

Nasalisation in Kire*

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0. Introduction

Kire, called Giri by Z'Graggen (1975), is a Papuan language spoken by approximately 1900 people in the Madang Province of Papua New Guinea. It belongs to the Misegian family of the Ramu superstock and Sepik-Ramu phylum. In this paper we examine the problem of how nasal vowels should be represented in the Kire language. In Section 1 we present the original phonemic analysis and the orthography developed from it. Then, in Section 2 we outline a reanalysis in which nasalisation is predictable, but only by making reference to morpheme boundaries. Finally in Section 3 we discuss the implications of this new analysis for the representation of nasalisation.

1. Original Phonemic Analysis¹

Pryor (1981) indicates nasal vowels contrast with oral vowels in a number of environments. In particular, it is claimed that while all nasal vowels occur preceding nasal consonants or word finally, not all vowels in these environments are nasal. The crucial examples are given in (1) where oral and nasal vowels apparently contrast word finally, and (2) where they apparently contrast before nasal consonants.

* The first author is primarily responsible for the fieldwork represented in this paper; the second author for the analysis.

¹ Apart from the problem of nasal vowels, the phonological inventory of Kire consists of 6 vowels: /i e ɛ a o u/; and 28 consonants: /p t k p^h t^h k^h m^ɸ n^ɸ ŋ^ɸ k b d g m^b n^d ŋ^g f s f^h s^h b v z n^z h r m n ŋ/.

- 1) a. [pɪ] 'to eat'
 b. [pɪɪ] 'breadfruit tree'
- 2) a. [pɪm] 'too much'
 b. [fɪm] 'crayfish'

Two interpretations are considered by Pryor: 1) nasal vowels are derived from sequences of vowel plus /ŋ/, and 2) nasal vowels are phonemic.

1.1. Nasal vowels as derived segments

The first interpretation is attractive since /ŋ/ has a restricted distribution, occurring only syllable initially. The other nasals, /m/ and /n/, occur syllable initially and finally. The restricted distribution would be eliminated if [ɤ] resulted from /Vŋ/. For example, (1b) would be derived from /pɪŋ/ with a syllable final /ŋ/.

This analysis proves problematic, however, for forms like (2b). Forms like (2a) indicate the nasalisation of the vowel cannot be caused by the final /m/. While the phonemic form for (2b) could be /fɪŋm/, Pryor notes that there are no other syllable internal consonant clusters in Kire. This analysis would set up an otherwise unsubstantiated syllable pattern.

Further problems with this analysis arise when vowel sequences are considered. Pryor claims that /u/ followed by a nasal vowel is nasal in some forms but not in others. Examples are given in (3).

- 3) a. [nɪɪɪ] 'limbum'
 b. [muɪ] 'yam'

It would be impossible to use the hypothesised syllable final /ŋ/ to cause nasalisation of the [u] in (3a) but not (3b).

In spite of these problems, Pryor (1981) reports discussing the possibility of using /ŋ/ to indicate nasalisation with the literates in the village committee. They rejected forms like **piŋ** for (1b) [pɪŋ] and **fɪŋ** for (2b) [fɪŋ]. This provides one more argument against the analysis of nasal vowels as derived segments.

1.2. Phonemic nasal vowels

Because of the problems with the first analysis, Pryor (1981) concludes nasal vowels must be phonemic. For the initial trial orthography it was decided to differentiate nasal vowels from oral vowels by a dieresis. Examples (1-3) would be represented orthographically as (4-6).

- 4) a. **pi** 'to eat'
- b. **pi̇i** 'breadfruit tree'
- 5) a. **pim** 'too much'
- b. **fɪm** 'crayfish'
- 6) a. **nɪ̇i̇i̇i̇** 'limbum'
- b. **ɪ̇ɪ̇** 'yam'

The dieresis was first suggested by a Kire who had attended a National Translator Course. It had the advantage of being above the vowel symbol and was well received by those who were literate in Pidgin. The main problem observed was occasional hesitation when reading sequences of nasal vowels such as in (4b), (6) or **sɪ̇i̇sɪ̇i̇** 'whisper', possibly because the cluster of dots was too visually confusing. It was felt, however, that the fact that the cluster was readily noticed by the readers could become an aid as their reading skills increased.

2. Reanalysis

Though this symbolisation was accepted by the Kire people, problems arose in deciding which vowels should be marked with the dieresis. Literate Kires began putting the dieresis on vowels that had previously been declared oral and omitting them on obviously nasal vowels following or preceding nasal consonants. In addition, analysis of the morphophonemics of Kire indicated at least some nasalisation was predictable.

As Kire literates became more experienced marking nasalisation it became evident that while contrasts between nasal and oral vowels could be found word finally as in (1), the alleged contrasts before nasal consonants as in (2) did not exist. Instead, all vowels were nasal in this environment. Furthermore, no clear examples of vowel sequences like (3b) with both nasal and oral vowels could be substantiated.

Surface contrasts can be found between short oral, short nasal, long oral, and long nasal vowels. Three-way contrasts can be established between short oral, long oral, and long nasal vowels as in (7-8).

- 7) a. [kɑ] 'basket'
 b. [kɑɑ] 'bed'
 c. [kɑ̃ɑ̃] 'know'
- 8) a. [tʰɑ] 'garden area'
 b. [tʰɑɑ] 'digging stick'
 c. [tʰɑ̃ɑ̃] 'bamboo'

Three-way contrasts can also be established between short nasal, long nasal, and short oral vowels as in (9).

- 9) a. [bɿ] 'bird sp (sg)'
 b. [bɿɿ] 'bird sp (pl)'
 c. [bɪ] 'to sweep (pr)'

No four-way contrasts have been found, however. In addition, all three-way contrasts occur in open syllables following a nonnasal consonant. In all other environments there are severe restrictions on the distribution of nasal and oral vowels. In the remainder of this section we present a phonological analysis of nasalisation, showing it is predictable although the triggering nasal consonants are not always present in the surface forms.

The correct distributional constraints on nasal and oral vowels within morphemes are given in (10).

- 10) a. Oral but not nasal vowels occur in closed syllables between nonnasal consonants.
EX: vop 'fire'; ph^hktu 'shoulder'
- b. Nasal but not oral vowels can occur in closed syllables before nasal consonants.
EX: bēm 'tree sp'; kōōn 'bamboo sp'; dōōdor! 'roll over'
- c. Nasal but not oral vowels can occur after nasal consonants.
EX: mōmūk 'tree sp'; mōnūm 'fish sp'
- d. Short oral vowels may occur in an open syllable preceding a nasal consonant when following a nonnasal consonant. Short nasal vowels have not been found in this environment.
EX: faromē 'thumb'; t^hvanē 'short'
- e. Long oral vowels cannot occur preceding nasal consonants, even in open syllables. Long nasal vowels can occur in this environment.
EX: tēēn! 'fish sp (pl)'; kh^hTTn! 'dove sp (pl)'

- f. While both nasal and oral vowels can occur with no contiguous nasal consonants, all such nasal vowels are in open syllables.

EX: t^hŋŋ 'bamboo'; bɪ 'bird sp (sg)'

The absence of contrasts between oral and nasal vowels characterised by constraints (10a-d) suggests that nasalisation of vowels is generally predictable. The most straightforward way to account for (10a), the constraint against nasal vowels in closed nonnasal syllables, is to assume nasal vowels are not phonemic and that there is nothing in this environment to trigger nasalisation.

Constraints (10b-d) can be accounted for by a rule of nasalisation triggered by an adjacent nasal consonant in the same syllable.² This rule is formulated as follows.

Vowel Nasalisation (VN)³

V → [+nasal] % \$ [+nasal] ____

(Nasalise a vowel next to a tautosyllabic nasal segment.)

VN must apply iteratively to nasalise vowel sequences including

² We make the standard assumption that syllable breaks occur between consonants or before single consonants.

³ '\$' indicates syllable boundaries; '%' indicates a mirror-image environment, that is, the environment can come either before or after the segment to be affected.

long vowels. Examples of long vowels are given in (7c), (8c), and (9b) above; examples of other sequences are given in (11).

- 11) a. [kũũn] 'tree sp'⁴
 b. [rũũm] 'fish trap'

VN also accounts for the morphophonemic alternations in (12).

- | | | | | |
|-----|------|---------|--------|----------|
| 12) | sg. | dl. | pl. | |
| | gũũũ | gũũũnĩ | gũũũgi | 'man' |
| | kĩn | kĩnũũnĩ | kĩnĩ | 'banana' |

The roots for 'man' and 'banana' both contain nasal consonants, but take different sets of endings. In forms where the nasal consonant is followed by a vowel, it syllabifies with that following vowel and the preceding root vowel is oral (cf. [gu\$ũũ] 'man, sg' and [kĩnũũ] 'banana, pl'). In forms where the nasal consonant is word final or is followed by a consonant, it syllabifies with the root vowel, causing it to become nasalised (cf. [gũũũ\$gi] 'man, pl' and [kĩnũũ] 'banana, sg').

As has been noted above, short vowels are nasalised only when tautosyllabic with a nasal consonant. According to (10e), however, long vowels are nasalised when followed by a nontautosyllabic nasal consonant. This is illustrated by the forms in (13).

- | | | | |
|-----|--------|----------|-----------|
| 13) | sg. | pl. | |
| | nĩtũũ | nĩtũũnĩ | 'fish sp' |
| | kũũtũũ | kũũtũũnĩ | 'dove sp' |

⁴ There is some difference of opinion among literate Kires as to whether the [u] here is fully nasalised. This may be evidence that different vowel sequences are syllabified differently, possibly idiolectally.

Long Vowel Nasalisation (LVN)

(Nasalise a long vowel before a nasal consonant.)

η -Deletion (η -D)

(Delete /ŋ/ syllable finally.)

By positing the underlying form /bɪŋ/ for [bT] we can partially regularise the distribution of /ŋ/, making it occur word initially and word finally⁵, while at the same time accounting for all short nasal vowels by VN. This analysis does not encounter the objections raised by Pryor (1981) since

nasalisation in closed syllables can be accounted for entirely in terms of VN.

Two other sets of forms in which nasalised vowels occur with no adjacent nasal vowel in the surface forms are given in (14-15).

- | | | | |
|-----|-------|-------|-----------|
| 14) | sg. | pl. | |
| | tʰõõn | tʰõõŋ | 'snake' |
| | rõõn | rõõŋ | 'tree sp' |
| 15) | ᵐpõõ | ᵐpõõŋ | 'tree sp' |
| | bõõ | bõõŋ | 'seine' |

The roots in (14) end in /n/, while the nasalised vowels in (15) indicate those roots end in /ŋ/. LVN will account for the nasalisation of long vowels in the roots in the plural forms. While /n/ occurs in both singular and plural forms in (13), it occurs only in the singular forms in (14). Thus, a rule is needed to delete the /n/ in the plural forms. In (15), the /ŋ/ does not occur in either the singular or plural form. The rule η-D will account for the singular forms, but not the plural forms. A comparison of the forms in (13) with those in (14) shows the deletion occurs only after long back vowels. This deletion can be formalised as follows.⁶

⁵ The distribution is only partially regularised, as /ᵐ/ and /n/ can also occur intervocalically which /ŋ/ apparently cannot.

⁶ This analysis assumes /ŋ/, like /n/, is only deleted after back vowels. If /ŋ/ also deletes after front vowels η-D could be generalised so /ŋ/ is deleted after a vowel instead of syllable finally. This would capture the fact that there seem to be no intervocalic /ŋ/'s in Kire. This revised rule of η-D would have to apply after both VN and LVN.

Nasal Deletion (ND)

C V

[+nasal] → Ø / $\left[\begin{array}{l} +\text{long} \\ +\text{back} \end{array} \right] \text{ — } V$

(Delete a nasal consonant after a long back vowel preceding a vowel.)

Both ND and η-D must apply after VN and LVN so the nasal consonants will trigger nasalisation before they are deleted.

In addition to the forms illustrated above in which a nasal consonant triggers nasalisation before being deleted, there are a number of forms in which a deleted nasal does not trigger deletion. The first set is illustrated in (16).

16) sg.	pl.	
ŋɪ	ŋgɪrɪ	'tree'
thɔ̃	thorɪ	'hole'
pɔ̃ɔ̃	mpoorɪ	'plant sp'

The nouns are part of a class which take /-rɪ/ instead of /-ɪ/ in the plural. The roots evidently end in /ŋ/ which causes nasalisation in the singular forms.⁷ These velar nasals do not cause nasalisation in the plural forms, however.

Verbal forms exhibiting a similar pattern are illustrated in (17).

17) Imperative Present	Past	
pɔ̃ɔ̃	mpol	pɔ̃ŋgɪ
fɪɔ̃ɔ̃	fual	fɪɔ̃ŋgɪ
rɪɪ	rul	rɪŋgɪ
		start fire
		explode
		worry

⁷ Nasalisation is not a general feature of the singular forms of these nouns as shown by forms like /mpɪ mɪrɪ/ 'high tide'.

Once again, VN can account for the nasal vowels in the imperative and past forms⁸, but we would expect nasalisation in the present forms also. In both (16) and (17) we will have to posit a separate rule deleting /ŋ/ in particular forms which will apply before VN. We will not try to develop this analysis further here, beyond observing that any such analysis will either need to make reference to class markers or inflectional classes. In other words, nasalisation is partially dependent on morphological classes and semantics.

The final set of forms to consider are those with roots ending in /m/. Examples of nouns and verbs are given in (18) and (19) respectively.

- | | | | |
|-----|-----|-------|----------------|
| 18) | sg. | pl. | |
| | tũm | ntuua | 'human spirit' |
| | kũm | ŋkaa | 'star' |
-
- | | | | | |
|-----|------------|---------|--------|--------------------|
| 19) | imperative | present | past | |
| | khũm | khɔl | khũmŋl | 'close one's eyes' |
| | khẽm | khɛl | khẽmŋl | 'overgrown' |

These forms are parallel to (16-17) with no nasal vowels in plural or present tense forms. Thus, they provide further justification for the analysis incorporating a deletion rule making reference to class markers or inflectional marking.

⁸ Nasalisation is not a general feature of the imperative (e.g., [bezɛ] 'to bury'; [ku] 'to sleep'; [puu] 'to fasten'). Note that although there is distributional and morphophonemic evidence that prenasalised segments are single segments, intervocally the prenasalisation must be considered the closure of the preceding syllable to trigger VN in the past forms.

3. Orthographic Representation of Nasal Vowels

Long before the reanalysis outlined in section 2 was completed, it had become clear that at least the majority of nasalised vowels were predictable. At the same time the dieresis was proving increasingly problematic. The major problem was the difficulty writers had in using it consistently. In addition, as neither Tok Pisin nor English use diacritics it was 'foreign' to their concept of spelling.

Because of these difficulties the possibility of eliminating the dieresis from the orthography was discussed with those Kires who had been trying to use the dieresis. During these discussions they indicated their feelings that nasalised vowels were generally conditioned by neighbouring nasal consonants, not 'basic' as the use of the dieresis would indicate. After explaining the possibility of using 'silent' *ŋ* as a spelling device to signal nasalised vowels not flanked by a nasal consonant, they were enthusiastic about eliminating the dieresis. This would also have the advantage of making Kire look more like Tok Pisin and English. This option was also unanimously favoured by other Tok Pisin literates with whom it was discussed.

The major problems have arisen in the representation of the plural forms like (14-15) above. The spelling of the singular forms are unproblematic; (14a) would be *thaaŋ* while (15a) would be *mpaaŋ*. There are two possibilities for the plural forms, however, as illustrated in (20).

- 20a. *thaaŋi* or *thaaŋ* /tʰaaŋ/ (14a)
 b. *mpaaŋi* or *mpaaŋ* /mpaaŋ/ (15a)

The first alternative in each case is morphologically more accurate, as the nasal is part of the root while the /-i/ is the plural morpheme. In addition, some people pronounce the /n/

in plural forms like those in (14); that is they say /tʰũũn!/ instead of /tʰũũŋ/.

The problem with the first alternative is that it makes the words appear to be bisyllabic, when in fact words like (20b) and the most prevalent form of words like (20a) are monosyllabic. The second alternative allows for a more straight-forward spelling rule: word final ŋ is silent, signaling nasalisation in the preceding vowel or sequence of vowels. Because of this, the second alternative is being used at the present time. Readers do not seem to stumble over the final nasal when reading. Some have followed the first alternative when writing, but when both alternatives are outlined they readily change to the second, saying that the ŋ should come at the end of the word.

4. Conclusion

Surface contrasts between nasalised and oral vowels in Kire have made the representation of nasalised vowels problematic. As we have discovered the underlying processes at work to set up these contrasts, however, people have readily adopted the resulting orthographic system even though it requires spelling rules for 'silent' letters. A more adequate phonological analysis has led to a more adequate orthographic system.

References

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