Nen

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Nen (ISO 639–3 code: nqn) is the easternmost language of the Yam (Morehead-Maro) family of Southern New Guinea. This family is one of over forty maximal genetic groupings in New Guinea, and is currently not relatable to any other language family in New Guinea or elsewhere. As with other aspects of their grammar, the phonology of the Morehead-Maro languages differs significantly from those of other Papuan languages. The phonology of Nen is broadly similar to that of other members of the family, except that (like most other members of the Nambu branch, of which it is a member) it lacks the velar nasal phoneme found in more westerly languages, and it has a smaller fricative inventory: other languages of the family include /ɸ ɣ θ/, all absent from Nen.

To date no member of this family has seen a published treatment of its phonetics, a lacuna we fill with this Illustration. See Evans (2012a) for a survey of languages of the area, and Evans (2012b, 2014, 2015) for more details on the grammar of Nen.

Nen is also the word for 'what', reflecting a standard language-naming practice in the area; other names occasionally used are Nen Ym ('what is it?') or Nen Zi ('Nen language'). It is spoken as the primary language in just one village, Bimadbn (population *c*. 300). Clan-exogamous marriage based on direct sister-exchange means that many people in the village have married in from other language backgrounds (especially the related language Nmbo and the unrelated language Idi), and conversely there are several score Nen speakers (predominantly out-married women) in adjoining villages. Most people are fluently multilingual, with a repertoire that includes one or more neighbouring languages (most commonly Nmbo or Idi), English, and Hiri Motu. Tok Pisin is not a significant part of the local linguistic ecology. Jimmy Nébni, the individual whose speech is recorded here, is a fluent speaker of Nen (his father's language), Idi (his mother's), Nmbo (his wife's), English, and Hiri Motu, with significant knowledge of other local languages as well.

A practical orthography with a one-to-one correspondence between graphemes and phonemes is employed here alongside standard IPA symbols. This orthography has been developed by the first author in consultation with Nen speakers since 2008.

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Consonants

	Bilabial	Dental/ alveolar	Palatal	Velar	Labial velar	Glottal
Plosive	p b	t̪ d		k g	k͡p g͡b	
Prenasalised plosive	ᵐb	ⁿd		ᵑg	ᴺg͡b*	
Affricate			ʤ			
Prenasalised affricate			ⁿʤ			
Nasal	m	n	ɲ			
Trill		r				
Fricative		s				h
Approximant			j		w	
Lateral approximant		l				

* The nasal in the phonemic representation of the prenasalised labial velar stop /ᴺg͡b/, not to be confused with the uvular nasal /ɴ/, represents a nasal unspecified for place, prior to homorganic assimilation. Phonetic representations vary from [ᵑg͡b] ~ [ᵐg͡b] ~ [ᵑ͡ᵐg͡b].

The list below exemplifies Nen consonant phonemes in word-initial position, except where phonotactically illicit.

Phoneme	Phonetic	Orthography	Gloss
p	[pɪd]	*péd*	'end (of something. e.g. a rope)'
t	[tɪb]	*téb*	'taste it!'
k	[kɪr.bɪr]	*kérbér*	'cold'
k͡p	[k͡pɪr.k͡pɪr]	*qérqér*	'bushfire'
b	[bɪ.mis]	*bémis*	'mango'
d	[dɪ.g͡bɪn]	*dégēén*	'stem of fern-like plant species'
g	[gə.məs]	*gms*	'to strike with hand; kill'
g͡b	[g͡bɪb]	*gēéb*	'shadow; shade'
ᵐb	[bəᵐb]	*bmb*	'ibis'
ⁿd	[kəⁿd]	*knd*	'star'
ᵑg	[beːraᵑg]	*berang*	'fly'
ᴺg͡b	[dɪᵑ͡ᵐg͡b]	*déngē*	'old-style bamboo pipe or container'
ⁿʤ	[bəⁿʤ]	*bnz*	'fire'
ʤ	[ʤɪg͡b]	*zégē*	'string'
s	[sɪᵑ͡ᵐg͡b]	*séngē*	'lid to lock a bamboo pipe'
h	[hos]	*hos*	'horse'
m	[mɪ.mɪk]	*mémék*	'fruit pigeon'
n	[nɪ.ᵐbut]	*némbut*	'navel'
ɲ	[tɪɲ]	*tñ*	'fence'
l	[lel]	*lel*	'needle'
r	[re.ra]	*rera*	'sulphur-crested cockatoo'
j	[jɪp]	*yép*	'bilum; bag'
w	[wɪr]	*wér*	'south-easterly winds'

Obstruents

Voiceless, voiced[1] and prenasalised stops occur at four points of articulation: bilabial, alveolar[2], velar and coarticulated labial velar. Labial velar stops contrast with both labials

[1] Phonemic voicing is manifested by prevoicing and by intensity in the voicing bar, as seen in the spectrograms in Figures 1 and 2 below.
[2] Voiceless stops tend to have an apico-dental articulation while voiced ones have an alveolar one.

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and velars; they tend to be tensely articulated and frequently have a labio-velar offglide, though this is not phonemic. Minimal pairs for the labial velar, velar and labial phonemes are presented here in (1)–(5).

(1) k vs. k͡p

knm	/knm/	[kə.nəm]	'come!'
qnm	/k͡pnm/	[k͡pə.nəm]	'I came (yesterday)'
kbr	/kbr/	[kə.bər]	'tree sp.'
qbr	/k͡pbr /	[k͡pə.bər]	(personal name)

(2) p vs. k͡p

prpr	/prpr/	[pər.pər]	'farewell feast'
qrqr	/k͡prk͡pr/	[k͡pər.k͡pər] ~ [k͡pʷər.k͡pʷər]	'diarrhoea'

(3) g vs. g͡b

garngar	/garᵑgar/	[ga.rəŋ.gar] ~ [gar.ᵑgar]	'weed'
ḡarngār	/g͡barᴺg͡bar/	[g͡ba.rəŋ.g͡bar] ~ [g͡bar.ᵑ͡ᵐg͡bar]	'mud'
girigiri	/girigiri /	[gi.ri.gi.ri]	'stone club'
ḡiri	/g͡biri/	[g͡bi.ri]	'widow'

(4) b vs. g͡b

béb	/bɪb/	[bɪ.bɪ̰]	'breadfruit'
zégḡ	/ʤɪg͡b/	[ʤɪ.g͡bɪ̰]	'string, rope'

(5) k͡p vs. g͡b

qérqér	/ k͡pɪrk͡pɪr /	[k͡pɪr.k͡pɪr] ~ [k͡pʷɪr.k͡pʷɪr]	'bushfire'
ḡérḡér	/g͡bɪrg͡bɪr /	[g͡bɪr.g͡bɪr]	'plant, Schizaea sp.'
déqén	/ dɪk͡pɪn /	[dɪ.k͡pɪn] ~ [dɪ.k͡pʷɪn]	'black anthill'
déḡén	/ dɪg͡bɪn /	[dɪ.g͡bɪn]	'stem of fern-like plant sp.'

The phoneme inventory is somewhat asymmetric, in that while stops do not occur at the palatal place of articulation, a voiced affricate /ʤ/ and a voiced prenasalised affricate /ⁿʤ/ do. These vary in their articulation from voiced palatal affricates [ʤ] to voiced alveolar affricates [ʣ] to voiced alveolar fricatives [z] and [ⁿʣ] and [ⁿz] for the corresponding prenasalised affricate. These two phonemes utilise the tongue tip as their active articulator in Nen and group with the alveolar/dental series.

The only commonly-used fricative is /s/. A voiceless glottal fricative /h/ is confined to a few deictic and interactional words such as *gẽhẽ* [gẽ.hẽ] 'over there' and [ã.hã] *ãhã* 'here you are (handing something over)', always adjoining a nasalised vowel in such words, plus a few English loan words like *hos* [hos] 'horse'.

Nasals

There are just three nasals: /m/, /n/ and /ɲ/. The first two of these can occur both initially and finally (in word or syllable), whereas /ɲ/ cannot occur word-initially: roots which underlyingly begin with it only manifest the palatal articulation when it has been placed in non-initial position by a prefix, e.g. /nps/ 'cut' [nə.pəs], /wɲpte/ '(s)he cut me' [wə.ɲəp.te]. Minimal and near-minimal pairs for the /n/ and /ɲ/ phonemes are offered in (6).

(6) n vs. ɲ

tntn	/tntn/	[tən.tən]	'trap'
tñ	/tɲ/	[tɪɲ]	'fence'
wanms	/wanms/	[wa.nə.məs]	'call'
wañms	/waɲms/	[wa.ɲə.məs]	'cover'

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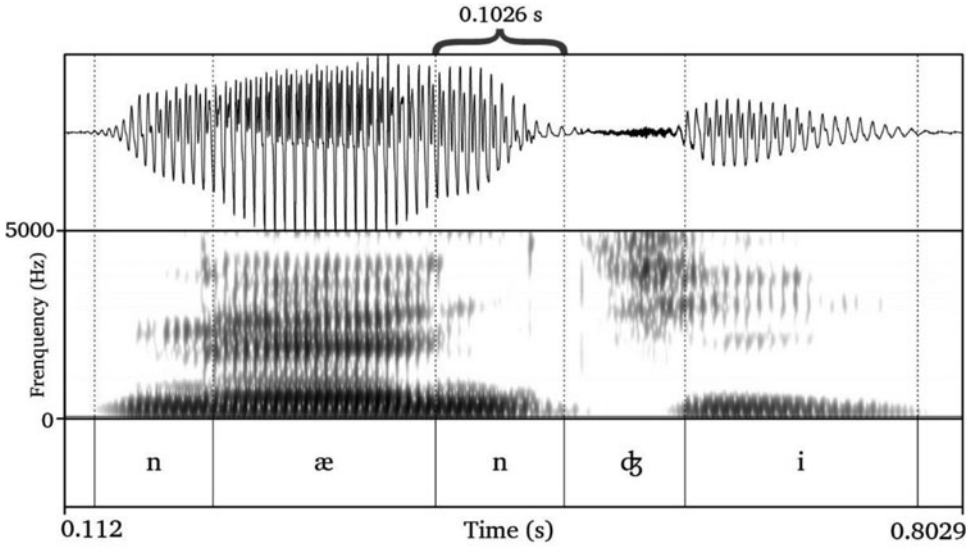

Figure 1 Length of nasal of /ⁿʤ/ in /næⁿʤi/ [næn.ʤi] 'a variety of banana'.

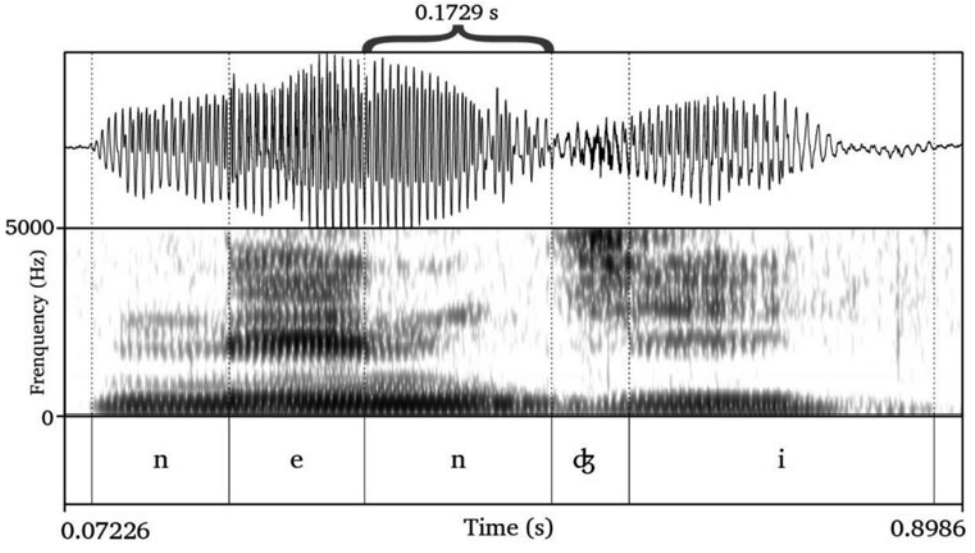

Figure 2 Length of second /n/ in /nenʤi/ [nen.ʤi] 'the Nen language'.

In cases where it is necessary to distinguish the sequence of nasal plus affricate /nʤ/ from prenasalised affricate /ⁿʤ/, the nasal part of the prenasalised stop tends to be audibly shorter. In Figures 1 and 2, a spectrogram[3] and waveform are offered to show the relative lengths of the nasals in /næⁿʤi/ 'a variety of banana' and /nenʤi/ 'the Nen language'.

The nasal component of the prenasalised affricate /ⁿʤ/ of /næⁿʤi/ is 0.10261 seconds long; the nasal /n/ of /nenʤi/is considerably longer, at 0.1729 seconds.

[3] All graphics were generated using the Praat software, version 5.3.59 (Boersma & Weenink 2014).

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Further illustration of nasal length is presented below. Figure 3 shows the difference in phonetic realization of the prenasalised affricate in *ynzrman* /jⁿʤrman/ [jɪn.ʤɪr.man] '(s)he was'; Figure 4 shows a sequence of the nasal /n/ followed by the prenasalised affricate /ⁿʤ/. *ynnzrman* /jnⁿʤrman/ [jɪnː.ʤɪr.man] '(s)he came'.

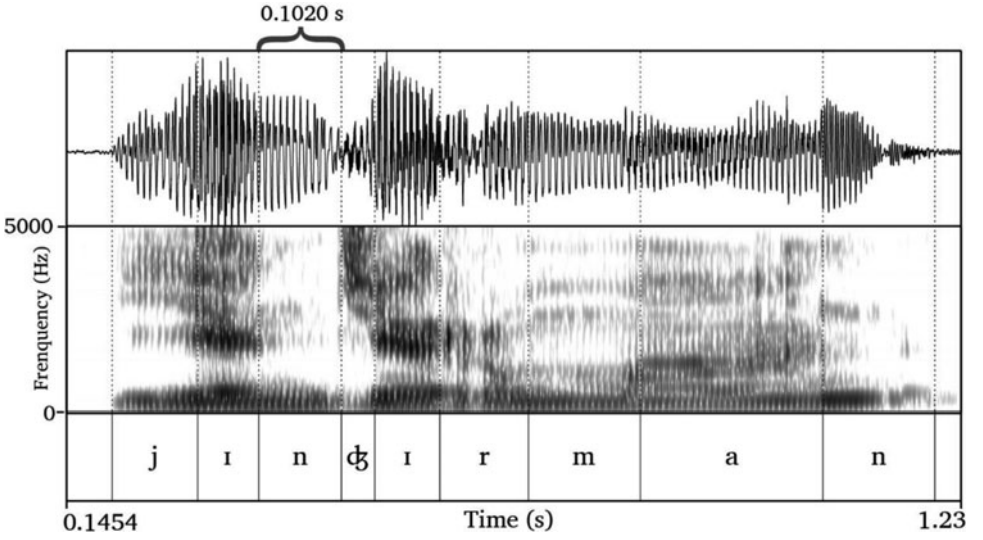

Figure 3 Length of nasal of /ⁿʤ/ in /jⁿʤrman/ [jɪn.ʤɪr.man] '(s)he was'.

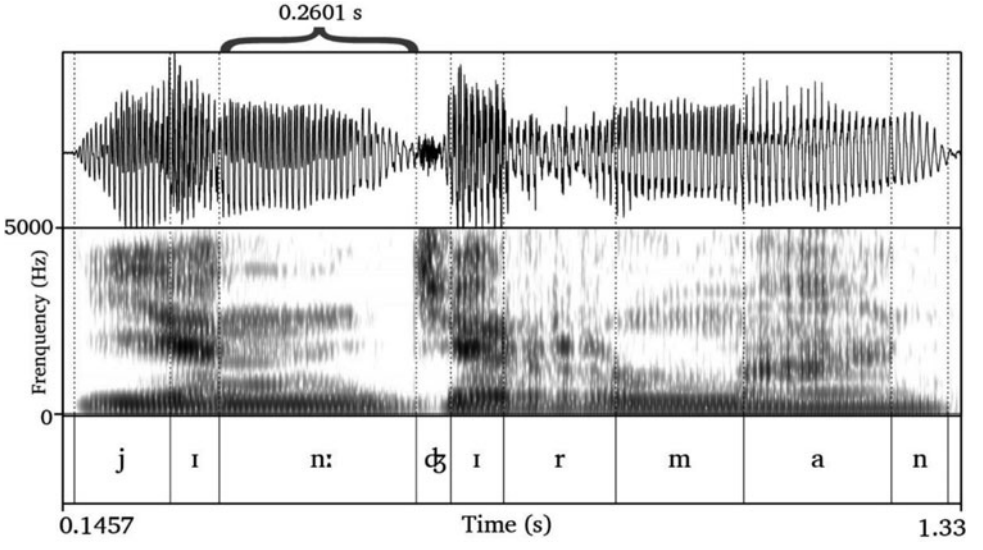

Figure 4 Length of nasal in sequence of /n/ followed by /ⁿʤ/ in /jnⁿʤrman/ [jɪnː.ʤɪr.man] '(s)he came'.

In the case of prenasalised labial velar stops, the nasalisation often displays acoustic and auditory evidence that both nasals are being articulated, beginning with the velar nasal, transitioning to the labial. Figure 5 shows the waveform and spectrogram of /sarᴺg͡b/ [sa.rə.ŋ͡mg͡bo̤] 'yam house'. Note the downward transition of F2 and F3, the dark horizontal

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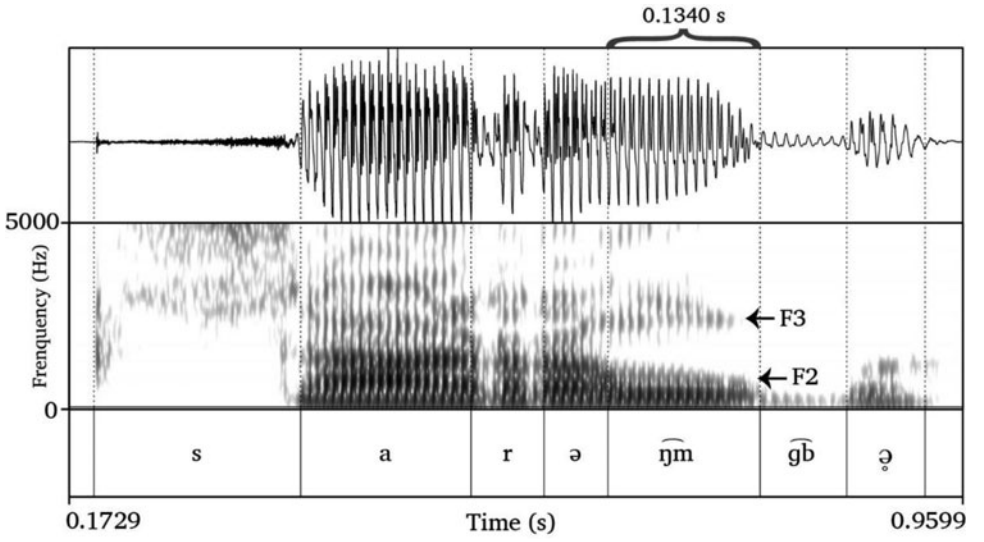

Figure 5 Nasal element of /$^{N}\widehat{gb}$/ surfacing as [$\widehat{ŋm}$] in /sar$^{N}\widehat{gb}$/ [sa.rə.$^{\widehat{ŋm}}\widehat{gb}$ə̥] 'yam house'.

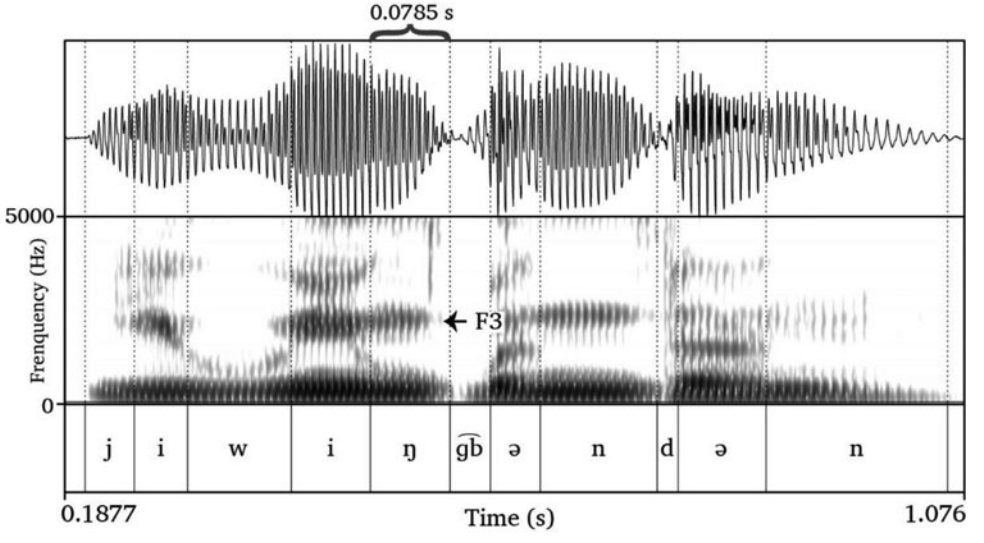

Figure 6 Nasal element of /$^{N}\widehat{gb}$/ surfacing as [ŋ] in /jiwi$^{N}\widehat{gb}$ndn/ [ji.wiŋ.$\widehat{gb}$ən.dən] 'I saw them'.

bands, indicating a movement towards a labial articulation at the end of the nasal and into the following labial velar plosive.

However, if the nasal segment re-syllabifies as the rime of the preceding syllable, it typically manifests as a velar nasal with a shorter duration than its labial velar counterpart. Figure 6 offers an example of the re-syllabified velar nasal. Note that F3 remains relatively even, indicating that there is no labial articulation for this nasal.

Voiced and voiceless stops can occur in both initial and final positions, whether defined by syllable or word. Prenasalised stops cannot occur word-initially but occur in all other positions. Evidence from reduplicates (e.g. *bermber* [ber.^{m}ber] 'share', *brmbr* '[bər.^{m}bər] 'soul, spirit') suggests that historically there has been a loss of the nasal portion in word-initial position

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and this is confirmed by comparative evidence: in a large number of Nen words initial voiced obstruents correspond to voiced prenasalised obstruents in related languages (e.g. Nen /ba^{n}d/ 'earth, ground', Kómnzo /^{m}ba^{n}t/, Nama /^{m}ba^{n}d/; Nen /ʤapar/ 'sky', Neme /^{n}ʤaɸar/ 'sky').

In (7)–(10) are minimal and near-minimal pairs for the prenasalised labial velar, velar, and labial phonemes.

(7) $^{N}\widehat{gb}$ vs. ^{ŋ}g

déngē	/dɪ$^{N}\widehat{gb}$/	[dɪ$^{ŋm}\widehat{gb}$]	'old-style bamboo pipe or container'
dng	/d^{ŋ}g/	[də^{ŋ}g]	'piece of wood'

(8) $^{N}\widehat{gb}$ vs. ^{m}b

angēs	/a$^{N}\widehat{gb}$s/	[aŋ.$\widehat{gb}$əs]	'return'
ämbs	/æ^{m}bs/	[æm.bəs]	'one'
karmb	/kar^{m}b/	[ka.rə^{m}b]	'ascend!'
sarngē	/sar$^{N}\widehat{gb}$/	[sa.rə$^{ŋm}\widehat{gb}$]	'yam house'

(9) g vs. ^{ŋ}g

ag	/ag/	[ag]	'coconut'
berang	/bera^{ŋ}g /	[be.ra^{ŋ}g]	'fly'

(10) b vs. ^{m}b

berber	/berber/	[ber.ber]	'tree fed to pigs to make them fat'
bermber	/ber^{m}ber/	[ber.^{m}ber] ~ [be.rəm.ber]	'share, portion'

Liquids and semi-vowels

Nen contrasts /l/ and /r/ phonemically, as well as the semi-vowels /w/ and /j/. Liquids can occur word-initially and as codas: /ra^{ŋ}ga/ 'pig of middle size', /kr/ [kər] 'dead', [ker] 'penis'; [lel] 'needle', [bə.ləm.bəl] ~ [bəl.^{m}bəl] 'grass type, *Dianella ensifolia*'. Minimal pairs for /l/ and /r/ and /j/ and /w/ are given in (11) and (12).

(11) l vs. r

blmbl	/bl^{m}bl/	[bə.ləm.bəl] ~ [bəl.^{m}bəl]	'grass type, Dianella ensifolia'
brmbr	/br^{m}br/	[bə.rəm.bər] ~ [bər.^{m}bər]	'spirit'

(12) j vs. w

jao	/jaw/	[ja$\underset{\sim}{\text{u}}$]	'no'
wao	/waw/	[wa$\underset{\sim}{\text{u}}$]	'ripe'

Semi-vowels /j/ and /w/ can occur word- and syllable-initially. Where the corresponding sounds occur in coda position after another vowel, speakers prefer to write these as two-vowel diphthongs[4] (e.g. *pupui* 'large riverine swamp', *sao* 'savannah swamp'), but they resyllabify as consonantal onsets before suffixes like the locative /-(a)n/ (e.g. /sawn/ [sa.wən] 'in the savannah swamp', /pu.pu.jan/ [pu.pu.jan] 'in the riverine swamp') and it is phonologically more appropriate to treat them as semi-vowels in coda position when in citation form (thus /pupuj/ [pu.pu$\underset{\sim}{\text{u}}$], /saw/ [sa$\underset{\sim}{\text{u}}$]), which resyllabify as onsets before certain affixes.

Vowels

Nen has six full oral vowels, /i e æ a o u/, plus two nasalised vowels of very limited distribution, /ẽ ã/, and two central vowels, /ɪ ə/, which likewise have a limited distribution. These vowels are

[4] Speaker preferences here are possibly influenced by Motu orthography, which many are conversant with, particularly for religious purposes through the Hiri Motu Bible.

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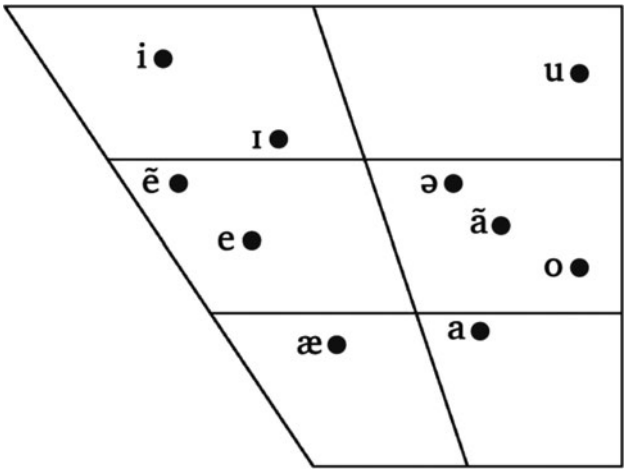
shown below. Placement of vowels in the trapezoid is based on relative locations of average F1 and F2 taken from 15 tokens for each vowel.



PHONEME	PHONETIC	ORTHOGRAPHY	GLOSS
i	[bi]	*bi*	'sago'
e	[be]	*be*	'2sg oblique'
æ	[bæ]	*bä*	'3sg absolutive'
a	[ba^{n}d]	*band*	'earth, ground'
o	[bo.lo]	*bolo*	'old man'
u	[bu.der]	*buder*	'friend'
ẽ	[gẽ.hẽ]	*gẽhẽ*	'over there'
ã	[ã.hã]	*ãhã*	'here you are (handing something over)'
ɪ	[bɪ.mis]	*bémis*	'mango'
ə	[bə.rəm]	*brm*	'spit'

Disposing first of the nasal vowels, as these are a very marginal part of the vowel inventory, each occurs in fewer than half a dozen words. All instances are found in either deictics (e.g. *gẽhẽ* 'there') or interactional words like *ãhã* 'here you are' or *ẽ* 'yes'.

Full oral vowels all have unlimited distributions and can occur initially, finally or as a syllable nucleus either as an open syllable as in *aragab* [a.ra.gab] 'sea' or followed by a consonantal coda, as in *arqan* [ar.k͡pan] 'tree sp. Acacia mangium'. The distinction between /e/ and /æ/ is always clear in open syllables and available in some closed syllables, and supported by many minimal pairs such as [be] '2SG oblique' vs. [bæ] '3SG absolutive' and [mer] 'good' vs. [mær] 'name of village'. However, it is undergoing neutralisation in some contexts so that words like 'friend' and 'day' vary between [bu.der] and [bu.dær], and [ke.ser] and [ke.sær], respectively. This movement towards neutralisation can be seen in the Principle Component Analysis (PCA) vowel chart below in Figure 7. Note the long ellipses for both /e/ and /æ/, indicating variability in vowel height. /a/ also shows a similar variation in vowel height; however, there is no other full vowel nearby with which it neutralises.

The distinction between /æ/ and /a/ is clearer and supported by numerous minimal pairs, e.g. /jaramandn/ 'I gave two' vs. /jæræmandn/ 'I gave a few', /dars/ 'to break open' vs. /dærs/ 'to poison, splash'. Near-minimal sets or pairs for all oral vowels are presented in (13)–(15).

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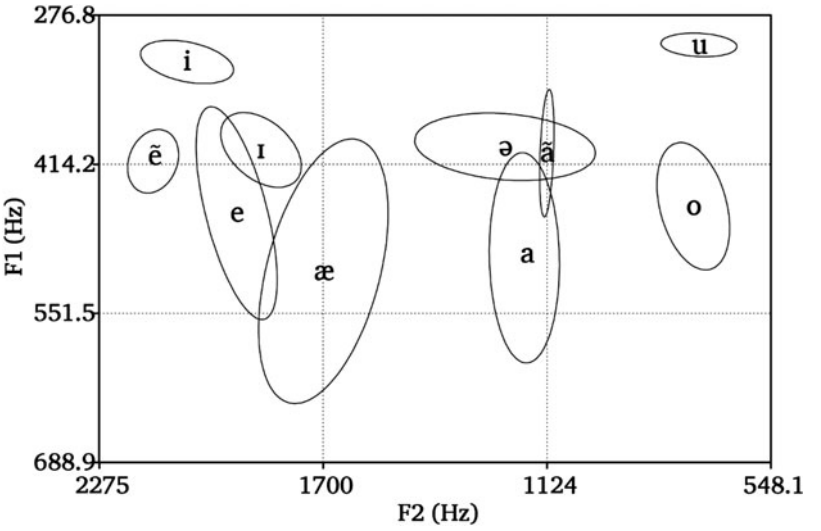

Figure 7 Plot of F1 versus F2 PCA plot of approximately 140 vowel tokens, male speaker, JN.

(13) i ɪ e æ

mir	/mir/	[mir]	'nipa palm'
mérpa	/mɪrpa/	[mɪr.pa]	'watch out! (interjection)'
mer	/mer/	[mer]	'good'
mär	/mær/	[mær]	'village name'

(14) ə vs. a

knm	/knm/	[kə.nəm]	'come!'
kanam	/kanam/	[ka.nam]	'snake'

(15) u vs. o

nu	/nu/	[nu]	'water
nono	/nono/	[nono]	'breast'

The central vowels have a more complex phonology. /ɪ/ is shorter, lower and more central than /i/. It can neither begin nor end a word, though it can begin a root, e.g. /-ɪgɪrᵑgr/ 'be away (non-dual)', as in /jɪgɪrᵑgr/ '(s)he is away', where /j-/ is the third person subject prefix. It also counts as a light vowel for purposes of stress assignment. When flanked by a consonantal onset and nucleus, [ɪ] contrasts phonemically with other vowels, as shown in (16)–(19), with minimal pairs contrasting it with /e/, /i/ and the epenthetic [ə].

(16) ɪ vs. e

bénba	/bɪnba/	[bɪ.nɪ̰.ba]	'with a smile'
beneba	/beneba/	[be.ne.ba]	'with a window'

(17) ɪ vs. i

déng̅	/dɪᴺg͡b/	[dɪᵐ̄ᵐ̄g͡b]	'old-style bamboo pipe or container'
ding̅	/diᴺg͡b/	[diᵐ̄ᵐ̄g͡b]	'OK, I'll see him'

(18) ɪ vs. ə

qérqér	/k͡pɪrk͡pɪr/	[k͡pɪr.k͡pɪr]	'bushfire'
qrqr	/k͡prk͡pr/	[k͡pər.k͡pər]	'diarrhoea'

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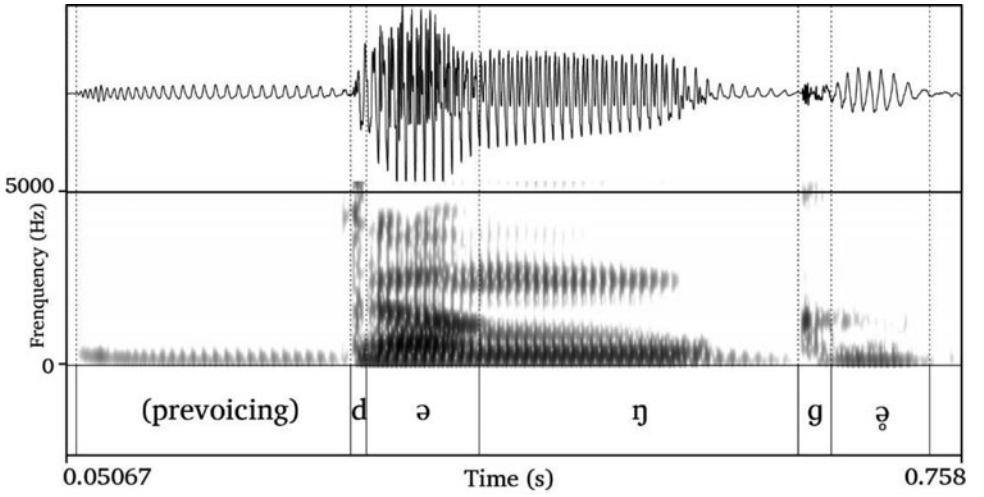

Figure 8 /dəᵑg/ 'piece of wood' manifesting as [dəŋ.gə̥].

(19) ə vs. a

kp	/kp/	[kəp]	'head'
kap	/kap/	[kap]	'cup'

A voiceless 'echo' version of the central vowels is common after monosyllabic stems in which the vowel occurs, if they end in a voiced stop, e.g. /pɪd/ [pɪ.dɪ̥] 'end (of something, e.g. a rope)', /bɪnba/ [bɪ.nɪ̥.ba] 'with a smile', /mᴺ͡gb/ [mə͡ᵑᵐ͡gbʷə̥] 'house'. Speakers are emphatic about not wanting to write such echo vowels, which are phonologically predictable. Figure 8 provides an example of an echo [ə] in the word /dəᵑg/ [dəŋ.gə̥] 'piece of wood'.

It is not the case that all echo vowels are the centralised vowels. Echoes of full vowels may also appear after voiced plosives. Figure 9 is an example of [e] as an echo vowel in the word /k͡peb/ [k͡pe.be̥] 'next day'.

/ə/ ([ə] ~ [ɐ]) is the most complex vowel analytically. In most cases phonetic schwa results from epenthesis and is not phonemic; essentially, phonetic schwa is used to fill in the nuclei of syllables to which no vocalic segment is linked, e.g. /kp/ [kəp]. However, there are some phonotactic positions in which schwa does not result from epenthetic insertion, preeminently in a couple of open monosyllables (e.g. /mə/ 'still').[5] To deal with such words, we need to retain schwa as a phoneme in its own right, even though the vast majority of phonetic schwas are epenthetic and non-phonemic.

Diphthongs

Most Nen diphthongs can be analysed as transitions between a long vowel and one of the semi-vowels, e.g. /kaj/ 'yesterday', /pupuj/ 'riverine swamp', /troj/ 'bamboo sp.', /wejwej/ 'sorry', /saw/, 'savannah swamp', /k͡pæw/ 'python', /yewtan/ 'they walk', even though the practical orthography writes them as sequences of two vowels (respectively *kae*, *pupui*, *troi*, *weiwei*, *sao*, *qäu*, *yeutan*). The only opening diphthong is /eæ/, found just in the word /geæ/ 'if'.

[5] [ə] or [ɐ] can also be a realisation of unstressed word-initial /a/, in verbs where the stress falls on the root away from the diathetic prefix, e.g. *átors* /ətors/ 'exit'. Speakers prefer to write this as <a>.

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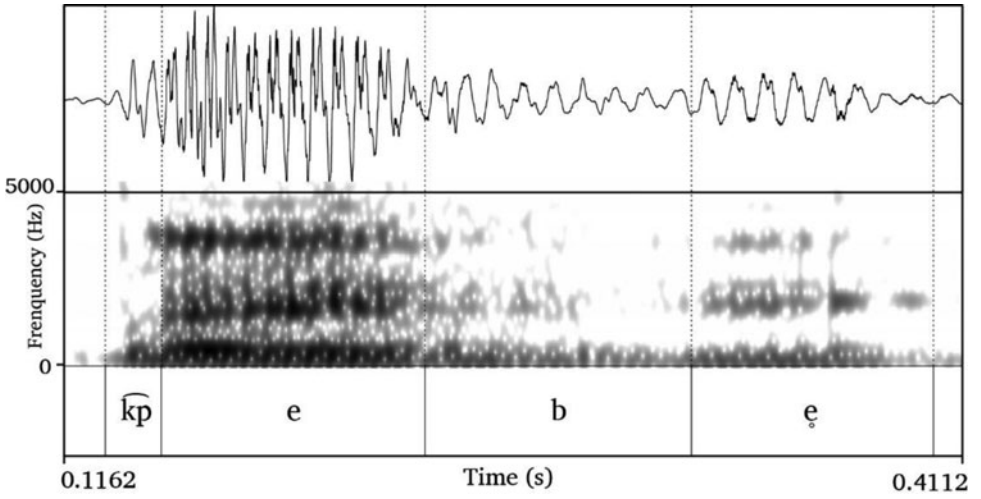

Figure 9 /k͡peb/ 'next day' manifesting as [k͡pe.be̞].

Normally diphthongs cannot be followed by a consonant in the coda of the same syllable, with the sole exception that diphthongal nuclei are licit before the infinitive suffix *-s*, as in *wakaes* /wakajs/ [wa.kai̯s] 'to see', *naos* /naws/ [nau̯s] 'to enclose'.

Vowel epenthesis

As in some other Papuan languages (Kalam, see Blevins & Pawley 2010, and Kanum, see Donohue 2009), the nuclei of many syllables in Nen are epenthetic schwas, e.g. [kə.nəm] for /knm/ 'come!'. In the practical orthography, speakers decisively prefer not to write these.[6]

Epenthetic schwas are inserted according to the following procedure:

(i) Associate each specified vowel with a syllable nucleus.
(ii) In word-final position and some other final positions (of reduplicate elements, compounds, verb stems, and boundaries before case affixes) associate the last consonant with a coda position.
(iii) For the remaining segments in the word, maximize onsets, in other words associate as many consonants as possible with onset position. Exception: the clusters /Sr/, /Sl/, /^{n}Sr/ (where S is a stop, and ^{n}S a prenasalised stop), /sp/ and /sk/ are syllabified as complex onsets before following associated vowels, e.g. /spɪl^{N}g͡b/ [spɪ.lɪ^{ŋm}g͡b] 'basket', /skop/ [skop] 'eye', /drondro/ [dron.dro] 'night carpenter bird'.
(iv) Likewise, reassociate the nasal element of any NS cluster that is not in word-initial position to the preceding coda. This reassociation of the nasal element of a prenasalised plosive is optional.
(v) Fill any unassociated nucleus slots with an epenthetic vowel. If there is an adjacent palatal, /j/ or /ɲ/, the epenthetic vowel manifests as [ɪ]. If there is an underlying or surface [ɪ] already present in an adjacent position in the word, the epenthetic vowel is [ɪ]. Otherwise the epenthetic vowel is [ə].

[6] In the trial orthography developed by SIL linguist Marco Boevé in 2000 (published in Boevé 2002), these vowels had been written as *á*, e.g. *kánám* for 'come!', but it emerged in consultation between NE (the first author of the present Illustration) and speakers in 2009 and 2010 that they prefer to write these words with no vowel symbol, e.g. *knm*. Their most frequent complaint about writing *á* was 'no, we don't drag it like that'.

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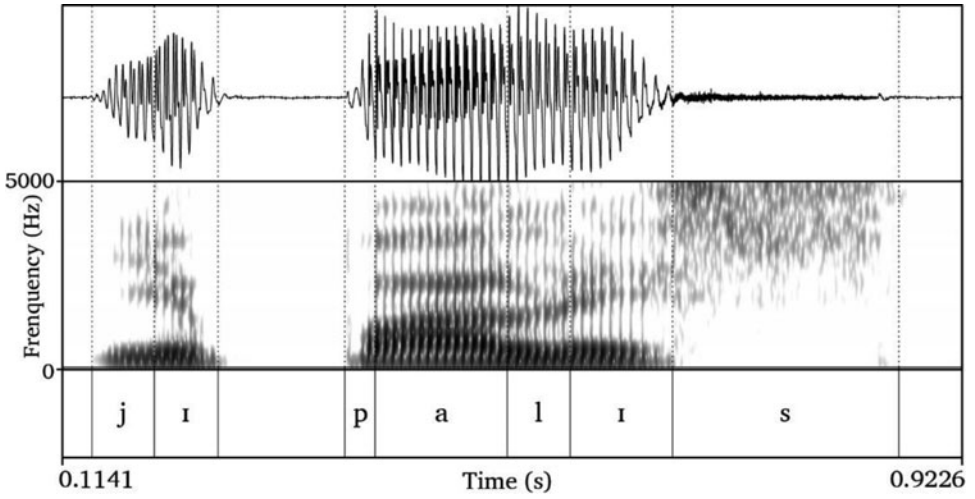

Figure 10 Epenthetic vowel harmony in /jpals/ 'truth, true', surface form [jɪ.pa.lɪs].

These principles of epenthesis can be illustrated with the following examples in (20) and (21).

(20) [ɪ] epenthesis

/spɪlᴺg͡b/	[spɪ.lɪᵑ͡ᵐg͡b]	'basket'
/tɲ/	[tɪɲ]	'fence'
/jmabem/	[jɪ.ma.bem]	'they (ergative)'
/jnⁿʤrman/	[jɪnː.ʤɪr.man]	'(s)he came'
/jⁿʤrman/	[jɪn.ʤɪr.man]	'(s)he was'
/jɪgɪrᵑgr/	[jɪ.gɪ.rɪŋ.gɪr]	'(s)he is away'

(21) [ə] epenthesis

/knm/	[kə.nəm]	'come!'
/nnam/	[nə.nam]	'come (later)!'
/lgigl/	[lə.gi.gəl]	'hook'
/jiᴺg͡bⁿdn/	[jiŋ.g͡bən.dən]	'I saw it'
/waɲmst/	[wa.ɲɪm.sət]	'to close'
/sakrdbnmne/	[sa.kər.də.bən.mə.ne]	'from the trunk of the sakr palm'
/kr/	[kər]	'dead'

A final quirk of [ɪ] is that it optionally conditions harmonic epenthesis; if a surface [ɪ] is present at some point in the word, other epenthetic vowels can be realised as [ɪ] rather than [ə]. Figures 10 and 11 offer examples of this epenthetic vowel harmony for /jpals/ [jɪ.pa.lɪs] 'truth, true' and /jɪgɪrᵑgr/ [jɪ.gɪ.rɪŋ.gɪr] '(s)he is away', respectively.

Epenthetic [ɪ] vowel harmony does not propagate in all environments. In Figure 12, the epenthetic vowel in the last syllable /gr/ does not surface as [gɪr] like in the similar final syllable of Figure 11, but as [gər].

The example in Figure 12 has a full vowel in the syllable following the first epenthetic vowel [ɪ], and moreover the blocking syllable is closed by a bilabial nasal. The authors posit that it is this combination which blocks the harmony; the example from Figure 10, /jpals/ [jɪ.pa.lɪs] 'truth, true', also has an intermediary full vowel but it occurs in an open syllable.

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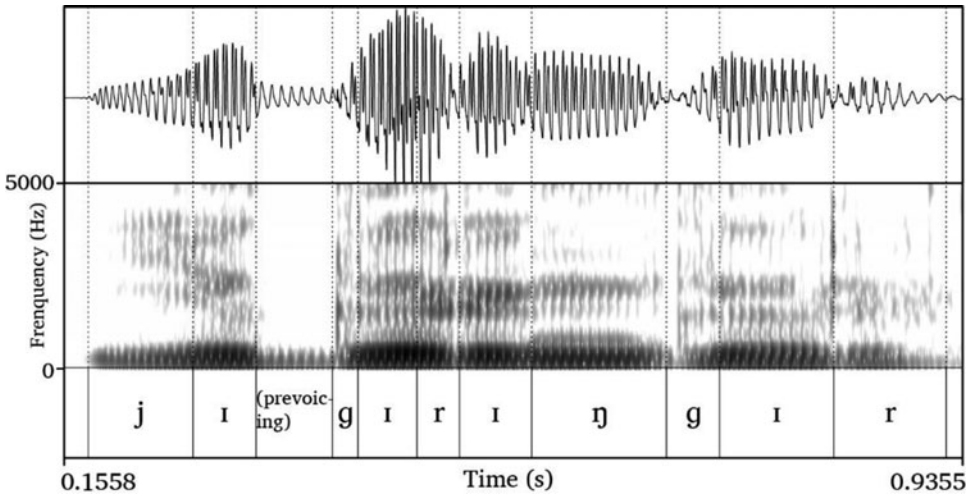

Figure 11 Epenthetic vowel harmony in /jɪgɪrⁿgr/ '(s)he is away', surface form [jɪ.gɪ.rɪŋ.gɪr].

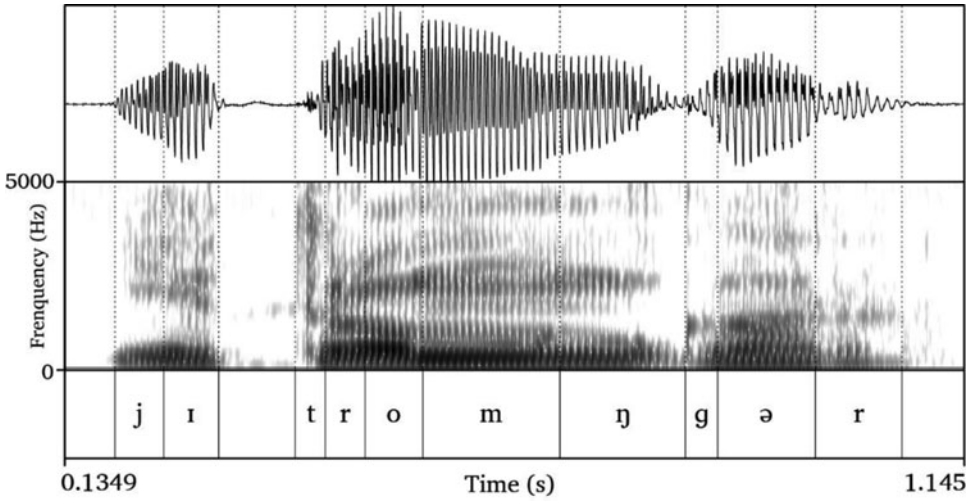

Figure 12 Optional epenthesised vowel harmony does not occur: /jtromⁿgr/ surfacing as [jɪ.trom.ⁿgər] 'it stands (of building)'.

Prosodic features

Stress is partly conditioned by word-class; there is a 'basic' stress pattern found in nouns, adjectives and some types of verbs. There is also a 'special verbal pattern', found with 'ambifixing verbs' (which take both prefixes and suffixes to index arguments) and 'positional verbs' (Evans 2014), as well as nominalisations formed from them. In this second pattern, stress placement is sensitive to three main factors:

(i) a light–heavy contrast in syllable nuclei, where light nuclei are those filled by /ɪ/ or the epenthetic vowels [ɪ ə] and everything else is heavy;
(ii) word-structure (singleton vs. reduplicate, ambifixing or positional vs. other prefixing verb);

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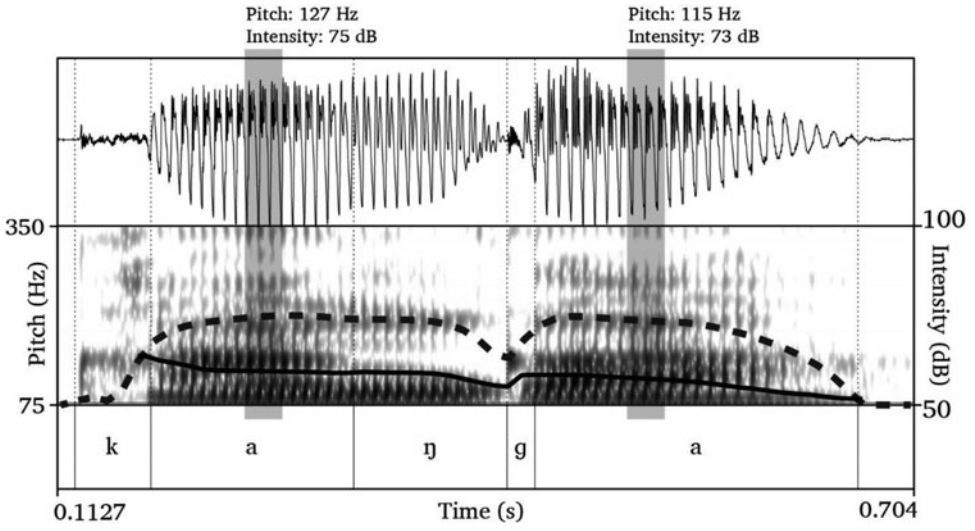

Figure 13 Stress on first syllable in /kaⁿga/ [ˈkaŋ.ga] manifests as higher fundamental frequency.

(iii) morphological structure (in verbs), most importantly the distinction between roots and prefixes.

It is ultimately possible to predict stress placement from interactions of these factors. But before the stress patterns are presented, the acoustic correlates of stress will be explained.

Acoustic correlates of stress

Stress in Nen surfaces as relative syllable prominence due to greater amplitude, increased fundamental frequency, or greater vowel length. When stress falls on the first syllable, higher fundamental frequency tends to be the correlate. Out of 45 tokens measured[7] with primary stress on the first syllable, 93% of the data showed higher pitch on the first syllable, 50% indicated greater intensity, and 14% had greater vowel length. First-syllable primary stress is evident in the noun /kaⁿga/ [ˈkaŋ.ga] 'bridge' seen in Figure 13.

The first syllable has a pitch measure of 127 Hz and intensity value of 75 dB. The second syllable has a pitch of 115 Hz and intensity of 73 dB. Prominence of the first syllable is marked by higher pitch.

When primary stress falls on the second syllable, increased intensity tends to be the correlate. Of 45 words measured with second syllable stress, 83% of the data showed higher intensity in the second syllable, 67% had longer vowel length, and 50% of the tokens had higher pitch. Second-syllable stress can be seen in Figure 14 in the noun /nætræᴺg͡be/ [næ.ˈtræ.ŋ̍m͡gb͡ʷe] 'it shone'. In this example, both pitch and intensity were higher in the second syllable than in either the first or third syllables, marking it for prominence.

Basic stress pattern

The basic pattern is to stress the initial syllable, such as [ˈa.ra.ˌgab] 'sea', [ˈka.nam] 'snake', [ˈkaŋ.ga] 'bridge', [ˈnæn.ʤi] 'banana', [ˈʤa.par] 'sky', [ˈpu.puˌi] 'riverine swamp', [ˈse.le.mi] 'clothes'. An example of this initial syllable stress pattern can be seen in Figure 15 in the noun [ˈʤa.par] 'sky'.

[7] Measures for pitch and intensity were taken over 30 ms at the steady-state of the vowel. In the following spectrograms, pitch is represented by the solid, black line; its scale is to the left of the spectrogram, measured in hertz (Hz). Intensity is represented by the thicker dotted black line; its scale is to the right of the spectrogram, measured in decibels (dB).

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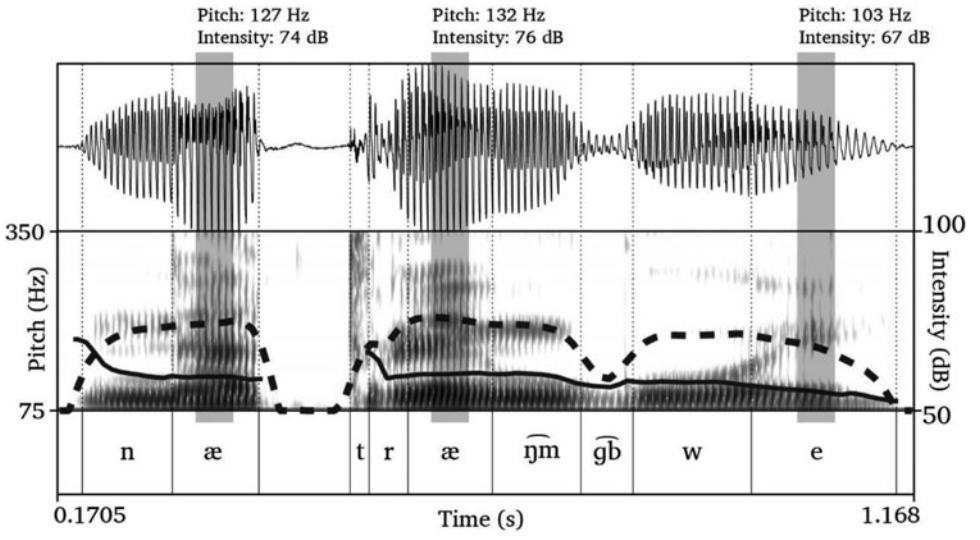

Figure 14 Stress on second syllable in /nætræ^{N}g͡be/ [næ.ˈtræ.ᵑᵐg͡bʷe] manifests as higher intensity.

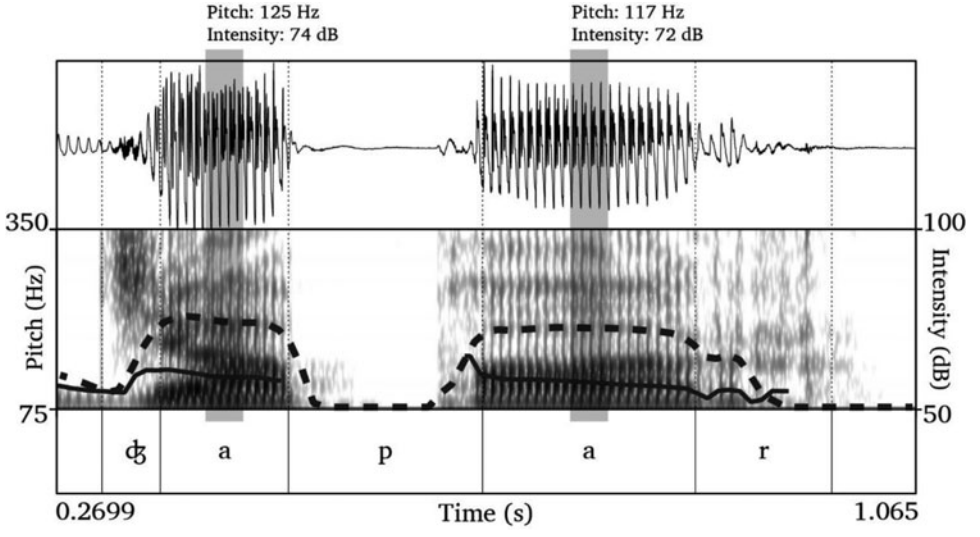

Figure 15 Basic stress pattern, exemplified by the noun [ˈʤa.par] 'sky', showing prominence of the first syllable.

But if a sequence of unfilled nuclear slots or the short vowel [ɪ] precedes a full-vowel syllable, it is the first full-vowel syllable which attracts the stress: /jˈpals/ [jɪ.ˈpa.lɪs] 'truth, true', /jˈmabem/ [jɪ.ˈma.bem] 'they (ergative)', /k͡pˈter/ [k͡pə.ˈter] 'flying fox', /bɪ.ˈmɪs/ [bɪ.ˈmɪs] 'mango', /bˈdrete/ [bə.ˈdre.te] 'wet'. Figure 16 provides an example of this for the word /k͡pˈter/ [k͡pə.ˈter] 'flying fox'. As mentioned above, for second-syllable stress, the correlate is higher intensity. The high pitch for the epenthetic vowel [ə] is due to influence from the preceding labial velar plosive.

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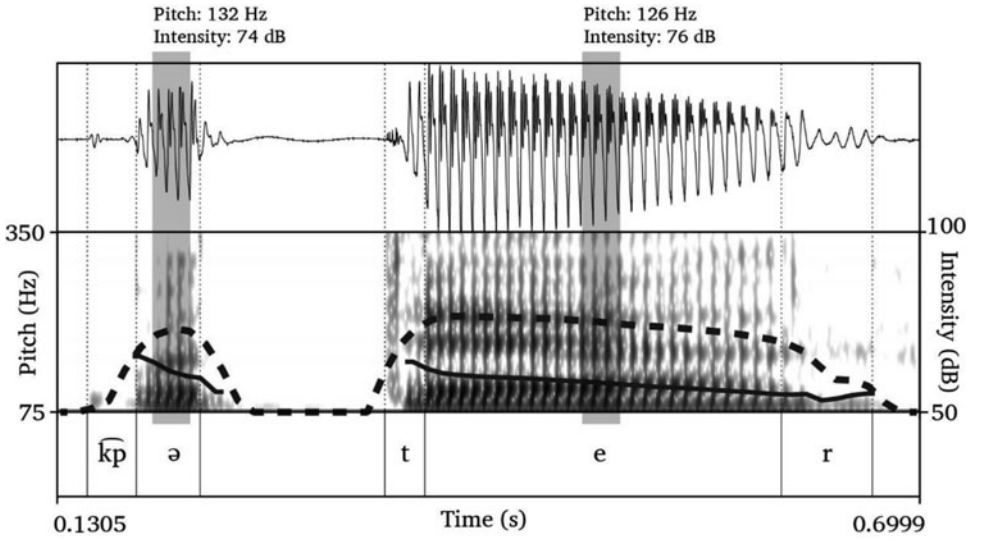

Figure 16 Stress pattern on /k͡pˈter/ [k͡pəˈter] 'flying fox', showing prominence of the second syllable (the first full vowel); stress assignment passes over the epenthetic vowel [ə].

Stress with verbs

Nen makes a basic morphological distinction between 'prefixing verbs' and 'ambifixing verbs'. In prefixing verbs, person agreement is only shown by prefixes – these are essentially a small set of intransitives like 'be' or 'walk', plus forty or so 'positionals' like 'be sitting', 'be immersed', etc. In ambifixing verbs, argument indexation uses both prefixes and suffixes (see Evans 2014, 2015 for details). Within ambifixing verbs, there is a further important distinction between basic roots (e.g. /wab/ 'to count') and derived roots (e.g. /owab/ 'to talk'), which add a 'diathetic prefix' (here *o*-); prefixes can change valence e.g. from transitive to reflexive/reciprocal, or they may simply modulate the meaning of the verb in other ways. The morphological distinctions between prefixing and ambifixing, and between root and stem, are relevant to stress assignment.

Standard prefixing verbs follow the 'basic' pattern of stress assignment, thus /ˈknm/ [ˈkə.nəm] 'come (now)!', /ˈknᵑgm/ [ˈkə.nəŋ.gəm] ~ [ˈkən.ᵑgəm] 'go (now)!', but /nˈnam/ [nəˈnam] 'come (later)!'.

However, ambifixing verbs, as well as the subclass of positional prefixing verbs, follow a different pattern. In these verbs, stress normally falls on the first vowel of the root, passing over argument and directional prefixes but also over diathetic prefixes.[8] Thus there are various derivatives of a root /pap/ 'begin': /opaps/ 'begin (intr.)', /wapaps/ 'begin (TR.)', /wawapaps/ 'begin for (DITR.), cause to begin, teach', but their various inflected forms will always place stress on the root: /noˈpapⁿdn/ 'I began', /jaˈpapⁿdn/ [ja.ˈpa.pən.dən] 'I began it', /jawaˈpapndn/ [ja.wa.ˈpa.pən.dən] 'I began it for them', /wawaˈpapser/ 'teacher'. Further examples illustrating the placement of stress on the first syllable of the root are: [næ.ˈtræ.ᵑ͡ᵐg͡bʷe] 'it shone' (stem /ætræᴺg͡bs/, root /træᴺg͡b/), /ˈtakata/ 'look at it!' (root /(w)aka(y)/), [no.ˈwab.tan] 'I speak' (stem /owabs/, root /wab/), /jˈtromᵑgr/ [jɪ.ˈtrom.ᵑgər] 'it stands (of building)' (root /trom/ ~ /troᴺg͡b/), /waˈteᵐbs/ [wa.ˈtem.bəs] 'to send' (stem /wateᵐb/, root /teᵐb/).

[8] One complication: Roots beginning with *w*- drop this after most prefixes, but the vocalic part of the root that remains still draws stress, e.g. [ˈja.ka.te] '(s)he sees him/her' from underlying /j-(w)aka(j)-te/.

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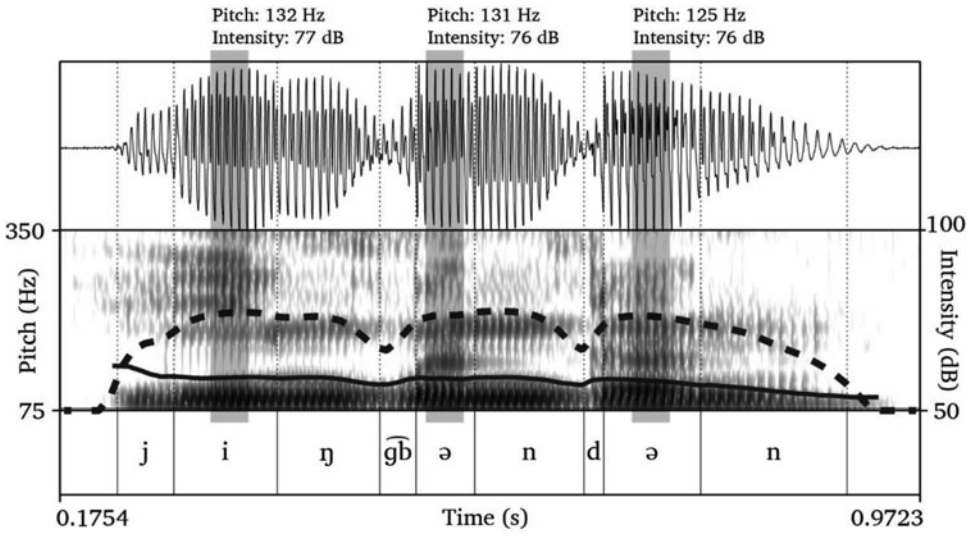

Figure 17 Example illustrating stress on the verbal root /-(w)i^{N}g͡b/ in the first syllable of [ˈjiŋ.g͡bən.dən] 'I saw it'.

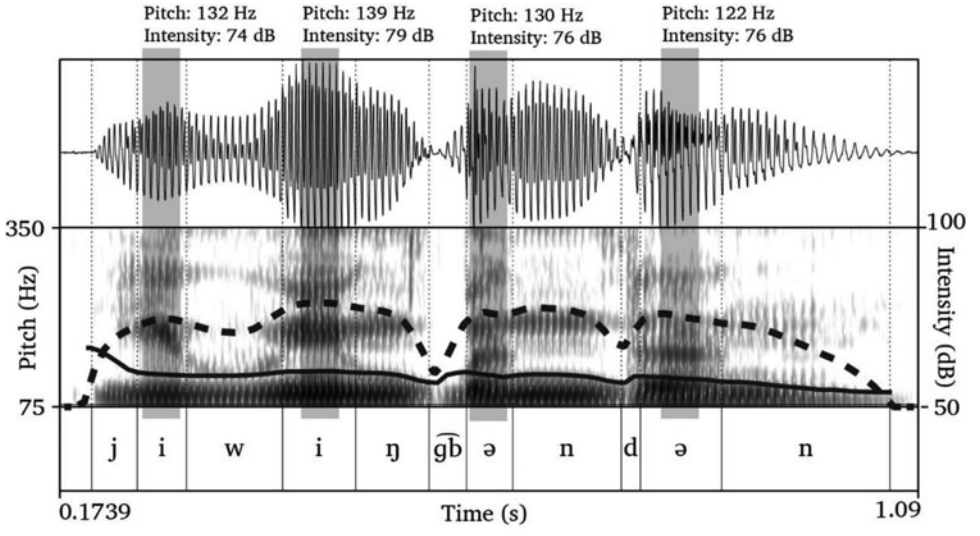

Figure 18 Example illustrating stress on the verbal root /-(w)i^{N}g͡b/ in the second syllable of [ji.ˈwiŋ.g͡bən.dən] 'I saw them'.

Figure 17 provides an example in which the vowel of the first syllable of the verb is from the verbal root, attracting stress, /ji^{N}g͡b^{n}dn/ [ˈjiŋ.g͡bən.dən] 'I saw it' (root /(w)i^{N}g͡b/).

The next example, in Figure 18, illustrates stress falling on the second syllable, which is the first syllable of the verbal root in this case (3NSGU prefix /yi-/ plus root /(w)i^{N}g͡b/), /jiwi^{N}g͡b^{n}dn/ [ji.ˈwiŋ.g͡bən.dən] 'I saw them'. As with the basic stress pattern, stress placement in verbs is sensitive to the difference between nuclei filled by full vowels and those filled by epenthetic vowels or the short vowel /ɪ/. If the only nuclei are drawn from this set, stress goes on the first syllable of the root, e.g. /ˈnps/ [ˈnə.pəs] 'to cut'. However, stems where the root-initial nucleus is light but a heavy nucleus precedes (e.g. a diathetic prefix) or

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follows have the stress on the full vowel: /ˈægms/ [ˈæ.gə.məs] ‘to fight each other’ (root /gms/, /æ-/ is the reflexive/reciprocal diathetic prefix), /gˈnes/ ‘to kiss on the mouth’, root /gne-/). Note that while stress-attraction by full nuclei over light ones is a property shared with the basic stress pattern, in the case of verbal stress attraction, stress can move either to the left or to the right, whereas in the basic pattern it only shifts it rightwards. Note also that nuclei after the root–suffix juncture are unable to attract stress, so that in e.g. /wˈɲpte/ [wə.ˈɲəp.te] ‘(s)he cuts me’ the /e/ in the suffix fails to attract stress.

There is one final wrinkle with verbal stress. If the root ends in a diphthong such as *ay* in /ˈwakajs/ ‘to see, look at’ or /ˈwæbæjs/ ‘to sew’ (the final /-s/ in both cases is the infinitive suffix), this syllable attracts stress just in case there is further suffixation on the infinitive, e.g. /wakajst/ [wa.ˈkaj.səṭ] ‘in order to look’, morphologically /wakaj-s-t/ (look-INF-DAT). But if there is no such suffixation the stress falls on the first syllable of the root, in the regular way: /ˈwakajs/.

Transcription of recorded passage

Although the story of the North Wind and the Sun is culturally unfamiliar, a careful translation was worked out with the speaker – Pastor Jimmy Nébni (JN), aged 46. The only deviation from the original version was the substitution of ‘cold wind’ (*kérbérba kiwil*) for ‘north wind’. After several passes improving the translation, the story was taken down by the first author from JN’s dictation, then written out longhand in Nen orthography, and the speaker practiced reading it back several times until he was able to do so confidently. The accompanying recording thus represents fluent reading from the Nen orthography given below.

Orthographic

Kérbérba kiwil a kesär
Kérbérba kiwil a kesär bä zi guwyt ebe muyaba pip bä ym.
Ämb är dnnzron ombte selemingama embaesmne.
Zi suri ymabem dene etanzt ebe muyaba pip bä ym,
mnegta yna äräm ebe embaesmne selemiba dnnzron
selemi geä dpträrnga de bä ypalés gämtenga, ebe muyaba bä ym.
Yna kérbérba kiwil muyabas dnapete yta muyaba pip dapete
wnde yna är ebe dnnzron selemingama kor mersraes
gembate. Yta yna kérbérba kiwil gs dapete muyabas
e dene muyapnär nämtewe. Wnde aqa kesär ombtebas
nätrenḡwe, ynamnewans yna ylsär äräm selemi dptrne.
Ynadbnan yna kérbérba kiwil de yäbäretawend ‘bm weiweizi
kowabta’ dene ‘kesär, bm muyaba pip nm.’

Broad phonetic

ˈkɪrˈbɪrba ˈkiwil a ˈkesær
ˈkɪrˈbɪrba ˈkiwil a ˈkesær bæ ʤi ˈgujɪt ˈebe ˈmujaba pip bæ jəm.
æmb ær ˈdənən:ʤəron ˈombte ˈselemiŋgama emˈbajsməne.
ʤi ˈsuri jɪˈmabem ˈdene eˈtanʤɪt ˈebe ˈmujaba pip bæ jəm,
məˈnegta jɪˈna ˈæræm ebe emˈbajsməne ˈselemiba dəˈnən:ʤəron
ˈselemi geæ dəpˈtrærŋga de bæ jɪˈpalɪs ˈgæmteŋga ˈebe ˈmujaba bæ jəm
jɪˈna ˈkɪrˈbɪrba ˈkiwil ˈmuyabas dəˈnapete jɪˈta ˈmujaba pip ˈdapete
wənˈde jɪˈna ær ˈebe ˈdənən:ʤəron ˈselemiŋgama kor ˈmersrajs
gemˈbate jɪˈta jɪˈna ˈkɪrˈbɪrba ˈkiwil gəs ˈdapete ˈmujabas
e ˈdene ˈmujapnær ˈnæmtewe wənˈde ˈak͡pa ˈkesær ˈombtebas
næˈtrɛŋg͡bwe,[9] jɪnˈaməne wanəs jɪˈna ˈjɪlsær ˈæræm ˈselemi dəpˈtərne.

[9] Note that the sequence /ŋg͡bw/ in the word [næ.ˈtrɛŋ.g͡bwe] ‘it shone’ is a cluster of the phonemes /ᴺg͡b/ (root: /ætreᴺg͡b / ‘shine’ and the third person singular preterite suffix /-we/. No epenthetic vowel is

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jɪˈna dəbəˈnan jɪˈna ˈkɪrˈbɪrba ˈkiwil de ˈyæbæretawend ‘bəm ˈweiˈwei ʤi kŏˈwabta’ ˈdene ‘ˈkesær, bəm ˈmujaba pip nəm.’

Acknowledgements

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inserted because the cluster straddles the boundary between verb stem and inflectional suffix (see (ii) of the epenthesis rule given above).

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