A grammar of Nchane: A Bantoid (Beboid) language of Cameroon

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Chapter 2

Phonology

The phonological system of Nchane represents a language undergoing syllable reduction, with resulting vowel nasalization and lengthening processes. While the phonology of verbs is relatively simple, the analysis of noun phonology is challenging, in part due to the presence of nasals, characteristic of other languages in the area, and documented to be associated with lowering of tones (see Good and Lovegren (2017) and Hyman (1980)).

This chapter is divided into three main sections. Consonants and vowels are described in §§2.1 and 2.2 respectively. A description of syllable structure and observations regarding the distribution of consonants and vowels appears in §2.3. Note that example transcriptions in this chapter are usually placed in brackets, indicating that they represent phonetic, rather than phonemic, realizations. Furthermore, the transcriptions are generally given utilizing IPA characters rather than the description orthography which is used for most of the chapters.

2.1 Consonants

Nchane has 18 consonant phonemes, a somewhat modest inventory when compared to neighboring languages. The Beboid languages Kemedzung, Chungmboko and Sari have 19, 21 and 21 consonants respectively (Cox 2005; Tabah 2010; Langhout 2015)[5], while the Yemne-Kimbi language Mungbam is observed to have 24 (Lovegren 2013).

The Nchane consonant phonemes are displayed in Table 2.1, each of which can occur in root-initial position. Note that all unvoiced plosives are aspirated when followed by a vowel. While all consonants occur word initially, only nasals are found in the coda position and only the velar nasal is found word finally. See §2.3.2 for more on distributional restrictions.

	Labial	Alveolar	Palatal	Velar
Plosives		t	ch	k
	b	d	j	g
Fricatives	f	s	sh	(gh)
Nasals	m	n	ɲ	ŋ
Approximants		l	y	w

Table 2.1 Nchane consonant phoneme inventory.

As with many languages in the area, there is no voiceless counterpart to the voiced labial plosive **b**, leaving a gap in the inventory where **p** is usually found. Speakers are able to pronounce **[p]** with little difficulty, as evidenced by the occurrence of the Cameroon Pidgin English loanword **[pjâ]** 'pear', referring to 'avocado', which is prevalent in the area. However, other loanwords like **[bā]** 'pa', which is often used as an honorific in place of the Nchane word **[tʃīː]** 'father', as well as western names like **[bɔ̄l]** 'Paul' and **[bítà]** 'Peter' show that **[b]** is preferable as a substitute for **[p]**.

2.1.1 Consonants with difficult analyses

Most of the Nchane consonants are analyzed with little difficulty. However, the alveopalatal affricates, the velar fricative and the palatal nasal each present challenges to a proper assignment in the consonant system. These are discussed in turn in this section.

The consonants ch and j The alveopalatal affricates have been analyzed as palatal plosives (**[c]** and **[ɟ]** respectively), but this is not without questions. The primary complication comes from the fact that the neighboring Beboid languages Sari, Chungmboko, Kemedzung and Mungong, each have an alveolar affricate set (i.e., **/ts/** and **/dz/**) in addition to the alveopalatal affricate set. Richards (1991) includes the Sari alveopalatal affricates with the palatalized consonant inventory and treats the alveolar affricates as palatal plosives, thus dispensing with the affricate class altogether. A

[5] Determining the number of consonants for these neighboring languages is not completely straightforward, as the analyses offered sometimes include questionable phonemes such as **/p/** and **/h/**, both of which are rare in the data and are often limited to borrowed words or exclamations and ideophones.

similar approach is used by Cox (2005) for Kemedzung, where he suggests that they are palatalized allophones of their alveolar affricate counterparts, although he also argues for the maintenance of the affricate class.

However, this analysis is untenable for Mungong, where the occurrences of the alveopalatal affricates outnumber their alveolar counterparts by almost 2:1. Meanwhile, the number of **/bj/** and **/kj/** tokens is extremely small compared to the **/b/** and **/k/** varieties, suggesting that Cy as a sequence type is not very productive and so, not supportive of viewing the alveopalatal affricates as being palatalized versions of some other consonants.

A similar problem exists for Nchane, since Cy sequences are somewhat rare, but the occurrences of **/tʃ/** and **/dʒ/** are significantly high, slightly higher than those of **/t/** and **/d/**. Furthermore, there are no significant differences in distribution between the alveopalatal affricates and the plosives. Meanwhile, the palatal series includes fricative, nasal and approximant members, with an available opening in the plosive series. Therefore, it makes sense to treat the alveopalatal affricates phonologically as palatal plosives,[6] although the affricate transcriptions are maintained to acknowledge their comparability to consonants of other Beboid language varieties.

The consonant gh The velar fricative **gh** appears in parentheses in Table 2.1 to indicate that its status as a phoneme is in question, since it occurs only a few times in the data. In addition to its paucity, it never precedes back vowels when root-initial and when it is root-internal an argument could be made that **[ɣ]** is simply a product of spirantization of **/g/**. An additional complication is that it never occurs in Cj, Cw or NC sequences, although this could simply be due to the small numbers in the data.

Richards (1991) treated this phoneme as an oral sonorant, in the same series as **w**, **l** and **y**, and without giving reasons for analyzing it as belonging to the set of approximants rather than to the set of fricatives.[7] It appears to have been rare in his data set as well, and he mentions the complete lack of the prenasalized form **[ŋɣ]**. Neighboring Noni lists 39 occurrences **[ɣ]** out of 4544 entries in its online dictionary (Lux 2016). All of these occurrences are root-initial, hinting at neutralization of contrast in other environments. When Nchane cognates are identified for these Noni words, there is usually a **[ɣ]:[j]** or **[ɣ]:[dʒ]** correspondence.

Consultants were asked to provide more words with this consonant, which resulted in nine additional words. Each of these words are **gh**-initial with a distinct preference for a following **a** and never with a following back vowel. The synchronic

[6] Additional evidence countering an analysis of the alveopalatal affricates representing palatalized versions of the alveolar plosives is observed with the spirantization of the number ‘three’ when prefixed with class 10 agreement presented in §3.6. When followed by a palatal glide, the underlying **/t/** is realized as **[ʃ]** rather than **[tʃ]** (**/jī-tɛ̄dē/→jī-tjɛ̄dī→[jī-ʃɛ̄dī]**).

[7] It is possible that Richards was moved in this direction because he observed that Noni had a minor phoneme **[h]**, which he treated as a velar fricative; thus, that slot was filled and could not also take **[ɣ]**. The treatment for Noni was then presumably extended to the Nchane case.

evidence for this phoneme is therefore tenuous and its support as a phoneme is flagging. All words with this consonant are given in Table 2.2. [8] Note that the examples provided by the consultants appear without tone indicated. Note also that the word for 'jeer at' **ghay** violates the coda restrictions adopted in the current analysis, namely that the velar nasal **ŋ** is the only consonant observed as a coda.

Via wordlist elicitation		Via ɣ elicitation session	
[mjæ̀ɣə́]	'blink'	**[ɣa:]**	'enthrone'
[fìŋkʰɔ̀ɣɔ́]	'wrist'[9]	**[ɣali]**	'name'
[ɣá]	'surpass'	**[ɣanɛ]**	'be insane'
		[ɣalɛ]	'improvise'
		[ɣɪŋ]	'attach with glue'
		[ɣaj]	'jeer at'
		[ɣɛ]	'be jealous'
		[ɣasɪ]	'mistreat'
		[ɣamɪ]	'braid a calabash'

Table 2.2 Exhaustive list of words with the consonant **gh**.

The consonant ɲ The problem faced in analyzing the palatal nasal **ɲ** has less to do with its phonemic status and series assignment, than with the interpretation of **[ɲ]** in any given occurrence. The phone **[ɲ]** has four possible underlying representations: **/ɲ/**, **/ɲj/, /n^{j}/**, **/^{n}j/**. The first option, a palatal nasal, is an expected member of the consonant system, since it completes the series of nasal consonants. I assume that a large number of **[ɲ]** occurrences are in fact realizations of **/ɲ/**.

The third and fourth options, a palatalized alveolar nasal and a prenasalized palatal approximant respectively, are discounted based on analytical interpretation. The analysis of palatalization as a consonant feature is rejected in favor of consonant-glide sequences (see §2.1.4). And possible instances of prenasalization are interpreted as nasal-consonant sequences (see §2.1.5).

Evidence for the second option, a **ɲy** sequence, is not easy to find, since there is a general constraint requiring NC sequences to have the same place features. Therefore, determining the underlying form of the nasal in NC sequences at morpheme boundaries is speculative at best, particularly as vowel initial stems do not exist. Positive evidence might be found in looking at class 19 nouns, where more than

[8] Without more data it is difficult to draw well supported conclusions. However, as mentioned earlier, it is possible that the **gh** in the word for 'wrist' is a phonological artifact resulting from a velar plosive in a **[ɔCɔ]** sequence. Careful speech results in **[fìŋkʰɔ̀gɔ́]**, which corresponds more closely with the Noni cognate **fīkōkó**. The word for 'blink' is unusual as it surfaces with the phone **[æ]** for which a clear analysis is lacking. Careful speech also results in **[g]** rather than **[ɣ]**. Therefore, neither of these two words provide unquestionable evidence for stem-internal **gh**, but rather supports an analysis of phonological variation of **/g/**.

[9] Likely, more specifically the knobby bone of the wrist and ankle (*pisiform*).

half of the nouns are marked unambiguously with a **fiN-** prefix, while the remaining nouns have a **fi-** prefix. Yet, the number of class 19 nouns with a **[ɲ]** at the prefix-root boundary is relatively high, suggesting that at least some of these are underlyingly **ɲ-y**. This is illustrated in Table 2.3, where it can be seen that 13% of the nouns have a **fiɲ...** shape versus, for example, 10% having **fiŋk...** and only 3% having **fim...**.

fiN-C…		**fi-C…**		**fiN-C…/fi-C…**	
m-b	2	**b**	2	**ɲ-y/ɲ**	4
n-t	4	**k**	2		
n-d	1	**l**	1		
ɲ-ch	4	**m**	1		
ŋ-k	3	**s**	2		
ŋ-g	1	**j**	1		
n-s	1				
ɲ-sh	1				

Table 2.3 Summary of (N)C sequences at morpheme boundaries of c19 nouns, illustrating likelihood of underlying **fiɲ-y...** forms (n=30).

Perhaps the strongest evidence can be found in words like **ɲū** ‘light’, which appears to be a nominalization of the verb **yū** ‘clean’. The underlying form of this noun therefore is **N- yu** (NMZR- clean). In light of the above evidence, it is justifiable to assume that at least some non-morpheme boundary occurrences of **[ɲ]** are in fact underlyingly **/ɲj/**.

2.1.2 Phonetic descriptions of consonants

Descriptions of the phonetic characteristics of the various consonants are given in this section. The descriptions are organized around the different types of articulation and include representative examples.

2.1.2.1 Plosives

Nchane has seven plosive consonants consisting of voiceless and voiced varieties of the alveolar, palatal and velar series, and the voiced labial **b**. As mentioned above, all voiceless plosives are slightly aspirated when followed by a vowel.

The consonant t The voiceless alveolar plosive **t** is realized as **[t]**. When followed by a vowel, it is slightly aspirated. Examples are **[fīntʰínɛ́]** ‘middle’, **[tʰā]** ‘kick’ and **[tʰɛ̄dī]** ‘stone’. The aspiration is greater in words like **[tʰī:]** ‘abdomen’ and **[tʰʊ́]** ‘return’, where the following vowel is high, but not significantly so.

The consonant ch The voiceless alveopalatal affricate **ch** is realized as **[tʃ]**, and fits into the consonant system as a voiceless palatal plosive. Because it is realized as an affricate, it is not prone to aspiration as observed in the voiceless plosives. Examples are **[tʃíŋ]** ‘dig’, **[tʃɛ́bɛ̀]** ‘termite hill’, **[fīɲtʃā]** ‘ring’ and **[kʰīɲtʃʊ́nɛ̄]** ‘bush’.

The consonant k The voiceless velar plosive **k** is realized as **[k]**. Again, as with **t**, this consonant is slightly aspirated when followed by a vowel, with the aspiration being somewhat greater when the following vowel is high. In fast speech, it can be slightly spirantized, particularly in VCV sequences, where the vowels are identical. Examples are **[kʰījɛ̄]** 'cough', **[bīŋkʰɛ̄sì]** 'fingernail (pl)', **[bīlīkʰáŋ]** 'papaya' and **[bāŋkʰʊ̀]** 'box (pl)'.

The consonant b The voiced bilabial plosive **b** is realized as **[b]**. Examples are **[bī]** 'goat', **[lábɛ̀]** 'spider web', **[báŋ]** 'shut', **[bɔ̄nɛ̀]** 'prayer' and **[m̄bʊ̄ʃá]** 'cat'.

The consonant d The voiced alveolar plosive **d** is realized as **[d]**. While it is observed to occur before high vowels, these sequences are rare, particularly the sequence **di**. An example is **[n̄dīŋɛ́]** 'omen'. It is possible that this sequence more often triggers spirantization of the **d**, resulting in the sequence **ji**. This hypothesis is supported by the fact that the word for 'omen' in Mungong and Noni is **[ɲ̄dʒɛ̰̀]** and **[ɲdʒìŋsɛ́n]** respectively, both showing a **[d]:[dʒ]** correspondence. See §3.6 for more details of the spirantization process.

This consonant has an allophone realized as the alveolar flap **[ɾ]**, which is relatively rare and occurs only when the consonant intervenes between identical high vowels. It usually does not occur in careful speech. Examples are **[fīntʰíɾí]** 'story' and **[fīʒɛ̀ɾɛ̀]** 'red'. Other examples of **d** are **[tʰɛ́dí]** 'stone', **[n̄dɛ̄ŋú]** 'cricket', **[kʰīdáádɛ̀]** 'palm branch', **[fīndɔ̄ŋ]** 'throat' and **[fīntʰʊ́dʊ̄]** 'ant'.

The consonant j The voiced alveopalatal affricate **j** is realized as **[dʒ]**, and functions as a voiced palatal plosive in the consonant system. Examples are **[dʒīsɛ́]** 'eye', **[dʒì]** 'path', **[kwādʒɛ́]** 'think', **[kʰīdʒāŋ]** 'weaver bird', **[dʒɔ́ŋ]** 'star' and **[ɲ̄dʒʊ̄]** 'cloth'.

The consonant g The voiced velar plosive **g** is realized as **[g]**. As with **k**, it can be slightly spirantized in fast speech in VCV sequences where the vowels are identical. Examples are **[gīː]** 'hundred (pl)', **[kʰīŋgɛ̀ŋ]** 'island', **[m̄wáŋgā]** 'hare', **[gɔ̄ŋ]** 'spear' and **[gʊ́]** 'buy'.

2.1.2.2 Fricatives

The Nchane fricative series includes three voiceless fricatives and one voiced fricative. The voiced velar fricative is a minor phoneme, with limited distribution and low occurrence. Phonetic descriptions are given below.

The consonant f The voiceless labiodental fricative **f** is realized as **[f]**. Examples of **f** are **[fí]** 'kidney', **[fɛ́ː]** 'two', **[kʰīfāː]** 'mahogany tree', **[fɔ̰̄]** 'sharpen' and **[kʰīfʊ̄fʊ́]** 'lung'.

The consonant s The voiceless alveolar fricative **s** is realized as **[s]**. It never precedes **i**, hinting at **[ʃ]** as a palatalized allophonic variant. However, the number of **[ʃ]** occurrences is too high for it to fit the profile of a palatalized allophone of **s**. In addition, multiple minimal pairs between the two phones exist. Therefore, I do not adopt the view that they are in allophonic relationship. Examples of **s** are **[kʰīŋkʰɛ̄sì]** 'fingernail', **[sɛ̂:]** 'slaughter', **[sâ]** 'mask', **[kʰīnsɔ̂ŋ]** 'fish trap' and **[sʊ́dɛ̄]**.

The consonant sh The voiceless postalveolar fricative **sh** is realized as **[ʃ]**. Its place of articulation is comparable to the place of release for the two alveopalatal affricates. Examples are **[bvʉ̄ʃí]** 'face', **[mɔ̄ɲʃɛ̰]** 'sand', **[m̄bɔ̄ʃá]** 'cat', **[fīɲʃɔ̄:]** 'mud wasp' and **[ʃɔ̄ŋʃɛ̀]** 'hum'.

The consonant gh The voiced velar fricative **gh** is realized as **[ɣ]**. Its status as a phoneme is questionable and discussed at length in §2.1.1 above.

2.1.2.3 Nasals

Nchane has a complete series of nasal consonants, including **m**, **n**, **ɲ** and **ŋ**. Nasal consonants occurring in word final position often are elided, accompanied by the preceding vowel taking on a nasal quality. This elision is less likely when the preceding vowel is short. In both cases, with preceding short and long vowels, there is a degree of free variation between **Ṽ~Vŋ**. Note that only the velar nasal **ŋ** is observed in word final position.

For the most part, NC sequences are restricted to consonants with the same place of articulation. Each of these nasals occur in NC sequences where they are observed to often carry tone, although the duration of the nasal's realization is generally shorter than one would expect with a typical syllabic nasal. The reader is referred to §2.1.5 for an in-depth discussion of the nature of these sequences.

The consonant m The bilabial nasal **m** is usually realized as **[m]**. Before the labiodental fricative **f,** it is usually realized as a labiodental nasal **[ɱ]**.[10] Examples are **[mí]** 'swallow', **[tʃīnāmɛ̄:]** 'weed (pl)', **[tʃʊ́mā]** 'locust', **[mɔ̰̄]** 'taste', **[kʰīmʊ́gɛ̀]** 'maggot', **[bāɱfā]** 'eagle (pl)' and **[ɱ̄fɔ̄]**.

The consonant n The alveolar nasal **n** is realized as **[n]**. Examples are **[biní]** 'dance (n)', **[fìntʃɔ̄nɛ̄]** 'groundnut', **[nâ]** 'cow' and **[nɔ̄ŋ]** 'throw'.

The consonant ɲ The palatal nasal **ɲ** is realized as **[ɲ]**. See §2.1.1 above for a discussion of its interpretation. Examples are **[ɲī]** 'bee', **[kʰīnfɛ̄ɲɛ́]** 'cockroach', **[ɲāŋ]** 'animal' and **[ɲɔ̄]** 'cutlass'.

The consonant ŋ The velar nasal **ŋ** is realized as **[ŋ]**. Examples are **[m̄bjɛ̄ŋɛ̄]** 'bell', **[ŋānɛ́]** 'crawl', **[sɔ̄ŋɔ̄]** 'oil palm' and **[n̄dɛ̄ŋʊ́]** 'cricket'.

2.1.2.4 Approximants

Nchane has three approximants: one lateral approximant and two glides. Each is described in this section.

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[10] Assigning **[ɱ]** as an allophone of **/m/** is somewhat arbitrary, since it is a product of place assimilation and its underlying form is not clearly identifiable from its source.

The consonant l The alveolar lateral approximant **l** is realized as **[l]**. In most environments, it is pronounced with a certain amount of closure by the dorsum, similar to the so-called "dark l" in many English dialects, but with much less closure. This is particularly the case when it is adjacent to high back vowels and when it is word initial. The dorsum involvement is much less when it is adjacent to front vowels. Examples are **[lílɪ̄]** 'dragonfly', **[kʰɪ̄lɛ̰́ː]** 'bat', **[lábɛ̀]** 'spiderweb', **[lɔ̄mɛ́]** 'hasten' and **[kʰɪ̄lʊ̃̄ŋ]** 'agama lizard'.[11]

The consonant y The palatal approximant **y** is usually realized as **[j]**. Other times it is realized with a light fricative quality best represented by the voiced palatal fricative **[ʝ]**. This variant appears to be in free variation with **[j]** in all environments and is often corrected to the approximant variant in careful speech. Examples are **[kʰɪ̄jí]** 'ghost', **[jɪ̄fɛ́]** 'transplant', **[jɛ̄lɛ́]** 'sweep', **[ʝɛ̄ŋ]** 'thigh', **[kʰɪ̄jájá]** 'flying ant', **[kʰɪ̄jɔ̄]** 'soul', **[ʝɔ̄]** 'snake' and **[kʰɪ̄jʊ́ŋ]** 'fool'.

The consonant w The labiovelar approximant **w** is realized as **[w]**. Examples are **[gwí]** [12] 'net', **[wɛ̄ŋɛ́]** 'tickle', **[wáːŋ]** 'market', **[wɔ̄ŋ]** 'village' and **[kʰɪ̄wʊ́ŋɛ́]** 'ditch'.

2.1.3 Consonant minimal pairs

Contrasts for all consonants are given in Table 2.4-Table 2.7 (established by near-minimal pairs when strict-minimal pairs are not available). In most cases, contrasts are given for consonants that share all but one feature. When a consonant has multiple possible analyses, then contrasts are given for that consonant to account for alternative analyses. For example, **w** could be analyzed as a labial or a velar approximant. Therefore, minimal pairs involving **w** are given with consonants from the labial and velar series. All examples in the minimal pairs show the contrasting consonants in root-initial position, with the exception of those involving **ŋ**, for which root-initial examples are relatively rare. Also, both members of a minimal pair belong to the same word class whenever possible. Finally, verb forms in the examples appear in the unmarked P0 form unless otherwise noted.

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[11] It is possible that **l** has **ɾ** as an allophone, occurring with words that have an **l** preceding the Progressive suffix **-ɪ**, the **lɪ** sequence sometimes surfacing as **ɾɪ** and also sometimes with apparent vowel harmony within the word. Speakers sometimes are not certain themselves if these words should be pronounced with an **l** or a **ɾ**, with limited free variation observed.

[12] The vowel **[w]** only precedes **[i]** when **w** is part of a CG sequence. See §2.3.2 for an account of distribution restrictions.

Consonants		Example	Gloss	Example	Gloss
t					
	/d	**[tʰāŋ]**	‘count’	**[dáŋ]**	‘jump’
	/ch	**[tʰō]**	‘hit’	**[tʃō:]**	‘feces’
	/s	**[tʰōŋ]**	‘shoot’	**[sōŋ]**	‘beat’
ch					
	/t	**[tʃō:]**	‘feces’	**[tʰō]**	‘hit’
	/k	**[tʃá̰]**	‘chew’	**[kʰā̰]**	‘swear’
	/j	**[tʃō:]**	‘feces’	**[dʒɔ̀]**	‘penis’
	/sh	**[tʃɔ̄]**	‘carve’	**[ʃɔ̄]**	‘wipe off’
k					
	/ch	**[kʰā̰]**	‘swear’	**[tʃá̰]**	‘chew’
	/g	**[kʰō̰]**	‘play’ (e.g., a drum)	**[gō̰]**	‘play’ (intr.)
b					
	/d	**[bāŋ]**	‘shine’	**[dáŋ]**	‘jump’
	/g	**[bá]**	‘choose’	**[gā]**	‘divide’
	/m	**[bī]**	‘follow’	**[mí]**	‘swallow’
	/w	**[bō]**	‘escape’	**[wɔ́]**	‘whistle’ (v)
d					
	/t	**[dáŋ]**	‘jump’	**[tʰāŋ]**	‘count’
	/j	**[dáŋ]**	‘jump’	**[dʒāŋ]**	‘announce’
	/n	**[kʰīdāŋ]**	‘table’	**[kʰīnáŋ]**	‘chin’
	/l	**[dɛ̄:]**	‘cook’	**[lɛ́:]**	‘deceive’
j					
	/ch	**[dʒɔ̀]**	‘penis’	**[tʃō:]**	‘feces’
	/d	**[dʒāŋ]**	‘announce’	**[dáŋ]**	‘jump’
	/ɲ	**[dʒì]**	‘hoe’	**[ɲī]**	‘bee’
	/y	**[dʒɛ̄nɛ̄]**	‘swing’	**[jɛ́nɛ́]**	‘breathe’
g					
	/b	**[gā]**	‘divide’	**[bá]**	‘choose’
	/ŋ	**[gānɛ̀]**	‘greet’	**[ŋānɛ́]**	‘crawl’
	/gh	**[gā]**	‘divide’	**[ɣá]**	‘overpower’
	/w	**[gā]**	‘divide’	**[wā]**	‘argue’

Table 2.4 Minimal pairs for plosives.

Consonants		Example	Gloss	Example	Gloss
m					
	/b	**[mí]**	'swallow'	**[bī]**	'follow'
	/n	**[mâ]**	'be alone'	**[nâ]**	'cow'
	/w	**[mâ]**	'be alone'	**[wâ:]**	'argue'
n					
	/d	**[kʰīnáŋ]**	'chin'	**[kʰīdāŋ]**	'table'
	/m	**[nâ]**	'cow'	**[mâ:]**	'decorative scar'
	/ɲ	**[nâ]**	'cow'	**[ɲâ]**	'gift'
	/l	**[kʰīnáŋ]**	'chin'	**[fīláŋ]**	'clay pipe'
ɲ					
	/j	**[ɲī]**	'bee'	**[dʒì]**	'hoe'
	/n	**[ɲâ]**	'gift'	**[nâ]**	'cow'
	/ŋ	**[ɲāŋɛ̄]**	'feed'	**[ŋānɛ́]**	'crawl'
	/y	**[ɲō̰:]**	'knee'	**[jōŋ]**	'thatch' (n)
ŋ					
	/g	**[ŋānɛ́]**	'crawl'	**[gānɛ̀]**	'greet'
	/ɲ	**[ŋānɛ́]**	'crawl'	**[ɲāŋɛ̄]**	'feed'
	/gh	**[ŋānɛ́]**	'crawl'	**[ɣá]**	'overpower'
	/w	**[tʰɔ̄ŋɛ̄]**	'crow' (v)	**[tʃōwɛ̀]**	'latrine'

Table 2.5 Minimal pairs for nasals.

Consonants		Example	Gloss	Example	Gloss
f					
	/b	**[bī]**	'cry'	**[fī]**	'blow'
	/m	**[mɔ̰̄]**	'taste'	**[fɔ̰̄]**	'sharpen'
	/s	**[fāŋ]**	'deny'	**[sāŋ]**	'draw'
s					
	/t	**[sōŋ]**	'beat'	**[tʰōŋ]**	'fry'
	/n	**[sōŋ]**	'beat'	**[nòŋ]**	'throw'
	/f	**[sāŋ]**	'draw'	**[fāŋ]**	'deny'
	/sh	**[sà]**	'mask'	**[ʃā̰]**	'pot'
	/l	**[sāŋɛ́]**	'scatter'	**[lāŋɛ̄]**	'pay'
sh					
	/ch	**[ʃɔ̄]**	'wipe off'	**[tʃɔ̄]**	'carve'
	/ɲ	**[ʃā̰]**	'pot'	**[ɲāŋ]**	'animal'
	/s	**[ʃā̰]**	'pot'	**[sà]**	'mask'
	/gh	**[ʃā̰]**	'pot'	**[ɣá]**	'overpower'
	/y	**[ʃā̰]**	'pot'	**[jā̰]**	'suck'
gh					
	/g	**[ɣá]**	'overpower'	**[gā]**	'divide'
	/ŋ	**[ɣá]**	'overpower'	**[ŋānɛ́]**	'crawl'
	/sh	**[ɣá]**	'overpower'	**[ʃā̰]**	'pot'
	/w	**[ɣá]**	'overpower'	**[wâ:]**	'argue'

Table 2.6 Minimal pairs for fricatives.

Consonants		Example	Gloss	Example	Gloss
l					
	/d	**[lɛ́:]**	‘deceive’	**[dɛ̄:]**	‘cook’
	/n	**[fīláŋ]**	‘clay pipe’	**[kʰīnáŋ]**	‘chin’
	/s	**[lāŋɛ̄]**	‘pay’	**[sāŋɛ́]**	‘scatter’
	/y	**[lɛ̄sɛ́]**	‘disappear’	**[jɛ́sɛ̄]**	‘be empty’
	/w	**[lō]**	‘stop’	**[wó]**	‘whistle’ (v)
y					
	/j	**[jɛ́nɛ́]**	‘breathe’	**[dʒɛ̄nɛ̄]**	‘swing’
	/ɲ	**[jōŋ]**	‘thatch’ (n)	**[ɲō̰:]**	‘knee’
	/sh	**[jā̰]**	‘suck’	**[ʃā̰]**	‘pot’
	/l	**[jɛ́sɛ̄]**	‘be empty’	**[lɛ̄sɛ́]**	‘disappear’
	/w	**[jā̰]**	‘suck’	**[wâ:]**	‘argue’
w					
	/b	**[wó]**	‘whistle’ (v)	**[bō]**	‘escape’
	/g	**[wâ:]**	‘argue’	**[gā]**	‘divide’
	/m	**[wâ:]**	‘argue’	**[mâ]**	‘be alone’
	/ŋ	**[kʰīwádɛ̀]**	‘corn husk’	**[kīŋāʃɛ̄]**	‘ringworm’
	/f	**[wâ:]**	‘argue’	**[fā]**	‘peel’ (v)
	/gh	**[wâ:]**	‘argue’	**[ɣá]**	‘overpower’
	/l	**[wó]**	‘whistle’ (v)	**[lō]**	‘stop’
	/y	**[wâ:]**	‘argue’	**[jā̰]**	‘suck’

Table 2.7 Minimal pairs for approximants.

2.1.4 Consonant-glide sequences

Occurrences of some consonant followed by either the labial-velar approximant **w** or the palatal approximant **y** are described in this section. Consonant-glide clusters are analyzed as sequences rather than as labialization and palatalization, but with some reservation. As pointed out by Parker (2012: 121–122), proper analysis of CG sequences is notoriously problematic for a number of reasons. In the case of Nchane, one difficulty is the variety of sources for such sequences. For example, while there are numerous examples of apparently monomorphemic Cw sequences, there are also many examples of Cw sequences resulting from noun class marking (e.g., **[bwɛ̄ŋ]**/**[bɛ̄ŋ]** ‘mosquito (sg/pl)’ and **[tʃwɛ̌]**/**[bàtʃɛ̌]** ‘witch (sg/pl), genders 3/4 and 1/2 respectively). The **w** found in such noun class marking comes historically from a CV-prefix. Therefore, the **w** in Cw sequences representing noun class marking might not be comparable to the **w** in Cw sequences occurring in monomorphemic words. It is clear, for example, that in such cases, the **w** segment should be considered unbound to the preceding consonant, at least lexically, making a labialization analysis less tenable.

However, support for a labialization analysis comes from looking at neighboring languages and how gender 3/4 noun marking is handled. While class 3 Nchane nouns are marked with a **w** following the initial consonant of the root, several neighboring languages show this same marking through a labial-velar alternation. For example, the singular and plural forms of the Nchane word 'root' are **[gwɛ̄ŋ]** and **[gɛ̄ŋ]**, while the Mungong forms are **[gbɔ̄]** and **[gɔ̄]**. Instances of Cw sequences in Mungong are attested elsewhere, as are instances of **gb** as a unique phoneme. The simplest way to capture the essence of class 3 noun marking across the Beboid language group is to analyze it as labialization.

Ultimately, with a clear interpretation difficult or impossible, a Cw sequence analysis is preferable to C^w due to the desirability of decreasing the consonant phoneme inventory. This interpretation is then extended to Cy sequences recognizing both clusters as categorically similar, capturing the generalization that both clusters are consonant-glide sequences.

2.1.4.1 Cw sequences

Consonant clusters C_1C_2, where C_2 is a labial-velar approximant **/w/** are attested when C_1 is a plosive, fricative or nasal. The consonant cluster is observed at morphological boundaries as well as within basic words in root-initial position. The majority of occurrences are observed in nouns, although they occur in verbs as well. The Cw sequence occurs in about 11% of nouns, which is slightly more than double the rate of the sequence in verbs. This difference in proportion is largely erased when nouns from classes 1 and 3 are removed from the count to control for the **-w-** infix, which represents class marking.

The phonetic realization is **[Cw].** When the preceding consonant is a plosive, the **w** often has a slight fricative quality as a result of the release of the preceding plosive. In all cases, there is a degree of lip rounding at or near the onset of the initial consonant.

Table 2.8 shows which consonants are observed in **Cw** clusters. The sequence **dw** appears in parentheses to indicate that it occurs only in the class 3 nouns **[dʒwɛ̄]** 'mouth', **[dʒwɛ̰̄]** 'calabash used in tapping palm wine' and **[dʒwɛ̄lɛ̄]** 'edge'. The phonetic realization of the initial consonant is therefore usually spirantized such that it sounds more like **[dʒw]** than **[dw]**. The underlying onset consonant for these words is clearly **/d/** (as evidenced by their plural forms) and in careful speech the spirantization can be lessened, but never completely absent. It is likely that **/dw/** is always realized as **[dʒw]**, although the small number of tokens and lack of contexts other than class 3 does not allow for certainty. Similarly, the sequence **sw** occurs only in the class 3 word **[ɲ̄ʃwɛ̰̄]** 'palm needle (**[n̄sɛ̰̄]** representing the plural form). Again, the alveolar consonant is spirantized when followed by **w**. (See §3.6 for a description of spirantization.)

		Labial	Alveolar	Palatal	Velar
Plosives	vl			chw	kw
	vd	bw	(dw)	jw	gw
Fricatives		fw	(sw)	shw	
Nasals		mw			ŋw

Table 2.8 Cw sequence types.

The number of occurrences of each **Cw** sequence is given in Table 2.9, which clearly shows that velar consonants are the most numerous in the C_1 position, with the labial consonants the next most common.

Sequences	Examples (in phonetic form)	# of tokens
chw	**[tʃwɛ̌]** ‘witch’, **[tʃwɔ̄]** ‘shrew’	2
kw	**[kwī:]** ‘moon’, **[kwādʒɛ́]** ‘think’, **[kwɛ̄sɛ́]** ‘woman’	13
bw	**[bwī]** ‘dew’, **[bwɛ̄dɛ̄]** ‘break’	8
(dw)	**[dʒwɛ̄]** ‘mouth’, **[dʒwɛ̄lɛ̄]** ‘edge’	3
jw	**[dʒwḭ̄]** ‘husband’, **[kīdʒwî]** ‘boundary	2
gw	**[gwí]** ‘net’, **[gwī** ‘fall’, **gwɔ̄ŋ]** ‘bamboo’	17
fw	**[fwī]** ‘forward’, **[m̄fwà̄]** ‘slave’	6
(sw)	**[ɲ̄ʃwɛ̰̄]** ‘palm needle’	1
shw	**[bvʉ̄sɔ̄ʃwī]** ‘seven’, **[ʃwā]** ‘shuck corn’	3
mw	**[mwɛ̄]** ‘farm’, **[mwà̄]** ‘child’, **[mwāŋgá̄]** ‘hare’	3
ŋw[13]	**[ŋ̄wāŋ]** ‘granary’, **[ŋwáŋwá]** ‘sugarcane’	4

Table 2.9 Examples of Cw sequences and their prevalence (n=62).

The sequence **ŋw** is ambiguous as it could represent either an **Nw** cluster belonging to the same syllable (similar in nature to **mw**, **bw** or **gw**), or it could represent an **N̩.w** sequence, where the two segments belong to different syllables. The word for ‘granary’, for example, clearly has tone on the initial nasal, while both instances of **ŋw** in the reduplicated form for ‘sugarcane’ are pronounced with the segments acting as a unit, the nasal being of shorter duration and minimal observable tonal presence. The reader is directed to §2.1.5, where some of the challenges related to analyzing nasal-consonant sequences are discussed.

An additional question is prompted by the fact that **NC** sequences usually are observed to share place of articulation, so the occurrence of **ŋw** and **mw** suggests that the two sequences are not comparable. It is possible that these **ŋw** tokens are derived

[13] All tokens of **ŋw** in the data have the sequence preceding the vowel **a**, but I suspect that this apparent restriction is an artifact of the limited database. This suspicion is supported by the greater variety of vowels observed following the sequence in Noni words, although there is a clear preference for **a** in this environment. Also note that the Cw sequence in the word **[ŋ̩̄wā̰]** ‘granary’ (c5) is one in which the two consonants belong to different syllables.

from verbs, which take a homorganic nasal prefix **N-**, with the nasal assimilating to the velar place of articulation. Both of the words **[ŋ̄wāŋ]** 'granary' and **[ŋ̄wā]** 'book' are class 1 nouns, which is the class to which most nominalized verbs belong and are credible as nominalized forms in terms of semantics, although their nominalized status cannot be confirmed. The fourth token, **[ŋ̄wŋwá]** 'smell (v)' is likely an ideophone, to which normal rules of phonology do not necessarily apply.

Meanwhile, two of the **mw** tokens are class 1 nouns and the third token is a class 3 noun. Two of these tokens clearly derive the **w** from noun class affixation. (The word for 'hare' has the variant **wāŋgā́** and so the nature of the **mw** sequence is not clear.) Thus, an argument can be made that nasal place assimilation does not apply in cases of NC sequences resulting from infixation. On the one hand, the nasal of an **N-** prefix undergoes place assimilation when prefixed to words with a **w** onset, with an **[ŋw]** realization. On the other hand, a word initial nasal maintains its place features when taking a **-w-** infix. (See §3.1 for a description of nasal place assimilation.)

Leaving aside the likelihood that the sequences **mw** and **ŋw** have different sources, I nevertheless present both of these sequences as Cw clusters and leave the question regarding their possible differing phonological character for future study.

2.1.4.2 Cy sequences

Consonant clusters C_1C_2, where C_2 is a palatal approximant **/j/**, are attested when the initial consonant is a plosive, fricative or nasal, and are nearly restricted to the labial series. As with Cw sequences, Cy sequences are observed at morphological boundaries, as well as in root-initial position of basic words. The sequence is rare, occurring uniquely only 19 times in the data and is pronounced as **[Cj]**.

The different consonants observed in Cy clusters are given in Table 2.10. The consonants **t**, **d, ch** and **sh** are placed in parentheses, since they are attested only rarely in the data. Richards (1991: 338) also observed **chy** and **jy** sequences (and no **dy** sequence). However, no mention of frequency of these sequences is offered. Given the similar acoustic properties of a palatal consonant alone and a palatal consonant followed by the palatal approximant **y**, it is possible that some tokens of **shy**, **chy** and **jy** have been mistakenly transcribed without the glide. But it is just as likely that Cy sequences with a palatal initial consonant are in decline. The consonant **n** is omitted from the Cy sequence inventory due to the unclear interpretation of the phone **[ɲ]** as a realization of **/nj/**. See §2.1.1 above for details.[14]

[14] The vowel **/i/** of agreement prefixes for the anaphoric 1 demonstrative is always realized as a palatal glide for classes 8 and 19 (i.e., **[bjɛ̄-ɛ̀]** and **[fjɛ̄-ɛ̀]** respectively). Meanwhile, a palatal glide is sometimes also observed in the agreement prefixes for classes 4, 5, 10 and 13 (i.e., **[tʃjɛ̄-ɛ̀]**) and class 7 (i.e., **[kjɛ̄-ɛ̀]**), particularly in careful speech.

		Labial	Alveolar	Palatal	Velar
Plosives	vl		(ty)	(tʃy)	
	vd	by	(dy)		
Fricatives		fy		(ʃy)	
Nasals		my			

Table 2.10 Cy sequence types.

A complete list of root-initial **Cy** tokens is given in Table 2.11.

Sequences	Examples (in phonetic form)	# of tokens
(ty)	**[kʰīntjɛ̂ŋ]** ‘diarrhea’	1
by	**[bjə̌ŋ]** ‘gall bladder’, **[bjə̄ŋ]** ‘fish’, **[bjɛ̰̄:]** ‘nail’, **[bjā]** ‘banana’, **[bjāŋ]** ‘palm nut’, **[bjʊ]** ‘raffia palm’, **[m̀bjɛ̄ŋɛ̄]** ‘bell’, **[fīmbjə̄ŋ]** ‘hunting bow’	8
dy	**[djá]** ‘testicle’, **[bvʉ̄djɛ̂]** ‘bridge’	2
fy	**[fjɛ̀]** ‘mouse’, **[fjə̄ŋsɛ̄]** ‘resemble’, **[fjɔ̀]** ‘debt’, **[fjí]** ‘burn’	4
shy	**[āʃjə̄ŋ]** ‘stomach (internal)’	1
chy	**[tʃjā̰:]** ‘hand’	1
my	**[mjǣɣə̄]** ‘blink’, **[mjɔ̄]** ‘squeeze’	2

Table 2.11 Examples of root-initial Cy sequences and their prevalence (exhaustive) (n=19).

2.1.5 Nasal-consonant sequences

A proper interpretation of nasal-consonant sequences is difficult for a number of languages in the area. The same is true for Nchane, where the nasal of NC sequences is observed to always be pronounced with a certain degree of pitch, due to the nasal’s sonorance quality. But the characteristics of the nasal in one word versus a second word are not always the same, and are sometimes different in separate utterances of the same word. While interpretation of such sequences is debatable, I consider them as involving a syllabic nasal rather than prenasalization. However, there is much variation, with the NC onsets of verbs particularly showing more prenasalization-like characteristics.

In §2.1.5.1 I present the general phonetic properties and distribution patterning of NC sequences. I attempt to limit my discussion here to NC sequences in monomorphemic environments. I do this, however, with a recognition that it is likely impossible to rule out all instances of nominalization (which involves a homorganic nasal prefix) and that the question regarding a correct synchronic analysis of the nasal of NC sequences at the morpheme boundary in at least some of the noun classes is not yet answered with certainty. In §2.1.5.2 I present the various sources of NC sequences and discuss briefly how this complicates the analysis. Recognizing the potential sources of NC sequences is critical to understanding their behavior, since the realization of many of them is variable, suggesting that processes resulting in NC sequences, such as syllable reduction and root incorporation of prefix nasals, have not yet fully regularized.

2.1.5.1 General phonetic properties and distribution of nasal-consonant sequences

Nasals followed by non-nasal consonants are very common in the data, with the nasal almost always matching the place of articulation of the following consonant. This sequence type is particularly prevalent among nouns, which account for more than 75% of tokens. Slightly more than 50% of these sequences occur in word-initial position and another 35% are stem-initial, with both contexts accounting for more than 85% of total occurrences.

Some of these nasal-consonant sequences show characteristics consistent with both syllabic nasal-consonant sequences and prenasalized consonants. In word-initial position, the duration of the nasal is usually comparable to that of a vowel in a word-initial vowel-consonant sequence and carries tone. However, the duration can be significantly shorter, almost to the point of being unheard by the inattentive listener, particularly in commonly used words like proper nouns.[15] The tone realized on the nasal often matches the preceding tone. When there is no preceding tone, or when the NC sequence occurs at a phrasal boundary, the nasal is almost always realized with a mid tone. (Note that observations regarding the phonetic characteristics of NC sequences in this section are substantiated through the use of Speech Analyzer, an acoustic analysis application.)

The nasal is usually resyllabified, forming a syllable coda, when preceded by a vowel, and usually with no apparent tone implications. In other words, there appears to be no lexical tone associated with most of these nasals. The duration of the resyllabified nasal in the coda position is relatively shorter compared to the word-initial variety and there is a clear reduction in intensity (i.e., a hiatus) marking the nasal-consonant boundary when the consonant is a voiced plosive like **b** or **g**. When the consonant is a voiceless plosive or fricative there is a smaller reduction in intensity at the nasal-consonant boundary and a large reduction between the consonant and the following vowel.

Rarely, reduced intensity has been observed instead occurring at the vowel-nasal boundary suggesting that the nasal has not been completely resyllabified and the nasal-consonant sequence showing characteristics more in line with a prenasalization analysis. Multiple utterances of the same word sometimes yield varying degrees of apparent resyllabification, possibly related to differences in careful and natural speech. These rare cases might be limited to nominalizations. However, examples of known nominalized forms are observed with the nasal being characteristically resyllabified.

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[15] Note for example the form **Cane** as one of the observed varieties of the language name.

The inventory of NC(G) sequences occurring in the data appears in Table 2.12. The glides are given in parentheses when they are attested with a particular NC sequence. The table shows that any consonant can be preceded by a nasal, with the exception of **gh**. There is no evidence to suggest that a **ŋgh** sequence is impossible; its absence is likely due to the scarcity in the data of **gh** itself.

	Labial	Alveolar	Palatal	Velar
Plosives		nt(y)	ɲch	ŋk(w)
	mb(w/y)	nd	ɲj	g(w)
Fricatives	ɱfw	ns	ɲsh(w)	-
Approximants		ŋl	ɲy	ŋw

Table 2.12 NC(G) sequence types.

Examples of NC sequences in nouns are given in Table 2.13, along with the prevalence of the different NC sequence types. Note that the distribution of glides following the various NC sequence varieties is largely consistent with that of the glides without the preceding nasal.

Some important observations regarding this data set can be made. First, nasal-consonant sequences occuring inside the root and not at a morpheme boundary are rare. In most cases, these appear to be nominalized forms with the NC sequence a result of a verb suffix. Two apparent exceptions are **[mwāŋgâ]** 'hare' (c1) and **[sɛ̄ŋlì]** 'okra' (c1). Second, the voiced velar nasal-plosive sequence **ŋg** rarely occurs before front vowels, with **[kʰīŋgɛ̀ŋ]** 'island' being the only occurrence in the data. Lastly, while the distribution of NCG sequences is modestly wide, their prevalence is very low.

NC	Examples (in phonetic form)	# of tokens
nt	**[kʰīntî]** 'bowl' (c7), **[kʰīntâ]** 'stool' (c7), **[n̄tʰɔ̀ŋ]** 'cane rat' (c1)	15
ɲch	**[ɲ̄tʃī]** 'law' (c1), **[fīɲtʃā]** 'ring' (c19), **[kʰīɲtʃɔ̄:]** 'horn' (c7)	24
ŋk	**[ŋ̄kʰī:]** 'song' (c1), **[ŋ̄kʰā]** 'jigger' (c9), **[kʰīŋkʰōfɛ̄]** 'bone' (c7), **[ŋ̄kfʉ́sà]** 'ancestor' (c1), **[kʰīŋkfʉ́nɛ̄]** 'stump' (c7)	22
mb	**[m̄bī:]** 'grasshopper' (c9), **[m̄bà:]** 'bait' (c9), **[m̄bɔ̄nà]** 'sweet potato' (c1)	23
nd	**[n̄dīŋɛ́]** 'omen' (c1), **[n̄dáŋ]** 'thread' (c1), **[n̄dɔ̀ŋ]** 'hawk' (c1)	7
ɲj	**[ɲ̄dʒī]** 'venom' (c1), **[ɲ̄dʒà̰]** 'balafon' (c1), **[ɲ̄dʒō:]** 'mortar' (c5)	13
ŋg	**[kʰīŋgɛ̀ŋ]** 'island' (c7), **[ŋ̄gáŋ]** 'tarantula' (c1), **[ŋ̄gōlʊ́]** 'vulture' (c1), **[kʰīŋgvʉ̀]** 'duck' (c7)	27
ɱf	**[kʰīɱfɛ̰̄:]** 'blind man' (c7), **[kʰīɱfàŋ]** 'molar tooth' (c7), **[ɱ̄fô]** 'ladle' (c3)	11
ns	**[fīnsɛ́sɛ̀]** 'louse' (c19), **[n̄sà̰]** 'friend' (c9), **[n̄sō:]** 'pepper' (c1)	10
ɲsh	**[fɛ̄ɲʃi]** 'daytime' (c16), **[ɲ̄ʃáŋ]** 'ground' (c9), **[fīnʃɔ̄:]** 'mud wasp' (c19)	4
ŋgh	-	
ŋl~nl	**[sɛ̄ŋlì]** 'okra' (c1), **[kʰīŋlà:]** 'kingfisher' (c7), **[n̄lɔ̄]** 'poison' (c1)	3
ɲy[16]	**[fīɲjɛ̄lɛ́]** 'earring' (c19), **[fīɲjɔ̄ŋà]** 'pig' (c19)	2
ŋw	**[ŋ̄wāŋ]** 'granary' (c1)	1
mbw	**[m̄bwɛ́īkʰōlō]** 'chameleon' (c1)[17]	1
ŋgw	**[ŋ̄gwāŋ]** 'whip' (c1)[18]	1
ɱfw	**[ɱ̄fwā]** 'slave' (c1)	1
ɲshw	**[ɲ̄ʃwɛ̰̄]** 'palm needle' (c3)[19], **[ɲ̄ʃwɛ̰̄]** 'broom' (c9)	2
nty	**[kʰīntjɔ̂ŋ]** 'diarrhea'	1
mby	**[m̄bjɛ̄ŋɛ̄]** 'bell', **[fīmbjɛ̄ŋ]** 'hunting bow'	2

Table 2.13 Examples of NC sequences in nouns and their prevalence (n=170).

The few examples of NC onsets occurring in verbs show that the duration of the nasal is closer to that of coda nasals. In addition, there is very little or no decrease in intensity at the nasal-consonant boundary. This NC variety shows characteristics of a prenasalized consonant. However, only seven examples of NC word-initial verbs

[16] The inclusion of **ɲy** as a NC sequence type is supported by the presence of a hiatus occurring between the nasal and the consonant. Furthermore, the palatal consonant in both of these words is sometimes realized as the allophone **[j]**.

[17] This is obviously a compound word of some sort. However, the NCw sequence is our focus here, and there is no reason to doubt it as a valid example of this sequence.

[18] This word refers to any instrument used to beat a person, e.g., a cane, stick or strap.

[19] The **w** in this word comes from c3 affixation. The word is likely the source from which the word 'broom' is derived, which is fashioned by tying palm needles together. The class 3 affix is apparently maintained in the stem of the new class 9 word.

are found in the data, which are given in Table 2.14. Furthermore, some verbs which were originally transcribed with an NC onset showed that the nasal was not present in recordings, suggesting that the status of this variety of NC sequence is tenuous.

Sequences	Examples (in phonetic form)	# of tokens
nt	-	
ɲch	-	
ŋk	**[ᵑ̄kʰʊ̀]** ‘clap’	1
mb	**[ᵐ̄bɛ̀]** ‘imitate’, **[ᵐ̄bǣfɔ́]** ‘subtract’, **[ᵐ̄bɔ̰̀]** ‘melt’, **[ᵐ̄bṵ̄:]** ‘foam’, **[ᵐ̄bɔ́ɲɛ̄]** ‘perspire’	5
ŋg	**[ᵑ̄gʊ̄mā]** ‘kneel’	1

Table 2.14 Examples of NC sequences in verbs (exhaustive) and their prevalence (n=7).

Considering the phonetic characteristics of NC sequences observed above, an argument can be made for syllabic nasals as well as prenasalized consonants, with a range of realization patterns consistent with either interpretation. This variability is consistent with diachronic change, the end result of which is difficult to predict, and is explained to a degree by looking at the different sources of NC sequences in the language, which are presented in the following section.

The realization of NC onsets of verbs is particularly more consistent with a prenasalization analysis than NC sequences in other contexts. But even this NC variety is prone to speaker/utterance variability. A more accurate analysis is one which views all NC sequences of the language as a single variety, but with realization tendencies associated with specific contexts (e.g., word class, consonant type, etc.). Most occurrences of NC sequences show characteristics inconsistent with a prenasalization analysis. Therefore, I consider a syllabic nasal analysis preferable.

2.1.5.2 Sources of nasal-consonant sequences

Analysis of nasal-consonant sequences is complicated due in part to their multiple sources, with some NC sequences difficult to categorize in terms their morphological status. Five primary contexts are observed:

1. The first-person singular subject agreement prefix **N-**, which affixes to the left side of the verb and often various elements of the verb core (e.g., tense and aspect markers). For example, mɛ̄ **ŋ-gɛ̄ n-dú** [1SG.PRO 1SG-P3 1SG-say] ‘I said…’.
2. Consonant initial suffixes added to verb roots with nasal consonant codas. For example, bī**ŋ-s**ɛ́ [dance-CAUS] ‘roll’.
3. Nominalization is usually accomplished through adding a homorganic nasal prefix **N-** to a verb. All verb roots have consonant onsets. The result then is a NC sequence. For example, kì-n-tɛ̰̀ɲɛ̄ [c7-NMZR-argue] ‘argument’.

4. Noun class prefixes added to nominal roots and nominal modifiers. For example, mā**ŋ-k**ɔ́ [c6a-ladder] 'ladders' and mw-ɛ̄: mù**n-d**ùdē [c18a-thing c18a-many] 'many things'.
5. Monomorphemic, root internal NC sequences. For example, **ḿb**ɛ́nɛ̀ [c5.breast] 'breast', mwā**ŋg**ā [c1.hare] 'hare' and **m̄b**ṵ̄: [foam] 'foam (v)'[20].

The first two contexts are easily dealt with, since it is usually obvious when a verb has been marked with subject agreement or a causative suffix, although many verbs are observed which have an apparent historical causative suffix lexicalized as part of the verb root (see §9.1.4 for more details). Contexts 3 and 4 represent environments which are not always easily analyzed. For instance, it is almost certainly the case that some nouns in the data are nominalizations, but without a corresponding source verb identified. This difficulty is particularly troublesome for class 1 nouns, since many of these have root-initial NC sequences, where the homorganic nasal represents either a nominalization prefix or a lexicalized class prefix. Therefore, it is not always apparent if the nasal present at the morpheme boundary in nouns is a part of the root or has been affixed to the root.

The morpheme boundary presented by class agreement marking on nominal modifiers is usually easily identifiable and brings no questions to the status of the resulting NC clusters. But certain genders (particularly 1/2 and 19/18a) are observed to have subgroups involving a homorganic nasal at the morpheme boundary. The question then is whether the nasal belongs to the root or to the prefix. See §5.2.1 for more discussion on noun classes with a prevalence of such NC sequences.

The various sources of NC sequences in the language and the accompanying ambiguity as to their morphological status should be kept in mind when considering the phonetic description offered in the above section. The variability of the phonetic realization of some NC sequences reflects an indistinct morpheme boundary, where a historical nasal prefix element is in the process of being lexicalized onto the root.

2.2 Vowels

Nchane has a seven-vowel system, which is in contrast to the neighboring Grassfields languages, which most often have nine vowel systems. However, within the Beboid group, Sari and Noni also have seven vowel systems (Richards 1991). The basic vowel phonemes of Nchane are displayed in Figure 2.1.

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[20] To agitate a liquid with a paddle or stick, resulting in the formation of foam. This is an action used in the production of palm oil to separate the oil from the water.

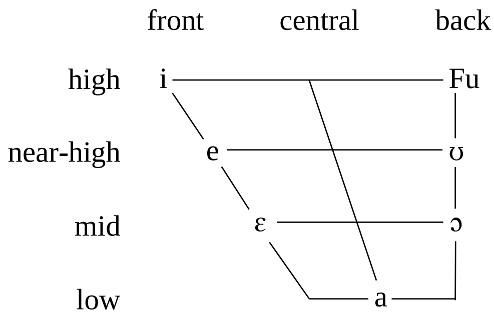

Figure 2.1 Inventory of Nchane vowels (short, oral varieties).

The figure above shows a symmetrical vowel system, with three height distinctions represented in front and back series. However, the vowel system is phonetically asymmetrical, as the high back fricative vowel (represented as **Fu**) is realized as a near-high central vowel **[ʉ̞]** with associated frication. Issues related to the fricative vowel analysis and this apparent discrepancy are discussed in §2.2.1, followed by sections describing the phonetic characteristics of vowels and support for their phonemic status. These sections are then followed by presentations of nasal vowels and long vowels. (While these vowels are represented in this chapter in their IPA form, see §1.3.3 for an explanation as to how they are represented in the description's orthography.)

2.2.1 Fricative vowel

The vowel **Fu**, appearing in the high back position in Figure 2.1 above, has a severely restricted distribution, following a limited number of consonants and always accompanied phonetically by a fricative. The fricative, either **[f]** or **[v]**, matches the voicing of the preceding consonant. For example, it is **f** following **k** and **ch**, but **v** following **b**, **g** and **j**. Table 2.15 presents the CFu sequence types with illustrative examples and their prevalence in the data. Note that long and nasal varieties of the vowel in question are also observed. Due to the overall small number of tokens, all varieties of this vowel are treated together.

Preceding consonant	**Examples (in phonetic form)**	**# of tokens**
b	**[bvʉ̌]** 'dog', **[bvʉ́lì]** 'lion', **[bvʉ̄gə́]** 'nine'	5
k	**[kfʉ̂:]** 'rope', **[kʰīkfʉ̄nə̀]** 'rat', **[ŋ̄kfʉ́sà]** 'ancestor'	12
g	**[gvʉ̄]** 'chest', **[gvʉ̄:nì]** 'obey', **[ŋ̄gvʉ̰̄]** 'tail'	12
ch	**[tʃfʉ̄]** 'reply', **[ɲ̄tʃfʉ̀gè]** 'thousand'	3
j	**[dʒvʉ̂]** 'cobra'	1

Table 2.15 Examples of CFu sequences and their prevalence (n=33).

Previous analyses of the Nchane sound system (see Boutwell 2014a; and Richards 1991)[21] have treated these phonetic CF sequences as allophonic variants of Cw sequences when preceding /u/. However, recent attention to similar phenomena in other languages suggests a better analysis is to view this frication as being associated, if only as a trigger, with the vowel itself (see for example Connell 2007; and Faytak 2014).

Figure 2.2 presents the various vowels according to their average formant values and shows that the high, back position normally filled by **[u]** is empty. The phonetic vowel representing the phoneme **/u/**, which at one time filled this position, is now realized as a near-high central vowel associated with labiodental frication of the preceding consonant (i.e., the fricative vowel **Fu**).

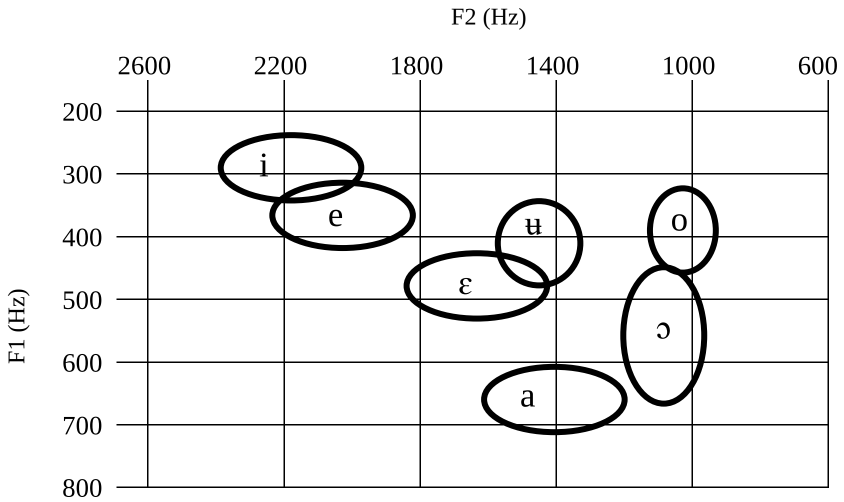

Figure 2.2 General zones of Nchane vowel realization reflecting F1 and F2 measurements.[22]

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[21] The CFu sequence is actually not attested by Richards for Nchane, even though at least one instance occurs in his data. However, in the same work, he treats CFu as an allophone of Cwu for Noni. The fact that CFu is not observed by Richards for Nchane may indicate that it is a relatively new development. The current Noni orthography observes 12 consonants in the initial position of CFu sequences (Andrus & Lux 2009: 8), whereas Hyman observed only seven (Hyman 1981: 1). While this might be a result of a relatively small sample size in the case of Hyman's study, it might also support the notion that this phenomenon is relatively novel in the area. Meanwhile, Mungong is the only other Beboid language reported as having this phenomenon of frication associated with the high back vowel, with preliminary work revealing only three consonants (**b, k** and **g**) allowed to precede the vowel in question (Boutwell 2011: 10).

[22] These zones reflect the F1 and F2 measurements of the various vowels plotted on a chart, with F1 serving as the horizontal axis and F2 as the vertical axis. The actual number of vowels measured are as follows: i=38, e=53, ɛ=52, a=19, ɔ=21, o=12, ʉ=8.

Faytak (2014: 56) suggests that such fricative vowels are associated with vowel systems with high vowels being encroached upon by lower vowels. This appears to be consistent with the Nchane vowel system. While no such encroachment is observed for the back vowels, the high front vowel is being crowded by the near-high front vowel and there is no high back vowel in opposition to the high front vowel.

In the past, **/o/** is assumed to have placed upward pressure on **/u/** resulting in a growing degree of closure and frication. The frication was also accompanied by centralization of the vowel. Speculation is that **/u/** is being reanalyzed as a near-high central vowel, relieving the pressure on the high back position and allowing **/o/** to move to a slightly higher position. Indeed, the **/o/** often sounds like **[u]** to me, as a native American English speaker. In addition, both of these vowels (**/u/** and **/o/**) exhibit behavior commonly associated with a high back vowel, as is shown in §§3.3 and 3.4.

2.2.2 Phonetic descriptions of short oral vowels

As stated in the introduction to the section on vowels, the vowel system is phonetically asymmetrical. This is demonstrated in Figure 2.2 above which shows that there is no high back vowel counterpart to the high front vowel. Further descriptions of each vowel are given below. Note that these descriptions can for the most part be extended to the long and nasal vowel varieties, only differing in duration and nasal quality respectively. Therefore, no phonetic descriptions will be given for the individual long and nasal vowels.

The vowel i The high front unrounded vowel **i** is realized as **[i]**, as in **[bī]** ‘goat’ and **[bā-ɲtʃī]** ‘laws’. It is normally laxed when followed by a nasal, resulting in the realization of **[ɪ]**, as seen in **[kʰì-mbà̰̏]** ‘walking stick’. In this environment, contrast between **i** and **e** is therefore neutralized, and it is highly probable that some instances of transcribed **e** should be considered as **i**. Following a palatal consonant such as **ch** or **ɲ**, laxing usually does not occur, as in **[tʃīɲdʒū́:]** ‘mortar’. See §3.2 for a treatment of high front vowel laxing.

The vowel e The realization of the near-high front unrounded vowel **e** may best be characterized as [ɪ]. Some instances are a bit lower, possibly represented as **[e̞]**. Some examples are **[fì-sì̏]** ‘larynx’, **[bílí]** ‘hail’ and **[lē̞gə̄]** ‘run’. There is also a degree of free variation between the realizations of **[ɪ]** and **[ɨ]**, particularly in word final position. Thus, alternative pronunciations are observed for certain words like **/ā-gé/→[ā-gí]~[ā-gɨ́]** ‘sole of foot’ and **/dʒé/→[dʒí]~[dʒɨ́]** ‘sandal’.

The vowel ɛ The vowel **ɛ** is a mid front unrounded vowel **[e̞]**. In normal speech, this vowel often laxes when adjacent to a velar consonant, being realized as the mid central vowel **[ə]**. Sometimes, this laxing also occurs when the vowel is utterance final. The laxing is less likely to occur if the vowel is in a position associated with stress (as indicated by an apparent increase in intensity), such as root initial, and is often “corrected” in careful speech. Note that stress as a feature of the sound system has not been studied beyond the observances made here. These allophones are illustrated in the examples **[kʰī-bɛ̄̂]** ‘wing’, **[kʰī-kwə̄̂]** ‘head’, **[bə̄ŋ]** ‘mosquitos’ and **[lɛ̄mə́]** ‘tongue’.

The vowel a The low unrounded vowel **a** is realized as **[a]**, although it is not as low as a standard low vowel and might be more accurately described as the near-high central vowel **[ɐ]**. This vowel is illustrated in words like **[lábɛ̀]** ‘spider web’, **[ŋ̄kʰâ]** ‘basket’ and **[bā-ndáŋ]** ‘thread’. Note that rarely this vowel is pronounced as **[æ]**. No specific environment for this alternative pronunciation has been identified, and it is analyzed as being in free variation with **[a]**.[23]

The vowel ɔ The mid back rounded vowel **ɔ** has the most widely scattered formant plotting area, with a height spanning from 450-650 Hz. However, most instances are realized as **[ɔ]**. There is a tendency for higher realizations to follow palatal consonants such as **/tʃ/** and **/ɲ/**. But the incidence is inconsistent, with some lower realizations observed after palatal consonants and some higher realizations after non-palatal consonants. Some examples are **[kʰī-bɔ́]** ‘arm’, **[kʰī-nsɔ̄mɛ̀]** ‘pestle’, **[lɔ̰̄]** ‘bite’, **[fìɲ-tʃɔ̄nɛ̄]** ‘groundnut’ and **[ʒɔ̰̄]** ‘snake’.

The vowel u The vowel **u** is realized as a near-high back rounded vowel **[ʊ]**, which is slightly higher than the American English **[ʊ]**. Its higher realization often makes it sound like **[u]**. This vowel is illustrated by the words **[kʰī-ŋkʰʊ̄fɛ̄]** ‘bone’ and **[kʰī-jʊ̰́]** ‘fool’.

The vowel Fu The vowel **Fu** is realized as a near-high central rounded vowel **[ʉ̞]**, which is associated with labiodental frication. Some examples are **[kʰī-ŋgvʉ̞̀]** ‘duck’, **[bvʉ̞́lì]** ‘lion’, **[bī-kfʉ̞̄nɛ̀]** ‘rats’ and **[tʃfʉ́]** ‘reply (v)’.

2.2.3 Contrastive sets for short oral vowels

The phonemic status of the seven Nchane vowels is illustrated in Table 2.16, which provides two contrastive sets. The first set establishes contrasts for all the vowels but the back series, with each vowel following the palatal plosive **[dʒ]**. Contrast for back vowels is observed in the set of words appearing below the dashed line, with the three back vowels following the velar plosive **[g]**.

[23] The vowel **[æ]** was not observed as a vowel for Nchane by Richards (1991). However, he did note the long version **[æ:]**, but as the phonetic realization of **/a:/** (Richards 1991: 355–6). This analysis is not supported by the data corpus associated with this current work, in which **/a:/** is realized as **[a:]**, as described in §2.2.5.

Underlying form	Surface form	Gloss
/dʒì/	**[dʒì]**	‘hoe’ (c9)
/dʒê/	**[dʒɪ̂]**	‘animal skin’ (c9)
/dʒɛ̀/	**[dʒɛ̀]**	‘word’ (c9)
/dʒá/	**[dʒá]**	‘stand’ (v)
/dʒū/	**[dʒvʉ̂]**	‘cobra’ (c9)
/dʒó/	**[dʒʊ́]**	‘sun’ (c5)
/gù/	**[gvʉ̀]**	‘chest’ (c9)
/gò/	**[gʊ̀]**	‘buy’ (v)
/gɔ̄/	**[gɔ̄]**	‘spear’ (c5)

Table 2.16 Contrastive sets for short oral vowels.

2.2.4 Nasal vowels

Nasal vowels, which are summarized in Figure 2.3, occur in Nchane and are analyzed as the product of syllable reduction processes. Therefore, the issue of their synchronic phonemic status is somewhat complicated. While minimal pairs which contrast oral and nasal vowels are readily available, the practical orthography represents nasal vowels as VN sequences, reflecting the lack of contrast between nasal vowels and their corresponding VN sequences. Accordingly, it is perhaps more accurate to consider these nasal vowels as the phonetic realization of an oral vowel followed by a nasal consonant in coda position.

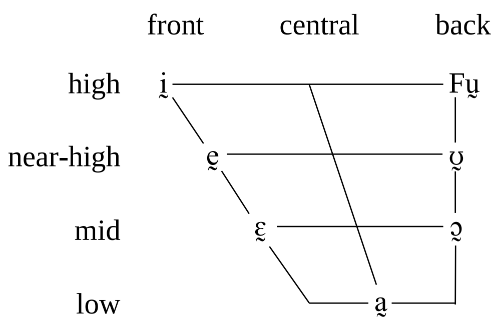

Figure 2.3 Nchane nasal vowel inventory.

Occurrences of nasal vowels are restricted to coda position and a moderate amount of free variation between V̰ and VN is observed.[24] This free variation appears to be less frequent for long nasal vowels than for short nasal vowels. Language

[24] Occurrences of **V̰** in the data are usually represented as **Vŋ** in this work. Although, since free variation between **V̰** and **Vŋ** is observed, both representations are used and are considered as accurate.

internal evidence for the treatment of these vowels as underlying VN sequences comes from verbs like **gɛ̰̂:** 'go', which has the progressive form of **gɛ̄né**. Considering cognates with neighboring languages in which a nasal consonant is present also supports the hypothesis that these vowels are a result of syllable reduction. Table 2.17 provides a partial list of cognate evidence of syllable reduction.

Nchane	**Noni**	**Sari**	**Kemedzung**	**Gloss**
kī-ŋgʊ̰̂	kə̀-ŋgū̀:n	fi-ŋgomu	kɨ-gɔmbɔ	'bedbug'
ŋ̄gvʉ̰́	wvún	wu:ŋ	wuɲshi	'tail'
tâ̰:	tā:n	taŋɛ	-	'ashes'
chā̰	chān	tsa:ŋ	tsandɨ	'monkey'
kī-ŋkâ̰	kè-ŋkā:ŋ	ki-ta:ŋ	kɨ-ŋkɔŋkɔ	'insect, beetle'
kī-lɛ̰́:	kē-lé:m	ki-lɛmɛ	kɨ-lɨŋgbə	'bat'
byɛ̰̄:	byɛ̄n	byɛni	byandɨ	'nail'

Table 2.17 Selected cognates of Nchane and three other Beboid languages supporting syllable reduction as source of Nchane nasal vowels.

Near-minimal pairs contrasting nasal and oral vowels are given in Table 2.18.

Vowels	**Underlying form**	**Surface form**	**Gloss**
ḭ/i	**/ʃîŋ/**	**[ʃḭ̂]**	'be silent'
	/ʃî/	**[ʃî]**	'sit'
ḛ/e	**/kī-ʃēŋ/**	**[kʰī-ʃḭ̄]**	'palm tree flower'
	/kī-ɲtʃê/	**[kʰī-ɲtʃî]**	'sleeping room'
ɛ̰/ɛ	**/dʒɛ̀ŋ/**	**[dʒɛ̰̀]**	'grave'
	/dʒɛ̀/	**[dʒɛ̀]**	'word'
a̰/a	**/ŋ̄gàŋ/**	**[ŋ̄gà̰]**	'proverb'
	/ŋ̄gá/	**[ŋ̄gá]**	'rust'
ɔ̰/ɔ	**/kì-mbɔ̄ŋ/**	**[kʰì-mbɔ̰̄]**	'door'
	/kī-bɔ́/	**[kʰī-bɔ́]**	'arm'
ʊ̰/ʊ	**/kī-kóŋ/**	**[kʰī-kʊ̰́]**	'shirt'
	/kī-kô/	**[kʰī-kʊ̂]**	'yam'
Fṵ/Fu	**/ŋ̄gúŋ/**	**[ŋ̄gvʉ̰́]**	'tail'
	/ŋ̄gù/	**[gvʉ̀]**	'chest'

Table 2.18 Contrastive pairs for nasal vowels.

2.2.5 Vowel length

Contrastive vowel length is observed in a small number of words, most of which have monosyllabic roots, with long varieties of all seven short vowels. The long vowels inventory is provided in Figure 2.4.[25]

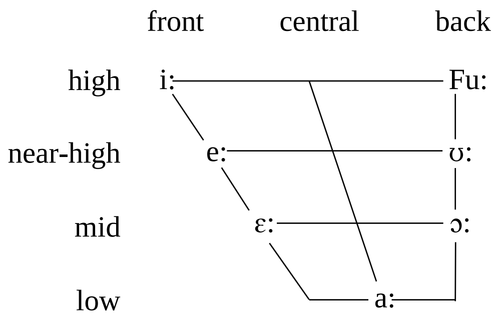

Figure 2.4 Nchane long vowel inventory.

The analysis is somewhat complicated by the occurrence of two types of long vowels, one being the so-called “half-long” variety. Short vowels usually have a duration of about 100 ms and long vowels are about 220-250 ms. Half-long vowels measure about 180-190 ms in duration. Some examples are **kīntî**· ‘bowl’ (c7) and **fɛ̀tā̰**· ‘fireside’ (c16). The actual duration of a vowel can be affected by a number of factors. Contour tones and nasalization are particularly associated with longer vowels in Nchane.

Although difficult to substantiate, it is likely that these half-long vowels are a product of syllable reduction, similar to what has been posited for nasal vowels (see §2.2.4). The same has been argued for as the source of long vowels in nearby Mungbam (Lovegren 2013: 96). Because of the relative difficulty in differentiating three length values by the researcher as well as by many native speakers, the current analysis considers half-long vowels as short varieties.

[25] Note that Richards (1991) postulates that **[æ]** is the surface realization of the long low vowel /aa/. However, there is no evidence in the current data to support this analysis.

Examples of contrast for long vowels are given below.

Vowels	**Example**	**Gloss**	**Example**	**Gloss**
i:/i	**[fī:]**	‘wind’	**[fí]**	‘kidney’
e:/e	**[tʃī:]**	‘mole’	**[tʃī]**	‘palm kernel’
ɛ:/ɛ	**[fɛ́:]**	‘two’	**[fɛ̄]**	‘make’
a:/a	**[bī-ɲdʒá̄:]**	‘clouds’	**[bā-ɲdʒà]**	‘balafon’
ɔ:/ɔ	**[kʰī-jɔ̄:]**	‘elephant’	**[kʰī-jɔ̄]**	‘spirit’
ʊ:/ʊ	**[ŋ̄gʊ̀:]**	‘canoe’	**[ŋ̄gʊ́]**	‘fire’
Fu:/Fu	**[bvʉ̀:gə̄]**	‘nine’	**[bvʉ́lì]**	‘lion’

Table 2.19 Contrastive pairs for long vowels.

2.3 Phonotactics

2.3.1 Syllable structure

Six types of syllables are observed in Nchane words: V, N, CV, CGV, CVN, and CGVN. The V syllable type is rare, with most occurrences accounted for by class marking for classes 6 and 18 and the preposition **à** ‘in’. The CV syllable type is by far the most prevalent and is observed involving all consonants and vowels.

The N syllable type is listed here in spite of the fact that the characteristics of the N in NC sequences do not always support its analysis as syllabic. The strongest candidates for such an analysis are the first-person singular subject agreement prefix and the nasal prefix of some class 6a nouns. See §2.1.5 for further discussion.

Examples of each of the syllable types are given in Table 2.20.

Syllable type	Example	Gloss
V	**[ā]**	‘in’
	[ā.dā]	‘testicles’
N	**[ŋ̄.k^{h}ʊ̰̀:]**	‘palm kernel oil’
	[m̄.bvṵ̀:]	‘palm wine’
CV	**[dā]**	‘testicle’
	[t^{h}í]	‘abdomen’
	[fì]	‘kidney’
	[jʊ̄]	‘hear’
CGV	**[bwī]**	‘dew’
	[gwɔ̄]	‘cut down’
	[kwɪ̄]	‘moon’
	[ŋ̄gwì]	‘fishing pole’
	[fjɛ̀]	‘mouse’
	[fjɔ́]	‘debt’
	[bjʊ̄]	‘raffia palm’
CVN	**[jɛ́ŋ]**	‘thigh’
	[dáŋ]	‘jump’
	[bɛ̄ŋ]	‘frighten’
CGVN	**[kwɛ̄ŋ]**	‘firewood’
	[ŋ̄wāŋ]	‘granary’
	[bjɛ́ŋ]	‘fish’
	[ā.ʃjɛ̄ŋ	‘stomach’

Table 2.20 Examples of different syllable types.

Nouns

Nchane shows a slight preference for monosyllabic noun roots. The phonological structure of roots is dominated by CV and CV.CV structures, although other combinations are not uncommon. Noun roots with more than two syllables are relatively rare. The different syllable patterns of noun roots are summarized in Table 2.21, along with representative examples.

Pattern	Example	Gloss
σ	**[bī]**	‘goat’
	[fjɛ̂]	‘mouse’
	[tʃɔ̌ŋ]	‘thief’
σ.σ	**[gá.nɛ̄]**	‘grass’
	[sɔ́.ŋɔ́]	‘oil palm’
	[kwɛ̄.sí]	‘woman’
	[sɛ̄ŋ.lì]	‘okra’
	[mwàŋ.gá]	‘rabbit’
σ.σ.σ	**[bì.lì.kʰáŋ]**	‘papaya’
	[bɔ́.ŋā.lī]	‘tortoise’
σ.σ.σ.σ	**[tʃā.lā.gʊ́.gʊ̄]**	‘spider’

Table 2.21 Syllable patterns of noun roots.

Verbs
The majority of Nchane verbs have monosyllabic roots with the shape CV. Disyllabic roots most often have the shape CV.CV. Other syllable types, such as CVN and CGV, are relatively uncommon in verb root structures. Table 2.22 summarizes the different patterns observed and gives some examples.

Pattern	Example	Gloss
σ	**[wâ]**	‘argue’
	[jà̰]	‘vomit’
	[bíŋ]	‘dance’
	[fjí]	‘burn’
	[gwī]	‘fall’
σ.σ	**[ɲī.lɛ̀]**	‘hide’
	[lī.gɛ̀]	‘run’
	[kwā.dʒɛ̀]	‘think’
	[mjá.gɛ́]	‘blink’
	[ŋ́gʊ́.mɛ́]	‘bow down’

Table 2.22 Syllable patterns of verb roots.

2.3.2 Distributional Restrictions

This section discusses observed restrictions on the distribution of consonants and vowels. Table 2.23 shows which CV sequences are attested, considering simple onsets only. Unattested sequences are represented by a minus sign and shaded.

	i	e	ɛ	a	ɔ	ʊ	ᶠu
b	+	+	+	+	+	+	+
t	+	+	+	+	+	+	-
d	+	+	+	+	+	+	-
ch	+	+	+	+	+	+	+
j	+	+	+	+	+	+	+
k	+	+	+	+	+	+	+
g	+	+	+	+	+	+	+
f	+	+	+	+	+	+	-
s	-	+	+	+	+	+	-
sh	+	+	+	+	+	+	-
gh	-	+	+	+	+	-	-
m	+	+	+	+	+	+	-
n	+	+	+	+	+	-	-
ɲ	+	+	+	+	+	+	-
ŋ	-	-	+	+	+	+	-
l	-	+	+	+	+	+	-
y	+	+	+	+	+	+	-
w	-	+	+	+	+	+	-

Table 2.23 Attested consonant-vowel sequences in Nchane (simple onsets only).

Restrictions on consonants

All consonants in the inventory are attested as onsets, although **ŋ** is rare in this position. Conversely, **ŋ** is the only consonant allowed in word final position. Additionally, only nasals are allowed in coda position. As was stated in §2.1.2.3, nasals in word final position are often elided and a nasal quality realized on the preceding vowel. This provides evidence of a preference for CV syllable types, with CVN the only type of closed syllable allowed, and that type of syllable often realized as the open syllable CV̰.

Table 2.24 summarizes the consonants which can occur stem-internally. While most consonants are observed in this position, the voiceless palatal plosive is notably unattested. Furthermore, the voiceless alveolar plosive appears only once in the data in a stem-internal environment as indicated by the brackets, in the word **tūtū** 'potato', which is possibly a loanword from English and/or perhaps a reduplicated stem. The voiceless velar plosive is also significantly rare in this environment, in spite of it being the most frequent of all but nasal consonants. This suggests that the language prefers voiced and sonorant consonants in stem-internal position. The velar fricative **gh** also appears in brackets, indicating that the total number of tokens of this consonant is small, and the two occurrences of stem-internal **gh** possibly represent an allophonic variety of **/g/** rather than the phoneme **/ɣ/**.

		Labial	Alveolar	Palatal	Velar
Plosives	vl		[t]		k
	vd	b	d	j	g
Fricatives		f	s	sh	[gh]
Nasals		m	n	ɲ	ŋ
Approximants			l	y	w

Table 2.24 Stem-internal consonants in Nchane.

Restrictions on vowels

While all vowels may occur in word final position, only **a**, **ɛ** and **ɔ** occur in word initial position, with **ɛ** and **ɔ** only attested in this position in interjections. The low occurrence of the fricative vowel has already been discussed in §2.2.1. Because of the small number of tokens, it is difficult to establish any firm conclusions regarding its distribution patterning, beyond the fact that it occurs most often following **b**, **k** and **g**.

The front high vowel **i** often follows the palatal plosives **ch** and **j**, but rarely follows the alveolar plosives **t** and **d**. It is also rarely observed following **n**, but only in word final position, and never follows the alveolar consonants **s** or **l**. These apparent restrictions are suggestive of a spirantization process, although it does not appear to be applied strictly.