/	→	[mpape]	'let me carry a pick'
b.	/N-tinte/	→	[ntinte]	'let me tug'
c.	/N-cite/	→	[ɲcite]	'let me do'
d.	/N-kake/	→	[ŋkake]	'bind me'

Although uncommon in Bantu, postnasal devoicing does occur in Tswana, Kgalagari, and Sotho. In (26) Tswana stem-initial voiced stop /b/ becomes [p] (26a-b) (Cole 1955:41) while Kgalagari stem-initial voiced stops /b, d, g, ɟ/ change to [p, t, k, c] (26c-f) after /N/ (Solé et al. 2009:303):

(26) Postnasal stop devoicing in Bantu

a.	Tswana:	/N-bôn-a/	→	[mpóna]	'see me'
b.	Tswana:	/iN-bôn-a/	→	[goipóna]	'to see oneself'
c.	Kgalagari:	/χʊ-N-bón-á/	→	[χʊmpóná]	'to see me'
d.	Kgalagari:	/χʊ-N-duʒ-a/	→	[χʊntuʒa]	'to anoint me'
e.	Kgalagari:	/χʊ-N-gát-a/	→	[χʊŋkata]	'to like me'
f.	Kgalagari:	/χʊ-N-ɟís-a/	→	[χʊɲcísa]	'to feed me'

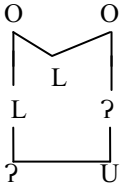
In both Tswana and Kgalagari, contrast in plosives involves three levels of phonation: [aspirated], [ejective], and [voiced]. Hence, postnasal devoicing neutralizes laryngeal contrast. This process also affects liquids and fricatives, but these approximants undergo concomitant postnasal plosivization.

The asymmetry of Bantu /N/ in postnasal nasalization and (de)voicing is predicated in Element-based Dependency (EBD) (Botma 2004). A number of EBD principles are relevant in understanding these variations. First, nasal manner consists of a combination of vocalic and consonantal manner properties. Secondly, the element that expresses nasalization is interpreted either as nasalization or

voicing.[12] Third, all phonation types are grouped into three phonological categories: for example, aspiration, breathy voice, and voicelessness constitute a single segment type phonologically.[13] Fourth, a particular phonetic entity does not have a unique phonological representation since its representation depends on the phonological system of a particular language.[14] In EBD consonants that are subject to postnasal nasalization are considered sonorants while those that undergo postnasal voicing are obstruents in their respective phonological systems. Since nasal manner is represented as a hybrid of vocalic and consonant manner types, it is represented by the elements |L| and |ʔ|. The vocalic property of a nasal is manifested in its prosodic interpretation, e.g. its syllabification as syllable nucleus and coda. The consonant property of nasals is noted in their place features. In EBD phonologically active nasals consist of an extra vocalic element represented as dependent |L|. When dependent |L| of a nasal is attached to a sonorant it is interpreted as nasalization but as voicing when attached to an obstruent (Botma 2004). When /N/ fails to cause postnasal nasalization or voicing, its dependent |L| is not linked to the dependent position of the target consonant. The diagrams below show the EBD representation of postnasal nasalization, postnasal voicing, postnasal devoicing, and the absence of alternation in a stem-initial consonant (O = onset; |U| = element for bilabial place; =|shows delinking):

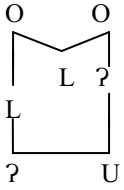
(27) Postnasal nasalization, voicing, devoicing and lack of postnasal alternation in EBD

a. Postnasal nasalization



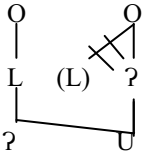
/N + b/ → [mm], [m]

b. Postnasal voicing



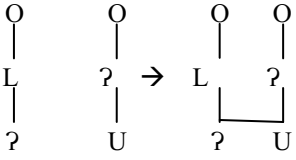
/N + p/ → [mb]

c. Postnasal devoicing



/N + b/ → [mp]

d. Lack of postnasal alternation



/N + p/ → [mp]

In (27a) postnasal nasalization is achieved by linking dependent |L| of the nasal to the dependent position of /b/, a sonorant. In (27a-d), linking the bilabial place element |U| to the stop element |ʔ| of the nasal represents nasal place assimilation. In postnasal voicing (27b), dependent |L| of the nasal is linked to the dependent position of /p/, but in postnasal devoicing (27c) |L| of /b/ is delinked. In (27d), dependent |L| of the nasal is not linked. Thus, in EBD the choice between postnasal devoicing and non-devoicing depends on the language. The choice between postnasal nasalization and postnasal voicing depends on whether the target consonant is a sonorant or obstruent in a given language. I now turn to the asymmetry of /N/ is its deletion patterns.

[12] The two-way interpretation of nasality in EBD diverges from that of feature-based models (e.g. Jakobson et al. 1951, Chomsky and Halle 1968) that characterize nasals and nasalized segment types by the feature [nasal].

[13] The other clusters of phonation types that EBD recognizes are represented by the elements |ʔ| and |L| whereby |ʔ| subsumes glottalization, ejection, creaky voice, implosion and |H| aspiration, breathy voice, voicelessness and |L| voice and nasalization.

[14] For details about Element-based Dependency, see Botma (2004).

5. Asymmetry of Bantu /N/ deletion in pre-consonantal position

Bantu /N/ is evidently asymmetric in its deletion behavior before stem-initial consonants. Bantu /N/ deletes before certain segments but this is so only in some languages. Bantu /N/ is known to delete regularly before voiceless consonants and another nasal. However, this behavior is not uniform across Bantu. Nasal deletion before voiceless obstruents is attested in languages such as Swahili and Konde (Meinhof 1932). In Swahili, /N/ occurs as a class 9/10 prefix, but it deletes before voiceless obstruents in polysyllabic stems (it is however retained in monosyllabic stems as a syllabi nasal). Swahili /N/ deletion induces aspiration in stem-initial voiceless stops. Thus, /N/ deletion in Swahili is determined by [voice] and stem size. Since Swahili content words must have at least two moras /N/ is retained as a syllabic nasal to supply the extra mora needed by monosyllabic stems (Park 1995). The Swahili data shows that /N/ deletes in polysyllabic stems (28) but surfaces syllabic in monosyllabic stems (29):

(28) Nasal deletion before voiceless obstruents in Swahili:

a.	/N-kubwa/	→	[k^{h}ubwa]	'big'
b.	/N-paŋga/	→	[p^{h}anga]	'machete'
c.	/N-fupi/	→	[fupi]	'short'
d.	/N-tatu/	→	[t^{h}atu]	'three'
e.	/N- ʧaʧɛ/	→	[ʧ^{h}aʧɛ]	'few'

(29) Nasal retention before voiceless obstruents in Swahili short stems

a.	/N-ʧi/	→	[n̩ʧi]	'country'
b.	/N-ta/	→	[n̩ta]	'wax'
c.	/N-swi/	→	[n̩swi]	'fish'
d.	/N-pya/	→	[m̩pya]	'new'

In (28) Swahili /N/ deletes before stem-initial /k, p, f, t, ʧ/ in polysyllabic stems, but is retained before /ʧ, t, s, p/ in short stems (29). The Swahili data (28) attests Pater's (1996) markedness constrain *NC̥ that rules against NC̥ (also see Hyman 2001). Stem size also influences the deletion of /N/ in Tswana /N/. In Tswana nominals /N/ is retained only in monosyllabic stems, but drops in disyllabic and polysyllabic stems. However, in verbal stems the 1SG object /N/ is always retained, irrespective of the the size of the stem (Cole 1955). Thus, in Tswana, the category of the stem (verbal vs. nominal) overrides stem size (monosyllabic vs. polysyllabic).

The other context that induces /N/ deletion in Bantu is stem-initial nasals as in Lungu (Bickmore 2007) and Gusii (Nash 2011). The deletion of /N/ in this environment suggests the prohibition of geminate nasals. Lungu /N/ deletion before another nasal triggers /i/ insertion (Bickmore 2007:113):

(30) Nasal deletion before another nasal in Lungu

a.	/ń-mil-é/	→	[í-míl-é]	'that I swallow'
b.	/n-mila +H/	→	[ìmìl-á]	'and when I swallowed'
c.	/n-mo-a _H/	→	[ì-mw-á]	'and then I drank'
d.	/ń-ɲép-é/	→	[í-ɲé$^{!}$p-é]	'that I tie a knot'

In Yao /N/ deletes before /s/ although Yao /N/ is retained before voiceless stops, e.g. /p, t, c, k/; these in turn undergo postnasal voicing. The sibilant /s/ is the only voiceless fricative in Yao. The Yao verbal stems (31) demonstrate the deletion of 1SG object /N/ before /s/ (Ngunga 2000:61-62):

(31) Nasal deletion before /s/ in Yao

a.	/ju-N-saadi-il-l-e/	→	[juu-saadiil-e]	's/he told me'
b.	/ju-N-sima-il-n-e/	→	[juu-siméen-e]	's/he encountered me'
c.	/a-N-suum-il-e/	→	[a-suum-il-e]	'they (cl.2) bought me'
d.	/a-N-son-il-e/	→	[a-son-il-e]	'they (cl.2) sewed me'

Nasal deletion before /s/ in Yao has crosslinguistic parallels (see Herbert 1986, Steriade 1991). In EBD /s/ is made up of one manner element |H|, also used for [aspiration]. Bantu languages such as Yao that delete /N/ before /s/ prefer that aspiration be realized on the oral consonant. Other Bantu nasals may delete /s/ or retain both /N/ and the sibilant. Thus, nasal deletion before /s/ is motivated by the desire to keep |H| on the oral; retaining /N/ before |H| would mean allowing aspirated nasals. Yao appears to disfavor aspirated nasals, and so resorts to /N/ deletion.

The deletion of /N/ in the preceding contexts is not shared by all Bantu languages. Some retain /N/ before voiceless consonants and nasals although the retention of /N/ before other nasals is restricted to word-initial position where the first half of the geminate surfaces syllabic and the second half functions as onset. For example, Gusii retains /N/ before voiceless consonants medially:

(32) Nasal retention before voiceless obstruents in Gusii

a.	/ko-N-tur-a/	→	[ɣo:-n-tur-a]	'to wake me up'
b.	/ko-N-kun-a/	→	[ɣo:-ŋ-kun-a]	'to touch me'
c.	/ko-N-sari-a	→	[ɣo:-n-sari-a]	'to spoil me'
d.	/ko-N-nʧiik-a/	→	[ɣo:-n-ʧiik-a]	'to invite me'

In Gusii /N/ may be retained or deleted before stem-initial nasals. When it fails to surface word-initially, Gusii /N/ is normally replaced by an epenthetic vowel /i/. The examples in (33) illustrate /N/ retention before stem-initial nasals in Gusii:

(33) Initial /N/ retention before another nasal Gusii

a.	/N-maŋ-ɛ/	→	[m̩maŋ-ɛ]	'that I know'
b.	/N-nor-e/	→	[n̩nor-e]	'that I become fat'
c.	/N-ɲwom-ɛ/	→	[ɲ̩ɲwom-ɛ]	'that I marry'
d.	/N-ŋaaŋ-ɛ/	→	[ŋ̩ŋaaŋ-ɛ]	'that I migrate'

The decision whether to delete or to retain /N/ appears to be determined by consonant cluster licensing in individual Bantu languages. Some languages allow NC̥s and NNs while others do not. Moreover, other languages such as Gusii allow /NN/ initially where the first /N/ surfaces syllabic but disallow NN medially because medial geminate nasals are marked. This fact leads to intra-linguistic asymmetries in the behavior of Bantu /N/.

6. Conclusion

In this paper I have discussed variations in the segmental alternations conditioned by Bantu N/. The discussion focused on the behavior of /N/ in prenasal vowel epenthesis, prenasal vowel lengthening, initial prenasal vowel shortening, prenasal nasalization and (de)voicing, and nasal deletion. The data supports the conclusion that the variation of /N/ in these contexts is conditioned by language-specific phonology. Prenasal vowel epenthesis, prenasal vowel lengthening, and initial prenasal vowel shortening occur in languages with contrastive vowel length. Vowel epenthesis and vowel lengthening conserve the mora vacated by /N/ following its demorification. These processes are unattested in languages without contrastive vowel length. Bantu /N/ triggers postnasal nasalization in consonants that occur as sonorants but postnasal voicing in obstruents. The choice between postnasal voicing and postnasal devoicing is also a choice of individual languages. Bantu /N/ deletes before nasals and voiceless consonants but its deletion depends on consonant cluster licensing in particular languages since some languages allow /N/ to surface in these environments.

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