3 Phonology

Yélî Dnye almost certainly has, with 90 distinctive segments, the largest phoneme inventory in the Pacific. Many of these are exotic sounds, and some of them are unique in the languages of the world, as far as we know. It is the only known language with systematic labial-coronal double-articulations (labial-dental, labial post-alveolar, as well as labial-velar), which occur in both stops and nasals. It is also the only known language combining prenasalized stops, nasally-released stops and a contrast between oral and nasalized vowels, requiring extremely fine control of the oral/nasal contrast. Given the scientific importance of these rare sound contrasts, the system has been investigated in collaboration with Ian Maddieson, and the following remarks are informed by this collaborative work (Maddieson & Levinson, nd). Ongoing work with Marisa Casillas investigates the order of acquisition of these complex sounds by children (see Casillas et al. 2020).

3.1 The phoneme inventory

We can think of the huge consonantal array as built up in the following way. There are four basic points of articulation, from bilabial stop, alveolar stop, post-alveolar stop to velar stop (Table 3.1). In addition, each of these positions can be prenasalized, and post-alveolar or velar stops nasally released. The 'dentals' range from dental to alveolar, while the post-alveolars may not always reach real retroflex positions (following Ladefoged & Maddieson 1996, we represent this as e.g. /**t**/ vs. /**ṭ** /, not /**t̪** / vs. /**t**/ as in Henderson 1995). However, ultrasound recordings of a single speaker performed in 2009 show that some articulations at least are full sub-apical retroflexes. This contrast is reinforced in various ways, e.g. in /**nm**/ vs. /**ṇm**/ the release is primarily labial vs. coronal respectively, and intervocally the post-alveolar stop /**ṭ**/ becomes a retroflex flap [**ɽ**]. Incidentally, linguography on the same single speaker shows the alveolar stops are laminal, at least on the four tokens collected.

Table 3.1: Stops and nasals – 1 Single articulations.

	Bilabial	Alveolar	Post-alveolar	Velar
Voiceless plosives	p	t	ṭ[ɽ]*	k
Prenasalized plosives	mp	nt	ṇṭ	ŋk
Nasally-released plosives			ṭṇ	kŋ
Nasals	m	n	ṇ	ŋ

*(ṭ is realized as [ɽ] intervocalically)

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Onto this basic array are mapped double articulations, involving a full bilabial release over the primary articulation shown in Table 3.2:

Table 3.2: Stops and nasals – 1 Double articulations.

	Labial-Alveolar	Labial-Post-alveolar	Labial-Velar
Voiceless plosives	tp	ṭp	kp
Prenasalized plosives	nmtp	ṇmṭp	ŋmkp
Nasally-released plosives		ṭpṇm	kpŋm
Nasals	nm	ṇm	ŋm

This series of contrasts is unique in the languages of the world. Maddieson (pers. comm.) suggests that historically the alveolar and post-alveolar double articulations may have arisen from secondary labialization of the coronal stops, since secondary labialization remains a feature of the language (with e.g. velar and bilabial stops) but is now absent from the coronals (i.e., the alveolars and post-alveolars).

The rest of the massive consonant series is built up by additional labialization of bilabial and velar stops, palatalization right across the positions of articulation, or combinations of these. In addition, there is a series of non-nasal continuants.

In order to introduce the practical orthography devised by the Hendersons, I will now revert to the way in which James Henderson (1995) presented the consonantal array. He isolated the four basic points of articulation, and then considered the double articulations with bilabial closure (which he called 'simultaneous bilabial closure') to form, as it were, an additional three places of articulation (see Henderson 1995:10–11). These seven consonants can then be palatalized, labialized, or both. Further, the seven basic consonants can be prenasalized (as in *mb*) or post-nasalized (as in *tn*), and these in turn can be further palatalized (as in mb^j) or labialized (mb^w) or both (mb^{jw}). Although not all of these possibilities are realized, this offers a huge array of possible stops, and the same positions together with palatalizations and labializations are extended to the nasals. Finally there are non-nasal continuants, yielding an overall inventory of 56 distinctive consonantal segments for which good or near minimal pairs can be found.[11] Tables 3.3 to

11 As shown in Table 3.3, four additional stop segments (*kpy, knw, dn, mdy*) have only a few attestations in a 6000 word lexicon: of these, *kpy* and *knw* (with three and seven attestations respectively) probably should be admitted on the grounds of minimal pairs, but we will stick here with the conservative count.

3.5 give the consonantal segments recognized in this study in an IPA representation preceded in bold by the practical orthography developed by the Hendersons (there are a few changes from Henderson's (1995) analysis mentioned in passing). Forms in brackets have earlier been used in transcriptions by Henderson or myself, but are now thought dubious.

The practical orthography stays reasonably close to the IPA rendition, except where consonants exhibit both simultaneous bilabial closure and either pre- or post-nasalization. In that case, in order to avoid tetragraphs, Henderson has used arbitrary conventions (e.g. *mg* is used to represent **/ŋmkp/** instead of e.g. the more transparent *ngmb*). Other arbitrary conventions include writing the alveolar stops (Henderson's "dental" series) with /t/, the post-alveolar ones with /d/, while the corresponding nasals are written with /ń/ (alveolar) vs. /n/ (post-alveolar). The digraph /ńt/ is not used, since the orthographic /t/ signals alveolar – in what follows I have for practical reasons used the digraph *'n* for ń.

Henderson's practical orthography is used in the 1987 New Testament and 2002 Old Testament translations, a dictionary and other pedagogical publications, and is accepted by the community, so will be maintained here: unfortunately, there is no elegant solution to writing a language with so many contrasts.

The stops in Yélî Dnye are basically unvoiced, except in medial position, where all but the alveolar stops are lightly voiced preceding a short vowel: thus orthographic *pêpê*, 'lying down', phonemic /pəpə/ → [pəbə], or tââkî 'turtle' /tɑːkɯ/ → [tɑːgɯ] (Henderson 1995:6). In the same environment, post-alveolar /ṭ/ → [ɽ] or possibly [ɾ] as in *pêêdî* 'pull', /pəːṭɯ/ → /pəːɽ̥ɯ/. Voicing is inhibited in medial position followed by a long vowel: *paapaa* 'pulling' is realized as [pæːpæː], or *daadîî* 'long' as [ṭæːṭɯː] (Henderson 1995). Prenasalized consonants (such as /mb/) are however voiced, but post-nasalized stops are initially voiceless, and are discussed in §3.2.

Table 3.3: Stops in practical orthography, with IPA counterparts beneath in slashes (SBC = 'simultaneous bilabial closure').

	Bilabial	Alveolar	Alv+SBC	Post-Alv.	Post-Alv+SBC	Velar	Velar+SBC
(a) Core							
	p	**t**	**tp**	**d**	**dp**	**k**	**kp**
	/p/	/t/	/tp/	/ṭ/	/ṭp/	/k/	/kp/
+Palatalized	**py**	**ch**	**tpy**	**dy**	**dpy**	**ky**	**(kpy)***
	/pʲ/	/tʃ/	/tpʲ/	/ṭʲ/	/ṭpʲ/	/kʲ/	(/kpʲ/)
+Labialized	**pw**					**kw**	
	/pʷ/					/kʷ/	

Table 3.3 (continued)

	Bilabial	Alveolar	Alv+SBC	Post-Alv.	Post-Alv+SBC	Velar	Velar+SBC
+Both	**pyw**						
	/p^{jw}/						

*This segment is attested in only four certain words, *kpyopwo* 'shell-money purse', *kpyipi* 'tree sp.', *Kpyipikîgha* 'old village name', *Kpyoo kn:ââ* 'reef passage name', all native.

(b) Prenasalized							
	mb	**nt**	**mt**	**nd**	**md**	**nk**	**mg**
	/mb/	/nd/	/nmdb/	/ṇḍ/	/ṇmḍb/	/ŋg/	/ŋmgb/
+Palatalized	**mby**	**nj**	**mty**	**ndy**	**(mdy)***		
	/mb^{j}/	/ndʒ/	/nmdb^{j}/	/ṇḍ^{j}/	(/ṇmḍb^{j}/)		
+Labialized	**mbw**					**nkw**	
	/mb^{w}/					/ŋg^{w}/	
+Both	**mbyw**						
	/mb^{jw}/						

*No attestations – possibly non-existent.

(c) Nasally-released				
	(dn)*	**dm**	**kn**	**km**
	/ṭṇ/	/ṭpṇm/	/kŋ/	/kpŋm/
+Palatalized	**dny**	**dmy**		
	/ṭṇ^{j}/	/ṭpṇm^{j}/		
+Labialized			**(knw)†**	
			/kŋ^{w}/	

†Seven attestations, only two in initial position (*knwede*, 'tree species', *knwi* 'unburnt garden') but these are all genuine native words.
*Only one attestation, in post-verbal inflectional clitic *dniye* – not clear that this is really distinctive from *dnyiye*

Table 3.4: Nasals in practical orthography, with IPA counterparts beneath in slashes (SBC = 'simultaneous bilabial closure').

	Bilabial	Alveolar	Alv+SBC	Post-Alv.	Post-Alv+SBC	Velar	Velar+SBC
Base	**m**	**ń**	**ńm**	**n**	**nm**	**ng**	**ngm**
	/m/	/n/	/nm/	/ṇ/	/ṇm/	/ŋ/	/ŋm/
+Palatalized	**my**	**(ńy)***	**(ńmy)***	**ny**	**nmy**		
	/m^{j}/	(/n^{j}/)	(/nm^{j}/)	/ṇ^{j}/	/ṇm^{j}/		

Table 3.4 (continued)

	Bilabial	Alveolar	Alv+SBC	Post-Alv.	Post-Alv+SBC	Velar	Velar+SBC
+Labialized	**mw**					**ngw**	
	/mʷ/					/ŋʷ/	
+Both	**myw**						
	/mʲʷ/						

*Not attested at all, seem not to exist.

Table 3.5: Non-nasal continuants in practical orthography, with IPA counterparts beneath in slashes (SBC = 'simultaneous bilabial closure').

	Bilabial	Alveolar	Alv+SBC	Post-Alv.	Post-Alv+SBC	Velar	Velar+SBC
	w			**y**			**gh**
	/w/ ~ /β/			/j/			/ɣ/
				l			
				/l/			
+Palatalized	**vy**			**ly**	**lv**		
	/βʲ/			/lʲ/	/lβʲ/		

The vowels of Yélî Dnye have four distinct levels of closure, make (minimal) use of a rounded/unrounded contrast in back vowels, and use one central position. Of these ten basic oral vowels, seven offer distinctively nasalized counterparts. These seventeen vowels have distinctively lengthened counterparts, yielding 34 vowel segments in total, as shown in Tables 3.6 to 3.9.

Table 3.6: The oral short vowels in practical orthography with IPA counterparts beneath in slashes.

i						**î**			**u**
/i/						/ɯ/			/u/
	é							**ó**	
	/e/							/o/	
				ê					
				/ə/					
		e					**o**		
		/ɛ/					/ɔ/		
			a		**â**				
			/æ/		/ɑ/				

Acoustic measurements show that orthographic *î* is an unrounded back vowel /ɯ/, not the high mid-vowel /ɨ/ Henderson (1995) presumed. Earlier transcriptions by Henderson (1974, 1975, 1986; Henderson & Henderson 1974a) had an additional segment *á* (a higher /æ/), but if there was a basis for it, it seems no longer to be distinctive, being assimilated either to /æ/ or /ɛ/ – Henderson always considered it marginal (see his 1995:2), and has now abandoned the letter in the practical orthography (this alone accounts for the difference in the number of vowels in his account, namely 38, and the present one with 34, since he assumed *á* had lengthened, nasalized, and nasal+lengthened forms). Acoustic measurements do not support its distinctiveness among current speakers. In the practical orthography, nasalization is marked with a preceding colon, perhaps an unfortunate choice given that in IPA it signals length; instead, in the practical orthography length is represented by gemination. The practical orthography is retained here for consistency with earlier publications and to make this text more accessible to Rossel people.

Table 3.7: Nasalized short vowels in practical orthography with IPA counterparts beneath in slashes.

:i					**:u**
/ĩ/					/ũ/
			:ê		
			/ə̃/		
	:e			**:o**	
	/ɛ̃/			/ɔ̃/	
		:a	**:â**		
		/æ̃/	/ɑ̃/		

These short nasalized vowels are mostly non-distinctive after a nasal continuant – e.g, there is no contrast /mɔ/ vs. /mɔ̃/ – since the vowel is always then nasalized except where there is a following non-nasal syllable (Henderson 1995:3).[12] Note that three segments from the non-nasal vowels are missing:

12 There are a few (bi-morphemic) words where a contrast is maintained. For example, *ma* /mæ̃/ 'yesterday, eat' contrasts with *ma* /mæ/ 'your side', which is derived from a root with a long vowel (2nd possessive *N+paa*). In general, nasalization of short vowels appears to be distinctive after prenasalized or nasally released stops, and is only non-phonemic after the nasal continuants proper (Table 3.4).

(1) The segments /ɯ/ (practical orthographic î) and /ɯː/ (orthographic îî) are never distinctively nasalized
(2) The close/open opposition between /e/ (orthographic é) vs. /ɛ/ (orthographic e), and /o/ (orthographic ó) vs. /ɔ/ (orthographic o), is lost in nasalized vowels.

Distinctive length can be applied to all of the above vowels – that is to the 10 oral short vowels, and the seven nasalized short vowels:

Table 3.8: Lengthened oral vowels.

ii						**îî**			**uu**
/iː/						/ɯː/			/uː/
	éé							**oo**	
	/eː/							/oː/	
				êê					
				/əː/					
		ee					**oo**		
		/ɛː/					/ɔː/		
			aa		**ââ**				
			/æː/		/ɑː/				

Table 3.9: Lengthened nasal vowels.

:ii						**:uu**
/ĩː/						/ũː/
			:êê			
			/ə̃ː/			
	:ee				**:oo**	
	/ɛ̃ː/				/ɔ̃ː/	
		:aa		**:ââ**		
		/æ̃ː/		/ɑ̃ː/		

In this way, we end up with total inventory of 34 total distinctive vowel segments.

Reviewing the phoneme inventory, then, we thus have 56 consonants and 34 vowels, making a total of 90 distinctive segments (93 if one counts exceedingly rare consonants).[13] Henderson (1995) gives minimal pairs for most of these, which are therefore not repeated here. Some segments in this inventory are very unusual, especially those with double articulations and post-nasalization. As mentioned, Yélî Dnye is the only known language in the world with contrastive labial-coronal stops, as in the segments /tp/ vs. /ṭp/. Some initial measurements are reported in Ladefoged and Maddieson (1996), together with remarks on why these segments were not expected to occur, and additional measurements are reported in Maddieson and Levinson (nd). The post-nasalized stops, involving de-voiced nasal plosion after a stop, are also very rare, occurring in less than half a dozen languages in the world (e.g. in Arrernte, Central Australia, Wilkins 1989) on current evidence. Another unusual feature of the overall inventory is the very complex contrastive use of nasalization in both consonants (with pre- and post-nasalization and real nasals) and vowels. Using air-flow measuring equipment we have been able to study the time course of nasalization in these complex conditions (illustrated below, Figures 3.7, 3.8). Other unusual features of the inventory involve the use of both palatalization and labialization superimposed to construct additional segments, and some additional unusual segments amongst the continuants, as with the palatalized and labialized laterals. Finally, by any standards the vowel inventory at 34 segments is large, but by the standards of the Papuan languages it is extreme – as Foley (1986) remarks, otherwise "[Papuan] languages with more than eight distinctive vowels are unattested".[14] There is also nothing like the Rossel consonantal inventory to be found amongst other reported Papuan languages. Foley (1986) in his survey found no dental/alveolar or alveolar/retroflex contrasts, but the recent surveys in Palmer (2018) show occurrence in a few Papuan languages in the Sepik-Ramu Basin (p. 272), North Halmahera (p. 584), and in the Pahoturi River languages in Southern New Guinea, where quite exceptionally Idi has both an alveolar/retroflex stop contrast and an /ŋ/ (p. 644, 699). These distinctively Australian features are shared with Yélî Dnye and contrast with nearly all the other Papuan languages known. Moreover although prenasalization is found on the Papuan mainland, no post-nasalization has been reported as in Yélî. We can conclude that the Rossel system – whatever its origin, as a relic of earlier languages, or a baroque development of simpler Papuan patterns – has no similar counterparts in this part of the world.

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13 As mentioned, three other stop segments have a few attestations, of which *knw* is the best candidate.

14 Imonda, however, has 10 distinctive vowels (Seiler 1985), as Harald Hammerström (pers. comm.) points out to me.

3.2 Phonetics

The complexity of the phoneme inventory raises many detailed questions about the underlying phonetics of the distinctions, how they are maintained, distinguished, and produced in connected speech. A great deal of phonetic information on these consonantal and vowel segments has been collected, including acoustic, aerodynamic and video data of lip movements, and the details are (or will be) reported in specialized papers co-authored with Ian Maddieson, who has undertaken the measurements. Here we report a few highlights.

(1) The nature of the vowel space

Figure 3.1 shows the ten long oral vowels in acoustic space defined by the first two formants (one speaker Y). Note the location of orthographic *îî*, IPA /ɯː/, which Henderson (1995) identified as a high central vowel – instrumental work shows it in fact to be a back unrounded high vowel: it falls between two allophones of orthographic *uu*, IPA /uː/, which has a fronted rounded allophone overlapping it in acoustic space. For contrast, note the location of the central vowel *ê*, IPA /ə/, which is widely separated in acoustic space.

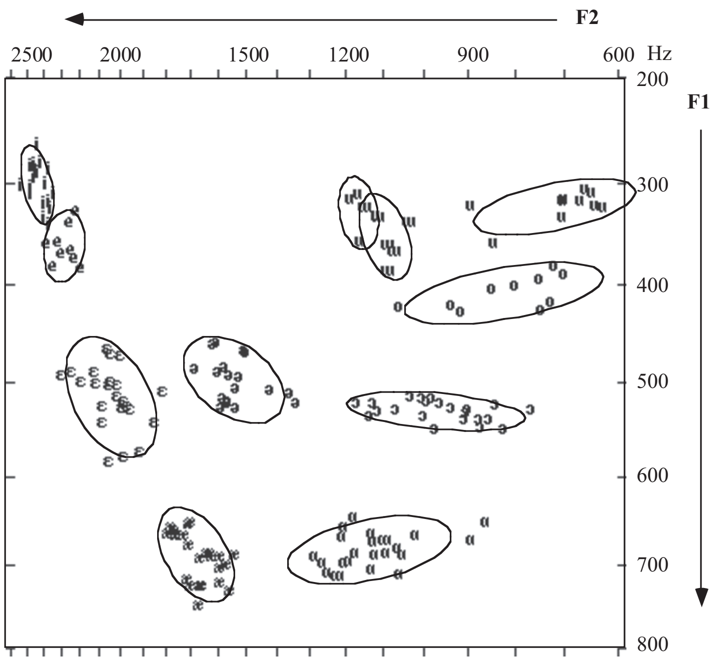

Figure 3.1: The vowel space as defined by the first two formants – the 10 lengthened oral vowels.

Note the fronted allophone of /u/; also that orthographic *î* is an unrounded back vowel /ɯ/, not a high central vowel as previously supposed. Note also the central V /ə/.

(2) The coarticulated consonants as single segments

The reader may naturally wonder whether a complex consonant like /ṭpṇm/ (as in the first two letters of orthographic *dmaadî* 'girl') is not in fact a complex consonant cluster. Timing facts support the notion that these complex coarticulations are nevertheless single segments. The total duration of the average non-doubly articulated stop vs. the doubly articulated stops involving simultaneous bilabial closure is negligibly different. Figure 3.2 gives the mean duration for single vs. double-articulated stops – although there is some durational difference here in the expected direction, voice onset times are notably shorter for the double-articulated stops, as shown in Figure 3.3. Allowing for this, total consonant duration is only slightly different, namely 157 vs. 164 ms.

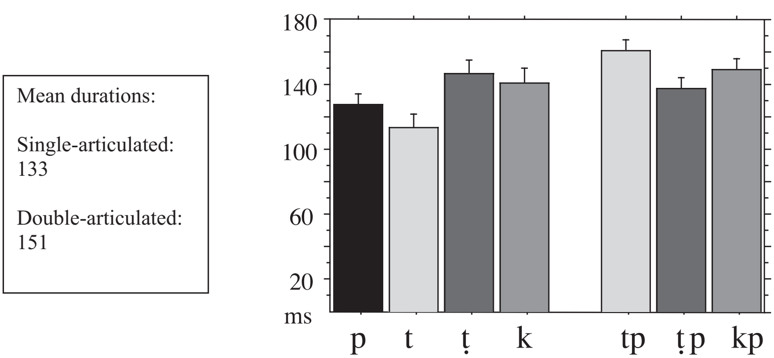

Figure 3.2: Average duration of singly vs. doubly articulated stops.

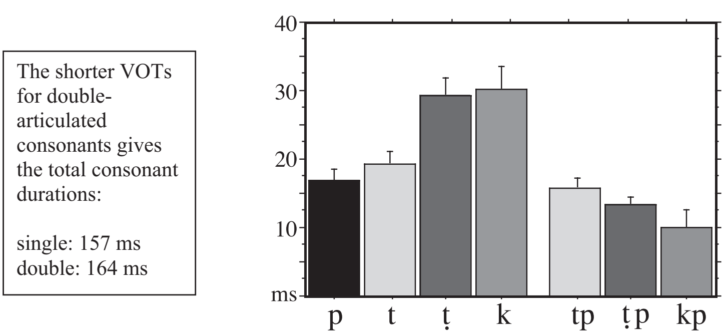

Figure 3.3: Voice onset times (VOT) for singly- vs. doubly-articulated consonants.

Figures 3.4 and 3.5 show a similar picture for the doubly-articulated nasals – in this case we have not only acoustic information, but also air-flow measurements.

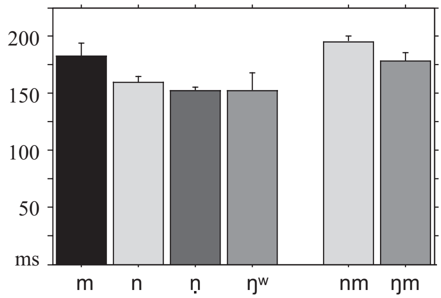

Figure 3.4: Mean durations of singly- vs. doubly-articulated nasals (acoustic duration of word-initial nasals after clitic *a*- 'my', from 6 speakers).

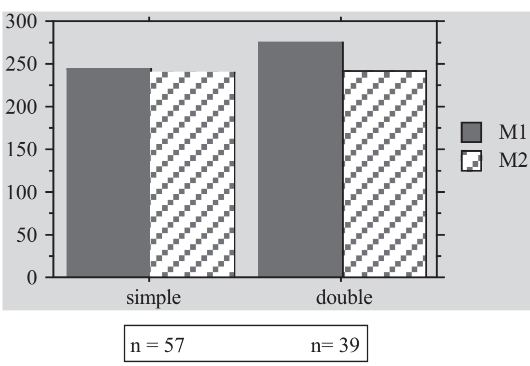

Figure 3.5: Mean durations of singly- vs. doubly-articulated nasals: aerodynamic recordings from two speakers.

(3) Doubly-articulated consonants – the relative timing of the two articulations

The doubly-articulated consonants can sound rather variable in different positions, and as articulated by different speakers – sometimes the labial element is phenomenologically dominant, sometimes the other articulation (cf. Evans & Miller 2016 on Nen). The key to recognition is that the timing of the two articulations tends to be offset. In African languages /kp/ is normally realized so that the velar closure precedes the labial gesture, and is released before the labial release, so that when preceded by a vowel the velar is audible alone at the beginning of the segment, and the labial at the end (Ladefoged & Maddieson 1996). Essentially the same pattern is found in Yélî Dnye /kp/ as diagrammed in Figure 3.6, where the timing off-set is probably c. 15–20 ms. The same pattern also seems to hold for the labial-alveolars and labial-post-alveolars; that is, that the coronal stop articulation precedes the labial – however, the timing shows more variation than with labial-velars. With labial-velar nasal /ŋm/ it is possible in the acoustic record to detect the end of the velar-closure, and the following bilabial release c. 30 ms later. This timing off-set explains how these complex sounds can be 'parsed' in speech recognition – the two components are separated, if only for a matter of milliseconds, so that the onset of vowel+/kp/ has a dominantly velar sound, and the offset /kp/+vowel has a dominantly labial sound.

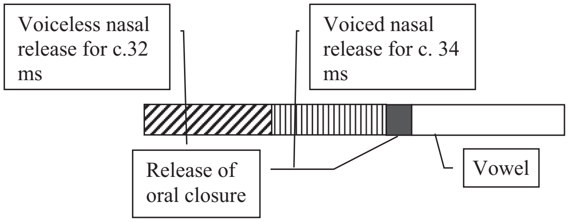

Figure 3.6: Timing off-set in the two articulations of /kp/ preceded by a vowel.

(4) Nasally-released stops

As mentioned, nasally-released stops are also typologically rare (analogous to the pre-stopped nasals in Arrernte and other Australian languages, but in this case perhaps with more evenly weighted components). In these segments, like /ṭṇ/, /ṭpṇm/, /kŋ/, /kpŋm/, the oral closure is made, and then there is a sharp voiceless release through the nose, and while the oral closure is still maintained, voicing begins, to be followed by release of the oral closure. This produces a nasal plosion (as Henderson 1995:7 puts it), which in citation forms at least may perhaps be produced initially by a non-pulmonic (glottalic) air-stream mechanism. There are a number of words either consisting of /kŋ/ alone or ending in it – here the voiceless syllabic nasal carries the syllable (Henderson 1995:7 writes this as *knî* in the practical orthography for symmetry with the rest of the phonotactics). Analysis shows the following timing patterns (average of 31 tokens by 3 speakers):

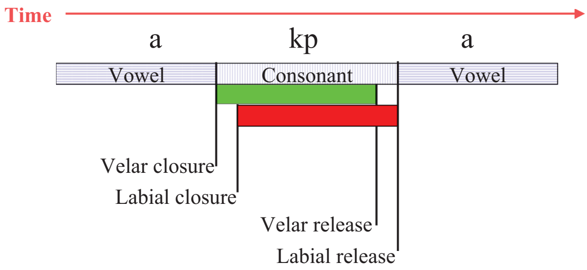

Figure 3.7: Timing of voicing in relation to nasal release in nasally-released stops.

The combination of such sounds with the voiceless/voiced contrasts in following vowels raises interesting questions about the fine control of nasal production and recognition. The following figure shows the acoustic signal combined with two air-flow measurements (oral vs. nasal) in a complex nasally released consonant followed by a long voiceless vowel, in the word [ʈpn̥mɑːɽɯ] *dmâââdî* 'girl'. One can clearly see here early nasal release, followed by nasal release with voicing (see audio trace), followed by oral release and oral airflow, followed by the sharp end of the nasal release c. 45 ms or c. 1/3rd into the long vowel. The maintenance of the oral/nasal vowel contrast must rely on this sharp cessation of nasality.

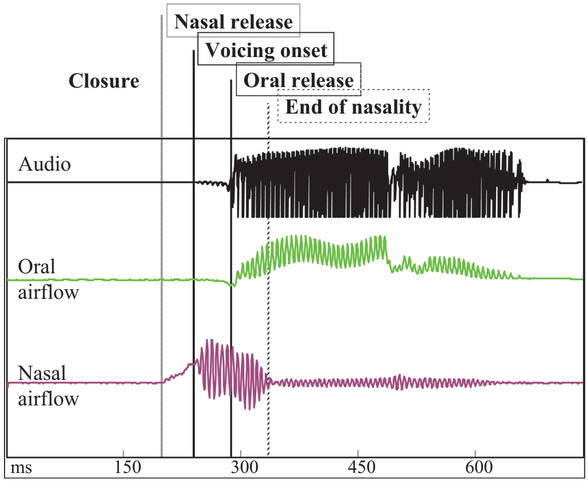

Figure 3.8: Aerodynamic record of the first syllable of [ʈpn̥mɑːɽɯ].

3.3 Phonotactics

This huge phoneme inventory is not equally deployed in all positions in the word, and there are a number of generalizations to be made. Yélî Dnye words are about half bi-syllabic, about one third monosyllabic, the rest with three or more syllables (words with four or more syllables are largely reduplications or place names). For example, in a text-based Shoebox lexicon[15] with 5809 distinct lexemes, we find the proportion of syllable-lengths as shown in Table 3.10:

Table 3.10: Syllable lengths.

	N	Percent of Words
Bisyllabic	2810	51%
Monosyllabic	2175	40%
Trisyllabic or more	520	9%
(trisyllabic	225	
quadrisyllabic)	295	
Total	**5505***	

(*Remainder 5% or 304 items are multiple word entries, with some possible slippage of categories due to computational techniques.)[16]

Derivational processes are very restricted, a major process being reduplication (e.g. of verb roots to form continuous aspect, of nouns to form adjectives) – but, as noted by Henderson (1995:5), reduplicated words remain phonologically two words, with for example no voicing in the repeated initial consonant. Most words longer than four syllables are either reduplications or names of places.

Nearly all words are composed of open syllables, on a CV+CV pattern. The exception is some 70-odd words ending in orthographic *-m*, *-p*, and *-y*; words ending in *-m* and *-p* are also often spelt with a final *-î*, which is optionally pronounced – one may therefore hold that there is either an underlying *î* in these words to preserve the CV generalization, or that *-î* is euphonically introduced (again, to preserve the CV pattern of word formation). Another exception is the small class of words (c. 50) beginning with a vowel: initial vowels are restricted

15 Sh5Ross4.db

16 Counts were done using Shoebox filters on a lexical database built primarily from texts. A number of features of this lexicon (e.g. multiple lexemes with same wordform, multi-word entries) make it hard to compute precise frequencies of word forms – the following figures should therefore only be taken as approximate indications of distributions.

to *a* (c. 50 words in the corpus, both lexical and grammatical), except for single segment grammatical morphemes in *u* and *o* or *ó*.

Monosyllabic roots form a large part (40%) of the lexicon, and many further Yélî Dnye expressions are formed by a combination of such roots in fixed (idiomatic) phrases. All consonantal phonemes may occur in initial position in such roots, but they do not occur with equal frequency. If we define 'simplex' consonants as the set:
– *{p, t, d, k, m, n, 'n, ng, w, y, l, gh},*

and 'complex' ones as the set:
– *{py pw pyw mb mby mbw mbyw ch nt nj tp tpy mt mty dy nd ndy dp dpy md mdy dn dny dm dmy ky kw nk nkw kp mg kn knw km, my mw myw 'n 'ny 'nm 'nmy n ny nm nmy ng ngw ngm vy ly lv}*

then the monosyllabic roots are split about equally between the two sets. The counts are complicated by the occurrence of monosyllabic word forms in multi-word entries in the lexicon, but the proportions are stable over different samples as shown in Tables 3.11 and 3.12:

Table 3.11: Monosyllabic roots – values of initial consonants.

	simplex	complex
including multiple word entries (N=2895)	1481 (51%)	1414 (49%)
excluding overlapping entries (N=1455)	761 (52%)	694 (48%)

One may also examine the proportion of monosyllabic words with all kinds of nasal consonants, i.e.
– *{m my mw myw ,n ,ny ,nm ,nmy n ny nm nmy ng ngw ngm mb mby mbw mbyw nt nj mt mty nd ndy md mdy dn dny dm dmy nk nkw mg kn knw km}*

or just with secondary nasalization, i.e.
– *{mb mby mbw mbyw nt nj mt mty nd ndy md mdy dn dny dm dmy nk nkw mg kn knw km}.*

Table 3.12: Monosyllabic roots (N=2175) – different kinds of nasal consonants.

all nasals	949	(44%)
secondary nasalization	437	(20%)

Turning to the vowel distributions in monosyllabic roots, Table 3.13 gives vowel frequencies in monoysllabic roots including those in fixed expressions with more than one root (a total sample of 2766). Recollect that nasalized vowels have a smaller inventory of vowel qualities (there is no :é, :éé, :ó, :óó), so the gaps below are systematic.

Table 3.13: Vowel quality frequencies in monosyllabic roots.

Oral vowels				Nasal vowels			
Short		**Long**		**Short**		**Long**	
i	293	ii	74	:i	6	:ii	74
é	109	éé	41				
e	132	ee	141	:e	21	:ee	83
a	144	aa	201	:a	30	:aa	150
â	22	ââ	158	:â	7	:ââ	109
o	233	oo	109	:o	39	:oo	89
ó	89	óó	70				
u	157	uu	74	:u	5	:uu	106
Totals	**1179 (43%)**	**868 (31%)**		**108 (4%)**		**611 (22%)**	

Table 3.13 shows that nearly 75% of vowels are oral vowels, and of the nasal vowels, long ones are much more frequent. The small frequency (4%) of short contrastively nasal vowels is partly due to the fact that nasalization is not contrastive in short vowels after a nasal consonant (which account for 44% of all consonants in these roots). Nasalization no doubt occurs in these environments but is not encoded in the lexicon on which these computations are done.

In non-derived words, that is monomorphemic words, there are phonotactic constraints that only become clear if one inspects bi-syllabic roots. In such roots, schematically C1-V1-C2-V2, C1 may be drawn from the full range of over 50 consonantal segments. But C2 comes from a much smaller class. The most frequent are 'simplex' consonants, not including complex double articulations, superimposed nasalizations or secondary palatalization. In fact, 98% of bi-syllabic words are accounted for by words that have just the C2 (orthographic) segments indicated in Table 3.14:

Table 3.14: C2 in bi-syllabic roots.

C2-value	No. of bi-syllabic roots with C2 shown in row (out of 2810 total bi-syllabic roots)
m	473
d	474
n	372
p	420
l	369
w	161
y [j]	119
pw	83
ng [N]	83
k	81
t [t]	78
gh [V]	47
mw	20

The remaining C2s are drawn from 24 other largely coarticulated consonants (apart from simple dental /n/), specifically orthographic *kp, myw, ch, tp, 'n, mbw, lv, kw, ngm, nt, ch, nd, md, nk, ly, tp, kn, nk, ngw, dy, mb, km, py, md, mt, ly, py, myw*. Despite these occasional complex consonants in C2 position, the great majority of complex consonants occur in word-initial position.

Bi-syllabic roots display other statistically restricted patterns. In a pattern probably true throughout the lexicon, V1 vowels are mostly simplex – that is, neither lengthened nor nasalized. Thus the simplex (short oral) vowels (orthographic *i, é, e, a, ê, î, ó, u*) account for about 74% of V1 vowels in bi-syllabic roots (2081/2810), long oral vowels for about 15% (421/2810), nasal vowels both long and short for another 12%. Despite the tilted distribution, all vowels occur in this position. (Note that nasalized *:î* and *:îî* are not phonemic, and indeed not written, occurring only after nasal consonants, and there are no nasalized vowels *:é* vs. *:éé* and *:ó* vs. *:óó*, for as Henderson (1995:4) points out, the close-open distinction, between *e* vs. *é* and *o* vs. *ó*, is lost in nasalization). The same kind of asymmetric distribution occurs in V2, but there are further constraints: there seems to be a restricted set of syllables C2+V2, and in addition possibly some kind of preference for 'harmony' in rounding across V1 and V2.

Tables 3.15 and 3.16 provide further details of the restrictions on second syllables. Ian Maddieson (pers. comm.) suggests that most C2 consonants are simplex, specifically *m, d, n, p, l, y, w, k, pw, ng, t, gh, mw* (I will denote this list as 'IM's C2 criteria'):

Table 3.15: Consonants in bi-syllabic roots.

in SCL database (Sh5Ross4_Phonetics) of		**5809 total entries:**
Bi-syllabic roots:	2810	(48% of total)
Bi-syllabic roots meeting IM's C2 criteria:	2622	(93% of bi-syllabic roots)
(C2 = m, d, n, p, l, y, w, k, pw, ng, t, gh, mw)		

Consonants very infrequent or unattested in C2:

py pyw mb mby mbw mbyw ch nt nj tp tpy mt mty
nd ndy dy dp dpy md mdy dn dny dm dmy ky kw nk nkw
kp mg kn knw km my myw 'n 'ny 'nm 'nmy ny nm
nmy ngw ngm
vy ly lv

Bi-syllabic roots which do not meet IM's C2 criteria were only **188** or 7% of the sample lexical database. Of these, many were bimorphemic, or reduplications or names. Excluding reduplications and bimorphemic words, but including names, these rare and exceptional C2s include:

kp, myw, ch, tp, 'n, mbw, lv, kw, ngm, nt, ch, nd, md,
nk, ly, tp, kn, nk, ngw, dy, mb, km, py, md, mt, ly, py, myw

Another way to gauge the constraints on C2 in bi-syllabic words is to count the number of C2 consonants that are 'simplex' (not doubly articulated) vs. 'complex' (doubly articulated, or nasalized in some way):

Bi-syllabic roots where C2 is 'simplex',

i.e. */p, t, d, k, m, n, 'n, ng, w, y, l, gh/*: **2065 (73%)**

Bis-yllabic roots where C2 is 'complex',

i.e. not simplex, and contains one of the following: **252 (9%)**

/ py pw pyw mb mby mbw mbyw ch nt nj tp
tpy mt mty dy nd ndy dp dpy md mdy dn dny dm

dmy ky kw nk nkw kp mg kn knw km
my mw myw ,n ,ny ,nm ,nmy n ny nm nmy ng ngw ngm
vy ly lv/

Bisyllabic roots where C2 is a nasal number **964 (34%)**. Nasal Cs are defined as one of the following:

/ m my mw myw ,n ,ny ,nm ,nmy n ny nm nmy ng ngw ngm/
and exclude nasalized Cs, i.e. not any of the following:
/mb mby mbw mbyw nt nj mt mty nd
ndy md mdy dn dny dm dmy nk nkw mg kn knw km/

Table 3.16: Bi-syllabic roots: characteristics of 2nd syllables. Regular morphological reduplications have been excluded (but unpredictable types of reduplication are included).

C2	attested syllables	notes
m	mi, ma, me mê mu mo mî ??m:ee	no long vowels except in reduplications
d	da, dâ, de, dê, di, dî, do, dó, du,	
	dââ, dîî, dêê	
	d:u, d:a, d:o, d:oo, d:e, d:ee, d:ââ, d:êê	
n	na, ne, nê, ni, no, nu, noo, naa, n:aa, nee, nuu	
p	pa, pe, pé, pê, pi, pî, po, pu,	
	poo	1 token in unanalysable reduplication
l	la, lâ, le, lê, li, lî, lo, lu	
	l:a, l:o, l:â, l:ââ, l:aa	
y	ya, ye, yé, yê, yi, ya, yo,	
	yoo, yaa, yââ	
	y:a, y:aa, y:e, y:o, yââ, yoo	
w	wa, we, wê, wó, wo,	
	w:o, w:e, w:a	
k	ka, ke, kê, ki, kî, ko, kó, ku	
	kóó, ?kîî, kââ, kaa	no nasals
pw	pwe, pwo, pwi, pwó,	
	pwee, pwii, pwoo	
	pw:a, pw:e	nasals – 2 tokens each
ng	nga, nge, ngê, ngi, ngî, ngo, ngu	no long or nasalized vowels
t	ta, te, té, ti	
	too, tii, taa	
gh	gha, ghâ, ghe, ghê, ghi, gho	
mw	mwe, mwi, mwo, mw:a, mw:i	

Bi-syllabic roots: V1 to V2 correlations

Tables 3.17 to 3.20 show patterns of association between the first and second vowels in bi-syllabic roots, together with the number (N) of each type of V1 in the database.

? = dubious attestation (e.g. in reduplication)

Table 3.17: (a) Short oral vowels in V1.

N	V1	V2
363	i	a, e, é, ê, i, î, o, ó, u
		oo, ii
		:a, :aa, :e, :ee,
172	é	a, e, i, î, o, ?é
		:o, :aa
182	e	e, a, ê, i, î, o, ó
		:a, :o, :oo, :e
163	a	a, ê, é, i, î, u
219	ê	a, e, ê, i, î, o,
		aa, oo
		:a, :e, :aâ, :ê, :o
270	î	a, e, é, ê, i, î, o, ó, u
		ââ, aa
		:a, :aa, :e, :ee, :o, :ê
193	ó	a, o, i, î, ó, u
		?oo
		:a
300	u	e, a, â, ê, î, i, o, ó, u
		:e, :o, :a, :â

Table 3.18: (b) Long vowels in V1. Note that after a long vowel in V1, vowels are mostly short in V2, many of the exceptional long V2 vowels occurring in names or frozen reduplications.

N	V1	V2	
23	ii	i, ee, aa, ii	
40	éé	i, o, u	
77	ee	a, e, é, i, î	aa, ee, :ee

Table 3.18 (continued)

N	V1	V2	
69	aa	a, é, ê, i, î, o	aa
110	êê	î,a,é,ê	ââ
6	îî	ê, :i	(îî redup)
17	óó	(?é), î,o	aa, (óó redup)
14	uu	e, ê, o, :e, :u	ee, (uu redup)

Table 3.19: (c) Nasal vowels in V1. In the database, there were a total of 324 bi-syllabic words with a nasalized first vowel, of which 102 follow a nasal/nasalized C1 consonant. The initial nasalized vowels were roughly 60% long (186) and 40% short (138).

Short (contrastively) nasal vowels in V1 position:			
N	**V1**	**V2**	
4	:i	:e, i	
0	:é		
39	:e	e, ê, i, î, :e	
39	:a	a, e, ê, i, î	(:a in reduplication)
33	:â	o, î, u	
0	:î		
17	:ê	a, e, î	
31	:o	i, o, u, ââ	
0	:ó		
8	:u	o, u	
(total: 171)			
Long nasal vowels in V1			
7	:ii	ee, :ii	(all reduplications)
0	:éé		
53	:ee	e, i, î, u, a	(:ee only in reduplications)
30	:aa	a, e, ê, i, î, ó, aa	(:aa only in reduplications)
17	:ââ	a, ê, o, ó, u	(:ââ only in reduplications)
0	:îî		
35	:êê	é, ê, î, ?ee	(many reduplications in :êê)
4	:oo	u,	(:oo in 1 reduplication)
0	:óó		
9	:uu	oo, aa	(2 bimorphemic in –î, -:ee)
(total: 104)			

Table 3.20: (d) Numbers of bi-syllabic roots, sorting by V2 (out of a total 1985 roots).

V2	N of roots ending in V2	
i	273	
é	52	
e	231	
a	117	
â	13	
î	281	
ê	273	
ó	44	
o	330	
u	181	
ii	11	(including 7 reduplications)
éé	3	(all reduplications)
ee	15	(9 reduplications)
aa	27	(11 reduplications)
ââ	11	(6 reduplications)
îî	4	(2 reduplications, 1 bimorphemic)
êê	3	(all reduplications)
óó	5	(all reduplications)
oo	11	(4 reduplications, and some bimorphemic)
uu	3	(2 reduplications)
:i	1	
:é	0	
:e	30	
:a	30	
:â	2	(both names)
:o	33	
:ó	0	
:u	3	
:ii	6	(all reduplications)
:éé	0	
:ee	16	(mostly reduplications)
:aa	9	(5 reduplications)
:ââ	8	(5 reduplications)

Table 3.20 (continued)

V2	N of roots ending in V2	
:îî	0	
:êê	8	(all reduplications)
:oo	4	(1 reduplication)
:óó	0	
:uu	3	(all reduplications)

Turning to other more general constraints, frequent words at first suggest that palatalization might be restricted to syllables with high front vowels, but this proves to be only a tendency as Tables 3.21 and 3.22 show. The one opposition which is feebly attested is that between *dn* and *dny*, since words beginning with the segment *dn* are few, but one minimal set of oppositions is frequent:

dniye = postverbal clitic encoding 3rd person dual/plural intransitive imperatives, and 3rd plural Remote Past intransitive
dnyi = preverbal inflectional clitic encoding 3rd plural Near Past Continuous aspect
dnye = preverbal inflectional clitic encoding 3rd plural Remote Past Continuous aspect

Palatalized consonants

Defining these as any of:

py ch tpy dy dpy ky mby nj mty ndy mdy pyw mbyw dny dmy my ‘ny ‘nmy ny nmy myw

there are 998 words with such consonants out of 5809 total lexemes.

Table 3.21: Combinations with vowels.

Palatalized consonant+			
Oral vowel	**N**	**Nasal vowel**	**N**
i	169	:i	1
ii	18	:ii	15
é	54		

Table 3.21 (continued)

Palatalized consonant+			
Oral vowel	**N**	**Nasal vowel**	**N**
éé	3		
e	138	:e	15
ee	12	:ee	24
ê	25	:ê	4
êê	22	:êê	12
a	53	:a	17
aa	44	:aa	28
â	15	:â	2
ââ	52	:ââ	20
o	34	:o	12
oo	16	:oo	23
ó	45		
óó	29		
u	54	:u	0
uu	21	:uu	8

What the figures do show is that there is a much higher frequency of palatalized consonants and high front vowels, although back vowels do account for c. 30% of the relevant syllables. The same sort of weighted occurrence with high front vowels can be found in *y*-initial words, as the distribution in Table 3.22 shows (which demonstrates the consonantal nature of *y* in Yélî Dnye, since many languages avoid *y+i* combinations).

Table 3.22: Y-initial words.

y-initial words (N=251):							
Oral vowels				Nasal vowels			
yi	83	yii	2	y:i	1	y:ii	1
ye	29	yee	2	y:e	7	y:ee	6
yé	28	yéé	2				
ya	13	yaa	5	y:a	1	y:aa	2
yâ	11	yââ	3	y:â	0	y:ââ	1
yo	12	yoo	1	y:o	0	y:oo	10
yó	13	yóó	0				
yu	17	yuu	2	y:u	0	y:uu	1

In summary, we have the following phonotactic constraints. First, absolute or categorical are:

(i) There is no contrastive nasalization of short vowels after nasal consonants.
(ii) All syllables are CV, except a few of the form CVm, CVn, CVp, CVy.
(iii) Words are of one, two or three syllables except for those derived by reduplication or compounding.
In addition, there are many statistical tendencies, and especially:
(iv) Although all Cs may occur word initially, in subsequent syllables complex Cs with multiple articulations or secondary features become very rare. Thus most of the highly complex sounds in the language occur word initially, which may provide a clue to their origin though syllable reduction.
(v) Oral vowels are much more frequent than nasal vowels. In first syllables, short oral vowels only slightly outnumber long oral vowels, but in second syllables short oral vowels are much more frequent than long ones.
(vi) Nasal vowels account for about a quarter of first syllables, but become much rarer in second syllables.
(vii) In palatal and palatalized environments, high front vowels are especially frequent.

These statistical patterns place the burden of distinguishing between the elements of the full complex phoneme inventory firmly on the first syllable of words.

3.4 Stress patterns

Henderson (1995:5) gives the basic stress rules of Yélî Dnye as follows (underlining here marks stress, because of the use of accents in the practical orthography):

(i) On two-syllable words the stress falls on the first syllable (C'VCV): *Weta* (man's name), *pala* (mat), *pipi* (pouring).
(ii) On four-syllable words the stress falls on the first and third syllables, with a slightly stronger stress on the first syllable (C"VCVC'VCV): *popokéni*, *tópukada*
(iii) On three-syllable words, stress falls either on the first syllable, or on the second syllable depending on vowel height or vowel-initial words: if the word starts with a vowel, or if the second vowel is more open than the first, the stress moves to the second syllable (i.e. $C'V_1CV_2CV_3$ unless V_2 is lower than V_1): *kédikââ* 'type of in-law' but *dîdyénî* 'very many'.

These rules seem essentially correct, but one may add a number of observations. First, stress on four syllable words, though pretty evenly matched on first and third syllables, may also vary slightly according to vowel height: thus in *dîdîp-wódu* ‘quarrel’ the third syllable with its lower vowel seems to attract slightly greater stress than the first syllable. Secondly, the stress movement in three syllable words is probably conditioned by somewhat more complex rules. For example, in *kumbwada* ‘woman’ the stress remains on the first syllable despite the low second vowel, and the same is true on *m:iitówo* ‘day before yesterday’. Combinations between front and back vowels seem to need to be specified. What is clearly true is that low front vowels in the first syllable will force stress onto that syllable. In addition, when vowels of the same quality occur in the first and in EITHER the second OR third syllable, this seems to induce an even stress on both first and last syllables, as in *kiniti, kîdîkpó, padada*. Finally, there are a number of case clitics that induce changes of stress which seem unrelated to the number of syllables in the word. For example, the ergative clitic or postposition (and its instrumental homonym) is itself an unstressed syllable, but induces stress and lengthening in the prior syllable, regardless of how many syllables there are in the prior word:

2 syllables: *Wéta*	→	*Wétaa ngê*
3 syllables: *Yidika*	→	*Yidikaa ngê*
4 syllables: *Pwiliyópu*	→	*Pwiliyópuu ngê*

This is not merely a case of resyllabification (i.e. the union of lexeme and case particle into a single phonological word), for then the regular stress assignment rules noted above would produce a different result. Other case particles with similar effects are: *y:oo* (plural ergative), *ka* (oblique, source/goal), and *k:ii* (comitative). In addition, the particle *knî* (‘augmented’), with unvoiced syllabic nasal (the orthographic vowel is usually silent), has the same effect, as in:

> *mupwó* (Parent & Child) → *mupwó knî* (Parent & Child augmented, i.e. F, M & S or F & S & S, etc.).

One may conclude that more research is needed into the stress rules of the language.

3.5 Phonological processes

There are naturally a number of phonological rules operating on lexical material. A few notes follow.

3.5.1 Euphonic final vowels

Given the open syllable structure of the language, where words end in final *-m* or *-p* they are often (as mentioned above in §3.3 and sometimes represented in the practical orthography) pronounced with a euphonic central or back unrounded vowel, /ə/, /ɯ/ or /u/ (orthographic *ê* or *î*, *u*). This euphonic final vowel is more or less obligatory in English loan words ending in other consonants such as *book* or *table* or *ball*, realized as *puku, tépilî, pólî*, and so on.

Despite the widespread use of clitics and postpositions, most of these resist phonological assimilation to preceding or following words. A systematic exception is the pre-verbal inflectional clitic which sometimes fuses with material to its left and right. Much of this fusion is lexicalized, that is, has arbitrary, specified phonological form, and the details will be discussed in §6.1.1.

3.5.2 Second person singular possessive forms

A very interesting phonological process concerns 2nd person singular possessive forms of nominals (nouns and verbal nouns). In the Eastern dialect (the dialect described in this book, see §1.3), but not in the Western dialect (where 2nd person singular possession is expressed by the independent pronoun *nyi*), 2nd person possession is expressed by the nasalization of the first segment of the word. That is, 2nd sg. possession is expressed as a floating nasal which displaces the original manner of the initial consonant, but keeps its place characteristics including secondary articulations. Maddieson and Levinson (nd) checked whether the resulting nasal has the same acoustic characteristics as a lexical nasal of the same type, comparing e.g. *maa* ‘path’, with *maa* -> *N+paa* ‘your side’. The answer is yes – the derived nasal is not a geminate nasal for example, and is not predictably longer than its lexical counterpart.[17]

Given that the language has a large range of complex multiple-articulated stops, this process has considerable phonological interest. Table 3.25 at the end of this section presents an extended list of unpossessed nominals with different initial segments, together with their possessed forms in the practical orthography. I give an extended list because the rules are not entirely straightforward. Essentially, though,

17 The measurements show some deviation in both directions, e.g. derived /m/ is longer in duration than lexical /m/ (150 vs. 194 ms.), but lexical /ng/ is longer than derived /ng/ (199 vs. 180 ms.).

(i) Oral stops are converted into the corresponding nasals at the same point of articulation – thus /k/ becomes /ng/, dental /t/ becomes dental /n/, etc. Palatalized or labialized consonants retain these features.
(ii) Stops with multiple articulations are nasalized at each point of articulation, thus /kp/ becomes /ngm/, /tp/ becomes /ńm/, and so forth.
(iii) True nasals (/m/, /n/ etc.) remain unchanged.
(iv) Prenasalized consonants lose their stops, so that e.g. /nt/ becomes /ń/, /mb/ becomes /m/, etc. In this case, a following short vowel may be lengthened (e.g. *ndê dmi* → *n:êê dmi* 'your bundle of firewood').
(v) Post-nasalized consonants have the initial consonant nasalized, so e.g. *km:ii* → *ngm:ii* ('your coconut'). Where this is at the same point of articulation as the nasal, the stop is effectively dropped, e.g. /dn/ → /n/.
(vi) Non-nasal continuants, laterals and glides behave variously:

/y/	→	/ny/
/w/	→	/ngw/
/vy/	→	/nmy/
/l/	→	/l/ (no change)
/ly/	→	/ly/ (no change)
/lv/	→	/nm/
/gh/ (velar fricative)	→	/ng/

(vii) Vowel initial words (all begin with /a/) lose the initial /a/, which is replaced with /n/ as in *Amdondi* → *Nmondi* ('your (man) Amdondi')

There are a few unpredictable changes. For example, labialization is not preserved after a labial stop, so /pw/ /m/ not /mw/, /tp/ is palatalized and loses its dental place of articulation, becoming /nmy/, and in addition vowel quality may change. Because of these small adaptations, I give below the list that was collected in full, to allow a fuller analysis.

This process reveals a number of things. First, it is further evidence that the double articulations are treated as one phonological segment, since both components are nasalized, but not for example a following long vowel. Second, it shows an interesting interaction between the conceptual/lexical level and the phonological levels of language, since it is not entirely restricted to possession, and it occurs only with the 2nd person singular: for example, what is realized in the Western dialect as *nyi k:ii* 'you Associative, i.e. with you', becomes in the Eastern dialect *ng:ii*. This 2nd person singular conceptual component, realized as a nasal feature, is combined on-line with the lexical head to yield a nasalized version, revealing a fine meta-sense of the structure of the phonological inventory. Third, in a phonological system already showing elaborately delicate control of nasalization (with oral vs. nasal vowels in the context of pre- vs. post-nasalized consonants), this use of a nasal morphological feature is a rather extraordinary added complexity.

I list body parts separately (Tables 3.23 and 3.24), as they behave specially under possession (see §4.2.1.4):

Table 3.23: Body parts which are unchanged under 2nd person possession.

mbodo, ngwolo, ń:uu, ngwene, nkene kn:ââ 'shoulder' *ngmo* 'breast'
ngmo 'breast'
nyóó 'teeth'

Table 3.24: Body parts changed under 2nd person possession.

Gloss	Citation form	2nd person possessive form
forehead	*kwódo*	*ngwódo*
forehead	*kîpa*	*ngîpa*
hair	*a gh:aa*	*ng:aa*
head hair	*mbodo gh:aa*	*modo gh:aa*
mouth	*komo*	*ngomo*
lips	*kwete pee dê*	*ngwete pee dê*
arm/hand	*kêê (u kóó)*	*ngêê*
palm of hand	*kêê yodo*	*ngêê yodo*
back of hand	*kêê kpâpu*	*ngêê kpâpu*
elbow	*kêê dópó*	*ngêê dópó*
finger	*kêê pyââ (dmi)*	*ngêê pyââ*
finger nail	*kêê ndipi*	*ngêê ndipi*
neck	*mbwamê*	*mwamê*
back	*kpada ma*	*ngmada ma*
chest	*yodo*	*nyodo*
stomach	*kmo.*	*ngmo*
navel	*n:iima*	*n:iima*
bottom	*kneedi tpi*	*ngeedi tpi*
leg/foot	*kpâlî*	*ngmâlî*
lower leg	*yi (u yu)*	*nyi*
top of foot	*yi kpâpu*	*nyi kpâpu*
knee	*yi (yu) mbodo*	*nyimbodo*
penis	*mdî*	*nmê* (note change of vowel – nmî would mean 'we')
vagina	*tpe*	*ńme*

In Table 3.25 there follow many further examples of the effect of 2nd person possession on the form of the nominal root, organized under the initial consonant of the root:

Table 3.25: 2nd person posssessive forms by initial consonant of root.

W		
sago	*wédi w:uu – ngwédi w:uu*	
T		
fish	*te – ńe*	
arm-band	*tpidi – nmyidi*	(no ‘n, i.e. loss of dental position)
pot of food	*tpyópu – nmyópu*	(no ‘n, i.e. loss of dental position)
song cycle	*tpile we – nmééli we*	(no ‘n, but change of vowel quality)
lime stick	*ch:aa – ny:aa*	(orthographic ch is /tʃ/)
clam	*chimi – nyimi*	
debt	*tp:uu – nm:uu*	
D		
wall	*d:omo – n:omo*	
island	*dyamê – nyamê*	
palm	*dpumo – ngmîmo*	
fire	*ndyuw:e – nuw:e*	
money	*dy:ââma -ny:ââma*	
P		
mother	*pye – mye*	
friend	*pyipe – myipe*	
village	*p:aa – m:aa*	
body	*pââ – mââ*	
story	*p:êê – m:êê*	
net	*pwoo – moo* (not *mwoo)*	
sago-food	*pwóó – móó (*not *mw)*	
torch	*pywapî – mywapî*	
price	*pywuu – mywuu*	
K		
immature coconut	*km:ii k:êê – ngm:ii k:êê*	
breadfruit	*kêêdî – ngêêdî*	
fire-for-stones	*kwunu – ngwunu*	
cough	*kyupwi – ngyupwi (or ngîîpwî)*	
nut	*kwee – ngwee*	
tree sp.(white flowers)	*kw:ee -ngw:ee*	
bailer-shell	*kwede – ngwede*	
purse basket	*kpyopwo – ngmyopwo*	
MB		
javelin	*mbee – mee*	
coconut crab	*mb:oo – m:oo*	
women‘s BS	*mbópó – mópó*	

Table 3.25 (continued)

MB	
neck	*mbwamê – mwamê (mw:amê)*
sister-in-law	*mbwanko – mwanko*
mangrove-species	*mbw:ee – mw:ee*
betel nut (native)	*mbwo – mwo*
brother	*mbwó – mwó*
parrot-fish	*mbyéém – myéém*
meat	*mbyuu – myuu*
bamboo	*mbywuu – mywuu* (also = your pay!)
shell-fish, for white paint	*mbyw:oo – myw:oo*
MT	
report	mt:ene – ńm:ene
parrot	mtye – ńmye
NT	
food	nté – ńé
tree	ntéli – ńéli
collarbone	nt:oo – ń:oo
ground oven	ntêmo -ńêmo
NJ	
rubbish	*nj:ee – ny:ee*
strut in canoe	*njé – nyé*
ND	
money	*ndapî – napî*
fire-place in garden	*nd:ângo – nângo*
fire	*ndyuw:e – nyuw:e*
firewood bundle	*ndê dmi – nêê dmi* (note lengthening of vowel)
MD	
shell for nets	*mdamê w:uu – nmamê w:uu*
money type	*mdoomdoo – nmoomdoo*
message	*mdoo – nmoo*
NK	
ceremonial lime stick	nkaa – ngaa
feast for sick person	nk:ââ – ng:ââ
ship	nkéli – ngéli
green parrot	nkêêmî – ngêêmî
possession	nkwodo – ngwodo
sorceror	nkwépi – ngwépi
cold	nkwuwo – nguwo

Table 3.25 (continued)

MG	
sardines	*mgomo – ngmomo*
centipede	*mg:ee – ngm:ee*
ridgepole	*mgópu – ngmópu*
DN	
language, noise	*dnye – nye*
stirrer	*dnyepi – nyepi*
DM	
girl	*dmââdî – ngmââdî*
sponge	*tpênê n:êê – ńm:êênê n:êê*
KN	
rump	*kn:eedi tpi – ng:eedi tpi*
base kê shell	*kn:ââ – ng:ââ*
faeces	*knê – ngê*
KM	
coconut	*km:ii – ngm:ii*
frog	*kma – ngma*
stomoach	*km:oo – ngm:oo*
left-overs	*kmono – ngmono*
M	
clam	*modo – modo*
husband	*moo – moo*
second time	*myombó – myombó*
ebony	*mywapê – mywapê*
‘N	
small breadfruit	*ńó – ńó*
widow	*ńeknwe -ńeknwe*
nose pin	*ń:ii – ń:ii*
nose	*ń:uu – ń:uu*
tooth	*nyóó – nyóó*
N	
mum	*niye – mye*
N’M	
bird	*ńmo – ńmo*
NM	
dish	*nmoko – nmoko*
NG	
armpit	*ngmââ -ngmââ*
surety for shell money	*ngm:aa – ngm:aa*

Table 3.25 (continued)

NG	
spy for sorcery	*ngete – ngete*
shell	*ng:aa – ng:aa*
eye	*ngwolo – ngwolo*
CH	
nephew	*chêne – nyêne*
W	
light	*wuu – ngwuu*
juice	*wulu – ngwulu*
VY	
lap	*vyââ – nmyââ*
black palm	*vyâm – nmyâm*
urine	*vye – nmye*
Y	
floor	*ya – nya*
outrigger side	*yaa pee – nyaa pee*
garden	*yâpwo têdê – nyâpwo têdê*
GH	
heart	*gha – nga*
soul	*ghê dmi -ngêê dmi*
eagle	*ghêmê – ngêmê*
stone axe	*ghêêpî – ngêêpî*
sea urchin	*gh:ee – ng:ee*
L	
soldier	*lede -lede*
big man	*léma – léma*
pool	*lêê – lêê*
LY	
sail	*lyé – lyé*
canoe type	*lyémlyém-lyémlyém*
landing place	*lyoko – lyoko*
LV	
cane	*lvamê -nmama*
man's name	*Lv:ââ – Nm:ââ ('your Lv:ââ' – if two people with same name)*
A	
man's name	*Amdondi-Nmondi*

3.5.3 Elision and resyllabification in fast speech

There are a number of processes that restructure the syllabification of phrases and especially compound words in fast speech. Two successive vowels in adjacent words or morphemes are likely to collapse into one lengthened one, as shown below:

(5)	a.	*kî*	*pi*	*knî*	*ngma*	*a*	*m:ii*
		those	people	PL	INDF	CI.3PROX	walk
		'Some of those people are wandering'					
	b.	*kî pi knî ngmaa m:ii*					

No systematic study of these fast speech processes has been undertaken. But as illustration, consider the adjectival phrase in (6)a. below – it is resyllabified as shown in b, because the two adjacent vowels collapse. In c., the vowel ending the first word acquires the nasal of the prenasalized consonant of the second word, as shown in d., and similarly for the penultimate word of e.

(6)	a.	*daa*	*até*	*nté*	*kéni*	
		not	just	like	kê.specified	
		'An especially big kê (shell coin)'				
	b.	*daa nté kéni*				
	c.	*yenê*	*nd:îî*	*kn:ââ*	*dî*	*l:uu*
		I.said.to.them	big	base.kê	1sPastPI	got
		'I said to them, I got that big base kê'				
	d.	*yenên d:îî kn:ââ dî l:uu*				
	e.	*kponî*	*y:i*	*mu*	*vyi*	*ngópu*
		Song.name	there	Deict.	say	PF3sgObjPIPast
		'They sang Kponî there'				
	f.	*kponî y:i mu vying ngópu*				

In the same way, in fast speech from some speakers *ala kéni* 'this kê' may resyllabify as *alak éni*, but this sort of pattern does not seem to be a wholly regular, predictable process.

3.6 Prosody

A proper study of prosody has yet to be undertaken, but some remarks, sharpened by instrumental analysis, are possible. The intonation contour (at least as shown by a pitch trace in Praat (Boersma &Weenink 2021) on default intonation settings) is nearly always falling, regardless of illocutionary force – accent seems to be done mainly through intensity. On declaratives a gently falling pitch is normal, but the intensity variation carries a great deal of the emphasis and accent, as shown in the following trace (Figure 3.9) of the utterance in (7).

(7)	*yi*	*n:ii*	*tp:oo*	*mu*	*ngmidi*	*ten*	*kina*	*u*	*kwo*
	that	REL	little	that	one	ten	kina	to	him
	y:ee	*ngópu*							
	give.to.3rd	PFS3sO							

‘For that little one alone they gave him ten kina!’

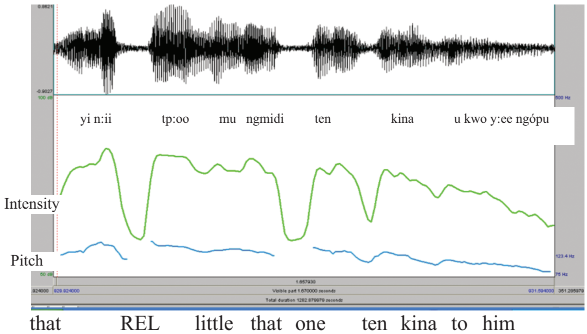

Figure 3.9: Declarative pitch and intensity.

There is some special interest in Yes-No Questions, since these are unmarked by syntax or question particle. This type of question also typically occurs with a falling pitch contour, as shown in Figure 3.10, the trace of utterance (8).

(8)	*éé*	*mê*	*dnyimo*	*n:aa*	*mumu*	*dé*
	oh	again	3pl.MOT	Motion	see	PFS3plO

‘Oh, they went again and saw them?’

Here the accent is on the *mê* and *mumu*, but the pitch (lower trace) falls as shown in Fig. 3.10.

How then are polar questions recognized? The answer seems to be largely pragmatically, in terms of who would be in expected possession of the information – if the speaker, the utterance is declarative, if the addressee, it can be assumed to be ‘interrogative’ although unmarked. A tag question particle (e.g. *apii?*) may be appended, often after a short pause, but this too is likely to carry falling intonation: see Levinson (2010).

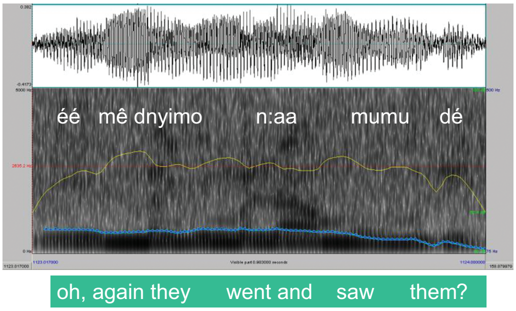

Figure 3.10: Polar interrogative pitch and intensity.

WH-Questions also usually lack rising intonation, as shown in Figure 3.11.

(9) *ló* *tpile?*
Which thing?

The pitch trace (bottom) is pretty much level.

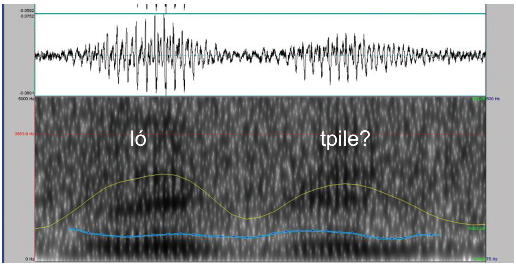

Figure 3.11: Content interrogative pitch and intensity.

The expected rise in pitch does however occur regularly in next-turn-repair-initiators (as in English “eh?”; Levinson 2015). In general, though, pitch seems to play a much less prominent role than intensity in the signalling of accent or emphasis.

To conclude this chapter, it will be evident that, firstly, the phonology of this language is so unusual that it deserves intense study, and secondly, that here the surface has hardly been scratched. It is clear for example that there are many phonological processes involved in cliticization, compounding and so on, that have simply not been investigated.