Chapter 2: Segmental phonology and phonotactics

2.1 Introduction
Enindhilyakwa has a fairly typical Australian consonant phoneme inventory, but a rather unusual vowel inventory. Quite characteristic from an Australian perspective are the six points of articulation for stops and nasals, a lateral in each coronal series, one apico-alveolar tap or trill, and three glides (labio-velar, palatal and retroflex). As is also common in Australia, there is no phonemic voicing or length contrast in the stops. Some less usual consonantal features include: three additional series that employ more than one articulatory gesture, including two labialised velars (/kʷ/, /ŋʷ/), a series of prenasalised stops (one in every stop/nasal series), and three dorsal+labial double stop articulations (/kp/, /ŋp/, /ŋm/). All of these will analysed as phonemic unitary complex segments in section 2.5, rather than clusters of consonants.

The Enindhilyakwa vowel inventory consists of four phonemic vowels, with no contrastive length distinction: /a/, /i/, /ɛ/ and /ə/>. This inventory departs from the typical Australian pattern of three vowel phonemes (/i/, /u/, /a/), and from most languages in Arnhem Land which have a five-vowel system (/i/, /ɛ/, /a/, /ʊ/, /u/) (Dixon 1980). The vowel [u] is a common sound in Enindhilyakwa, but it is not contrastive and its distribution is fully predictable. The mid-central vowel /ʊ/ is very rare as a contrastive vowel in Australia (and also the subject of some controversy in Enindhilyakwa, see below and section 2.6.1). Between the Gunwinyguan languages, it is only shared with Rembarrnga. Dalabon has a high central vowel /ɨ/ (see Map 1.1 for an outline of the Gunwinyguan language family). Although there is no phonemic length contrast in the vowels, /a/ and /ɛ/ are characteristically longer than /i/ and /ə/ in Enindhilyakwa. Since stress is quantity-sensitive, /a/ and /ɛ/ are stress attractors.

Enindhilyakwa phonotactics are also rather atypical for an Australian language. There is a strong preference for open syllables, and codas are avoided by: (i) all words ending in [a] (where word-final [a] is not a stress-attractor); (ii) the frequent breaking up of consonant clusters by vowel epenthesis; and (iii) the syllabification of some sequences of consonants as onsets: this happens with the complex segments mentioned above. The only permitted codas are apical sonorants (nasals, laterals and rhotics).

Table 2.1 sets out the consonant phoneme inventory, comprising altogether 32 consonants, some of which are complex. Table 2.2 presents the vowel inventory, consisting of non-round and non-back vowels only. The most suitable IPA symbols are given in bold, followed by their orthographic representations in parentheses. The phonemes in the shaded cells are comparatively rare (see Heath n.d.; Stokes 1981; Waddy 1986; Leeding 1989).
<table>
<thead>
<tr>
<th>Manner of Articulation</th>
<th>Place of articulation</th>
<th>Bi-labial</th>
<th>Apico-retroflex</th>
<th>Lamino-dental</th>
<th>Palatal</th>
<th>Dorso-velar</th>
<th>Dorso-velar rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop</td>
<td>p (b)</td>
<td>t (d)</td>
<td>t (rd)</td>
<td>d (dh)</td>
<td>c (j)</td>
<td>k (k)</td>
<td>kʷ (kw)</td>
</tr>
<tr>
<td>Nasal</td>
<td>m (m)</td>
<td>n (n)</td>
<td>n (n)</td>
<td>n (nh)</td>
<td>n (ny)</td>
<td>n (ng)</td>
<td>nʷ (ngw)</td>
</tr>
<tr>
<td>Lateral</td>
<td>l (l)</td>
<td>l (rl)</td>
<td>J (lh)</td>
<td>J (ly)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrant</td>
<td>r, r (rr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glides</td>
<td>θ (r)</td>
<td>j (y)</td>
<td>w (w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal + stop</td>
<td>mp (mb)</td>
<td>nt (nd)</td>
<td>nɪ (rnd)</td>
<td>nɪ (ndh)</td>
<td>nɛ (nj)</td>
<td>nɛ (ngk)</td>
<td>nɛk (ngkw)</td>
</tr>
<tr>
<td>Complex segments</td>
<td>k̆p (kb)</td>
<td>n̆p (ngb)</td>
<td>n̆m (ngm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.1: Consonant phoneme inventory (orthographic symbols in parentheses, phonemes in shaded cells are rare)

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i (i)</td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td>e (e)</td>
<td>a (v)</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>a (a)</td>
</tr>
</tbody>
</table>

Table 2.2: Vowel phoneme inventory (orthographic symbols given in parentheses)

Enindhilyakwa phonology is perhaps the most controversial aspect of the language, in particular the vowels. The issue is that, very generally, the quality of the high vowels and schwa appears to be conditioned by the surrounding consonants. But, to be argued in detail in this chapter, this is not the full story, because these vowels also appear in non-conditioning environments. The main differences between the various proposals in the previous work and this work, then, concern the number of vowel phonemes. Leeding (1989) argues for a two-vowel system, consisting of /a/ and /i/, whereas the Stokes/Waddy system assumes four phonemic vowels: /a/, /i/, /u/ and /e/ (Stokes 1981, 1982; Waddy 1988, n.d.-a-c; Groote Eylandt Linguistics 1993; Waddy Dictionary). Heath (n.d.) suggests there is only one ‘real’ vowel, /a/, and two parasitic or distributionally restricted vowels, /e/ and /ɛ/. He assumes that the remaining vowels are due to epenthesis. Based on my own fieldwork, I will both build on and extend the previous analyses, resulting in a yet again different analysis, where /i/ and /ɛ/ are contrastive, whereas [u] is not. The rounding of [u] will be argued to be underlying feature of contiguous consonants. I furthermore make new proposals concerning Enindhilyakwa phonotactics, stress assignment, and the consonant inventory.
2.1.1 Outline of chapter

This chapter is organised as follows. Section 2.1.2 first outlines the orthography adopted for this thesis. The next two sections address the phonotactics and prosody of the language, as these are crucial to understanding its segmental phonology: section 2.2 starts with the phonotactics of words, and the skewed distribution of word-initial and -final segments. Section 2.3 investigates the syllable structure and phonotactics: the phonotactic structure of the syllable is addressed in section 2.3.1, followed by an examination of syllable clusters across morpheme boundaries in section 2.3.2. Section 2.4 provides a brief discussion of stress. The consonant inventory is dealt with in section 2.5, starting with the simple consonants in sections 2.5.1 to 2.5.5. Section 2.5.6 investigates the homorganic nasal+stop clusters, and section 2.5.7 the heterorganic dorsal+labial clusters, which will both be argued to be phonemic single segments. Section 2.5.8 addresses loss of retroflexion, a process responsible for the presence of a subset of alveolar consonants. Section 2.6 takes up the vowel inventory. Section 2.6.1 starts with an overview of the differing previous analyses of the vowels, and section 2.6.2 proposes a yet again different inventory, introducing the phoneme /əә/ in section 2.6.6. Section 2.7 describes the various reduplication templates. Section 2.8 concludes this chapter with a summary.

2.1.2 Orthography

In this thesis I adopt the orthography, with some modifications, designed by Judith Stokes and Julie Waddy during their long residences on Groote Eylandt (Stokes 1981, 1982; Waddy 1988, n.d.-a-c; Groote Eylandt Linguistics 1993; Waddy Dictionary). Most orthographic symbols employed in this thesis are set out in Tables 2.1 (consonant phonemes) and 2.2 (vowel phonemes) above. The two additional orthographic symbols that are used in this thesis are: ee for [e], and u for [u], as will be justified below.

There are several reasons to favour the Stokes/Waddy orthography to the one developed by Velma Leeding, or the preliminary orthography in Jeffrey Heath’s sketch grammar. First of all, it is the system in use in Angurugu, where I did most of my fieldwork, and in perhaps all of Groote Eylandt.¹ Most of my textual data come in this orthography. Secondly, the Stokes/Waddy system employs four vowels, a, e, i and u, which is phonetically more realistic than Leeding’s two-vowel system consisting of a and i only. In Leeding’s system the symbol i represents [i], [ɪ], [u], [ʊ] and [ə]. The symbol a represents [a], [æ], [ɛ] and [e]. However, as I will show in detail in this chapter, [i], [ʊ], [a] and [ɛ] are contrastive sounds, which thus merit a distinct symbol in the orthography. Heath’s system has a similar drawback, because he takes the high vowels and schwa to be epenthetic, which are therefore not represented in his orthography.

¹ Velma Leeding’s orthography was only ever in use in Umbakumba, on the eastern side of the island. She mainly
The proposed modifications to the Stokes/Waddy orthography include:

(i) Addition of the orthographic symbol v to accommodate the phoneme /ə/

(ii) Representing the sound [e] as ee (rather than Stokes/Waddy e). Even though [e] is not contrastive, I do distinguish it in the orthography from [e] (symbol: e). The former only occurs in primary stress position (e.g. eeka ['e:ka] ‘tree’ vs. ekalhara ['e:ka ',a:k] ‘burnt off bush’). See section 2.6.3

(iii) Representing Stokes/Waddy’s sequences kwu and ngwu as ku and ngu, respectively. In my analysis, [u] may be generated from the vowels /i/ and /ə/ that absorb the labialisation of a preceding labialised velar consonant. Thus, /k⁷i/ and /k⁷ə/ are both phonetically realised as [ku], written as ku, and /ŋ⁷i/ and /ŋ⁷ə/ as [ŋu], written ngu. The labialisation of the velar disappears because it is transferred to the vowel. See section 2.6.7

(iv) Distinguishing lamino-dental from alveolar consonants. Although Stokes/Waddy note the existence of lamino-dentals, these are not distinguished in their orthography because “the spelling system was already difficult enough” (Julie Waddy, p.c.) (Leeding 1989 and Heath n.d. do make this distinction in their orthographies). Following Australianist tradition, h is used to indicate lamino-dental articulation (i.e., dh, lh, nh). This allows Stokes/Waddy’s r/d or r.d (the forward slash or full stop is used to distinguish it from the retroflex stop rd) to be represented as rdh

My orthography thus uses six vowel symbols: a, i, e, v, u, ee, which are a mixture of phonemes and allophones. This is done to make the orthography as phonetically realistic as possible. Using allophones in the orthography is not problematic, because there is no variation: the symbol u always represents [u], ee always represents [e], and so on. In those instances where there is variation, the underlying phoneme is used in the orthography. For example, /ə/ contiguous to a bilabial consonant varies between [ə] and [u], and the orthography represents the underlying phoneme (e.g. aryma [aːemplates – aːemplates] ‘big’).

The orthography adopted in this thesis follows the common Australianist convention of indicating palatal articulation with y (thus: ly, ny), but it uses j (rather than dy) for the stop. Finally, double digraphs are simplified in the orthography: rnd represents [ŋt], ndh represents [pŋ], and nj represents [ŋe]. This is visually more elegant than using rrnd, nhdh, nyj.2

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2 The Stokes/Waddy system employs (b, d, k) for the stops, which is followed here. Since there is no phonemic contrast in voicing of the stops, this in effect frees two sets of English graphemes (b, d, g) and (p, t, k) for use in the orthography. The problem of this three-way contrast has a long history in Australian languages, and a great deal of argument has gone on concerning whether (p, t, k) or (b, d, g) are most appropriate (Dixon 1980: 138). For Enindhilyakwa, Heath (n.d.) uses (b, d, g), whereas Stokes (1981) and Leeding (1989) use (p, t, k). The mixed set of voiced and voiceless symbols (b, d, k) avoids the orthographic confusion that g creates when dealing with the distinct phonemic sequences /nk/, /ŋ/ and /ŋk/. This is also the approach taken by Chadwick in his (1975) Jingulu grammar, and by Carroll (1976) and Evans (2003a) for Kunwinjku.
Except where specifically indicated, all examples in this thesis are in the Stokes/Waddy orthography with the modifications outlined above. This means that, based on my analysis of the Enindhilyakwa phonology, I have also altered their transcriptions of words that I have never heard myself (for example, \(\mathcal{u}\) never appears adjacent to \(\mathcal{m}\) and \(\mathcal{b}\) in my transcription, except when also adjacent to a velar. E.g. Stokes/Waddy \textit{mabulala} is rendered \textit{mabvlhalha} ‘\text{VEG}.shallow sea’ here).

### 2.2 Phonotactics of the word

One of the most prominent phonological features of Enindhilyakwa is that all words end in \([\mathcal{a}]\)\(^3\) (Heath n.d.; Stokes 1981; Leeding 1989). There are only a few exceptions, which are interjections such as \(\text{yindhiyi }[\text{ji}p\text{ti}:] \) ‘oh, I’m sorry!’, \(\text{kardiyi }[\text{ka}\text{ṭi:}]\) ‘watch out!’ (Leeding 1989: 27, 80). Also, \(\text{yawa ‘yes’ is often pronounced as }[\text{ja}^\text{a}]\). The phonotactics of Enindhilyakwa words is furthermore skewed in that the range of word-initial segments is biased towards the initial segments of the noun class and pronominal prefixes. This is because all predicates and arguments obligatorily inflect for noun class (for non-humans) or person, number, gender (for humans), and all modifiers obligatorily show noun class and pronominal agreement with their heads. Enindhilyakwa words may thus begin with a vowel (which is not that common in Australia): this can be \([\mathcal{a}]\) or \([\mathcal{ɛ}]\), which represent the \text{NEUT} noun class prefix on nominals (section 3.4) or the negated non-past (\text{NEGNP}) prefix on verbs (section 4.2). To my knowledge, there are only two words that underlyingly start with a different vowel: these are the particle \(\text{vmba }[\text{ˈɚmpa}] \) ‘but’ and the noun \(\text{eeka }[e^\text{ka} \sim e:k\text{a}]\) ‘\text{NEUT}.tree, wood, log’. Otherwise, words start with a consonant. Any consonant, apart from retroflexes (save \([\mathcal{ɻ}]\)) and the complex segments in Table 2.1 above, can occur in word-initial position, although this distribution is skewed towards the initial segments of the noun class and pronominal prefixes. Apart from \([\mathcal{a}]\) and \([\mathcal{ɛ}]\) representing \text{NEUT} noun class or \text{NEGNP}, inherited nouns begin with \([\mathcal{m}]\) (\text{VEG} class), \([\mathcal{w}]\) (\text{COLL} class \text{wurr}-), \([\mathcal{j}]\) (\text{MASC}) or \([\mathcal{ŋ}]\) (\text{FEM}). Loanwords do not conform to this pattern, because these do not receive an overt noun class marker. Examples are: \textit{libaliba ‘dugout canoe’ (< Mac \text{lepalepa ‘dugout canoe’})}; \textit{lyelyinga ‘knife’ (< Mac \text{ladiŋ ‘knife’})}; \textit{kaliwanga ‘sword’ (< Mac \text{kalewaŋ ‘sabre’})}; \textit{jebiya ‘church’ (< Eng \text{service})}; \textit{bikibiki ‘pig’ (< Eng \text{pig})}; and so on. Adverbs and particles do not inflect for class, so these may also begin with a divergent consonant (e.g. \textit{karrawara ‘high up’}, \textit{biya ‘and’}, \textit{lhaka ‘are you ready?’}).

Verbs and adjectives may begin with the abovementioned segments of the noun class markers, or a number of other consonants that constitute the first segments of the pronominal prefixes: \([\mathcal{n}]\), \([\mathcal{k}]\), \([\mathcal{n}]\) and \([\mathcal{p}]\) (see Chapter 4 and Appendices J, K for the pronominal prefix paradigms on verbs). Some imperative forms (sections 4.2.1 and 4.2.2.3) take a phonologically null pronominal prefix, resulting in differing word-initial consonants: e.g. \(\mathcal{Ø}-\text{lyengme-na }[2.\text{IMP}-\text{lead-NP2}] \) ‘lead!’ starts

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\(^3\) This is the case in slow speech and in all written material. In fast speech, the final \([\mathcal{a}]\) may assimilate to a following consonant or vowel, or it may be swallowed up into the next word.

The pronominal prefixes on verbs generally receive secondary stress. Whether or not the noun class prefixes on nouns receive stress depends on the vowel and on their position within the word. In disyllabic words the noun class prefix occurs in penultimate position and thus receives primary stress, as in (1a,b). In longer words it depends on the vowel that follows the noun class marker:

(1)

a. arra [ˈara] ‘NEUT. forehead’

b. merra [ˈmerge] ‘VEG. blood, rope’

c. miyalkwa [ˈmi.jalkʷa] ‘VEG. starfish’

d. mamvka [ˈmamako] ‘VEG. bandicoot’s nest’

e. dhymakbvlha [ˌd̪amˈa.kəl̪a] ‘FEM. pelican’

f. dherriba [ˈd̪eɾipə] ‘FEM. trepang’

When the VEG class prefix m- or the FEM class prefix dh- are followed by a short vowel this does not receive primary stress (1c,e). If the class prefixes are followed by a long vowel this does attract primary stress, as in (1d,f).

2.3 Phonotactics of the syllable

Enindhilyakwa has a strong preference for open syllables. The only syllable-final consonants are non-occlusive apicals; syllables never end in a stop.4 Syllable codas are avoided by a number of phonological processes, to be described in detail further down this chapter: (i) insertion of epenthetic vowels (phonological rule P-1 in [3] below); (ii) bonding of consonants across syllable boundaries to form complex unit phonemes (sections 2.5.6 and 2.5.7); (iii) heterorganic clusters becoming long stops (section 2.5, Appendix C); and (iv) all words ending in [a].

The current section first examines the phonotactic structure of the syllable, and then turns to the restrictions on consonant clusters across syllable boundaries.

2.3.1 Phonotactic structure of the syllable

The basic syllable structure is:

(2)  \( C V (L_{[+\text{apical}]) / (N_{[+\text{apical}]})) \)

where C is any consonant (which may be complex), V is any vowel, L is a liquid (i.e., a lateral or a rhotic) and N a simple nasal. Polysyllabic words can be seen as a concatenation of syllables of this structure, with a few exceptions: (i) retroflexed consonants and complex segments cannot occur word-initially; (ii) words can also start with a vowel; (iii) intervocalic syllable onset is the only

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4 Enindhilyakwa differs in this from for instance Bininj Gun-Wok, which exhibits a relatively high proportion of closed syllables. In a randomly chosen sample, 23% of all syllables ended in a stop (Evans 2003a: 89). However, in general stops do not tend to occur as codas in Australian languages (Dixon 1980).
position in which all consonants occur; (iv) when following another consonant, only the peripheral consonants, including the complex segments, and the laminal simple stops can occur in syllable onset. Unless otherwise indicated, data in this chapter come from the Waddy Dictionary. And unless otherwise indicated, the original orthography has been adjusted to conform to the analysis presented in this thesis.

SINGLE NUCLEUS SYLLABLES: \( V \)  These only occur word-initially.

| a | a.rra | ‘NEUT. forehead’ |
| e | e.rra | ‘NEUT. vomit’ |
| e: | ee.ka | ‘NEUT. tree’ |
| ø | ø.mba | ‘but’ |
| u | u.wa.yi.ji.na | ‘open it!’ |
| i | i.nha.nha | ‘MASC. nail’ |

The vowels [a] and [ɛ] are very common word-initially and always represent the NEUT noun class prefix or the negated non-past prefix for verbs (except for particles that do not inflect for class, such as arrawa ‘inside’, akwa ‘and’). The vowels [e:], [ø], [u] and [i] are very rare in word-initial position. To my knowledge, word-initial [e:] and [ø] only appear in the two words given above, whereas initial [u] and [i] only occur due to dropping of word-initial /w/ and /j/, respectively, which is rare (see section 2.5.5).

OPEN SYLLABLES: \( CV \)  This is by far the most common syllable. It may begin with any consonant when intervocalic, and contain any vowel. When preceded by a consonant, the set of consonants in syllable onset is limited (see next section). Examples combining a representative of each manner of articulation with each vowel (where available) are:

SIMPLE STOPS: =ba.ba ‘because’; bi.ya ‘and’; -be.ka- ‘to drink’; -bv.rra ‘wide’; bu.ngka.wa ‘boss’

NASALS: ma.ma ‘nevermind’; mi.ya.ka ‘VEG. friend’; me.me.ma ‘VEG. this’; ma.mv.ngba ‘VEG. hair’; a.ma.mu.wa ‘NEUT. egg’

LATERALS: lha.ka ‘are you ready?’; -ye.lhi.ya- ‘to be ashamed’; -ja.lhe.na ‘hang out-\( NP^2 \)’; a.lhv.ka ‘NEUT. foot’; nga.lhu.wa ‘3f.PRO’

TAP/TRILL: rra.kaji.ya ‘sit down!’; ye.re.rra ‘MASC. forked stick’; yi.lyi.rri.ya ‘MASC. crushed coral’; a.rrv.rra ‘NEUT. wind’; a.bv.rru.wa ‘3a.PRO’

NASAL+STOPS: mi.ya.mbe.na ‘what?’; -a.mbi.lyv.ma ‘two’; ke.mbv.rra ‘then’; -a.mbv.mba ‘deaf’;

-Nya.ngba- ‘go across’; -ki.lya.ngbe.rrr.kee.yi- ‘to branch off’; a.nghi.lyu.wa ‘NEUT. sickness’;

-lyi.ngu.wu.rrv.ma.lya.ka- ‘make smooth’

SEMI-VOWELS: -wa.ja- ‘to brush away’; we.rr- ‘chest’; =wi.ya ‘pergressive clitic’; wu.bv.rra ‘like’

LIQUID-FINAL SYLLABLES: \( CVL \)  These may end in an apical liquid, but only when followed by another consonant.
\( r \) \( a.yarr.ka \) ‘NEUT.hand’

\( t \) \( ar.ja \) ‘NEUT.Green Tree frog’

\( l \) \( al.kwa \) ‘NEUT.crab species’

\( l \) \( yu.war.l.rra \) ‘MASC.kneecap’

NASAL-FINAL SYLLABLES: \( CVN \) These may end in an apical nasal.

\( n \) \( men.ba \) ‘VEG.eye’

\( n \) \( marn.ja \) ‘VEG.bees’ eggs’

SYLLABLES STARTING WITH COMPLEX PHONEMES: \( CV(L/N) \) These complex units are the homorganic nasal-stop, and the heterorganic dorsal+labial complex segments.

\( nt \) \( e.mi.nda \) ‘NEUT.nose’

\( n \) \( dvh.rndvrr.ka \) ‘my mother’

\( n \) \( yi.me.ndha \) ‘MASC.turtle’

\( nc \) \( -ma.nja \) ‘locative case suffix’

\( mp \) \( v.mba \) ‘but’

\( nk \) \( a.rv.ngka \) ‘NEUT.head’

\( nk \) \( e.nu.ngkwa \) ‘NEUT.spear’

\( kp \) \( a.kba \) ‘NEUT.buttocks’

\( np \) \( ma.mv.ngba \) ‘VEG.hair’

\( nm \) \( ma.ngma \) ‘VEG.brain’

In sections 2.5.6 and 2.5.7 I will argue for the phonemic status of these complex segments. Thus, as in most Australian languages (Dixon 1980; Evans 2003a: 90), onsets in Enindhilyakwa are simple. Stokes (1981) and Leeding (1989) do not consider the above sequences as complex unit phonemes (though Leeding does so for the homorganic nasal+stop series). They break them up by inserting a syllable boundary between the dorsal and the labial consonant: e.g. \( \text{mang.m}a \) ‘brain’ (Stokes p.158); \( \text{errk}.\text{bulha} \) ‘Tussock Grass’ (Leeding p.62), though Leeding admits that her “syllable boundaries have been established quite arbitrarily” (p.62).

Yet speakers do not tend to break up these complex segments. My informant inserted a vowel between /\( \bar{r} \)/ and /\( kp \)/ in the above example, and syllabified /\( kp \)/ in the onset: [\( æ.rı.kpo.ja \)] (anin2_pw-au_002). Schwa-epenthes is a common process in Enindhilyakwa and can be formalised as phonological rule P-1 (more phonological rules follow in the discussion of the vowels in section 2.6):

(3) \( P-1: \) schwa-epenthesis: \( \emptyset > a / C \_ C \) (where CC is a cluster)

A consequence of schwa-epenthesis and of syllabifying /\( kp \)/ in the onset is that stops do not occur in syllable coda, a common property of Australian languages (Dixon 1980: 159-66).
2.3.2 Consonant clusters across syllable boundaries

Consonant clusters only occur across syllable boundaries. The permitted clusters are presented in Table 2.3. A consonant cluster and its environment can be schematically represented as (...)VC1.C2V(...); the consonants in C1 position are indicated by the dashed line and those in C2 by the solid line.

![Table 2.3: Permitted consonant clusters]

C1 in syllable coda and C2 in syllable onset are mutually exclusive. The consonants that can occur in C1 position are apical laterals and nasals, but not stops (the retroflex lateral is lacking in the data because of its scarceness, not because of the theoretical impossibility to occur as the first member of a cluster). Those that can occur in C2 position are non-apical, mostly peripheral, and pre-eminently stops. The only two permitted laminals in C2 are the two laminal stops. They can never be an apical, nor a lateral or a rhotic. Similar patterns occur in the phonotactics of other Australian languages (Dixon 1980: 161). The permitted clusters are decreasing in sonority when moving from left to right, which is also the case in many other Australian languages (Evans 2003a: 97), as well as universally.

Not all combinations in Table 2.3 are attested. For instance, nasals do not follow nasals, ruling out *nm, *nng, *rnm, and so on. A vowel always intervenes between two nasals in lexical roots, such as enungkwa ‘spear’; amangbala ‘five’. When two nasals meet over a productive morpheme boundary an epenthetic vowel is inserted: -win-v-mindha- ‘to win’; warn-v-mamalya [3a.m-people] ‘Aboriginal people’. Nasals also cannot be followed by /kp/. A vowel always intervenes between the two, as in adhvnakba ‘first’. A nasal followed by a laminal stop assimilates to the stop and is thus indistinguishable from a nasal-stop complex phoneme, which occurs in C2 position. Apical laterals cannot be followed by a laminal stop, or by a complex segment save /kp/, ruling out *ldh, *lj, *lk, *ngk, *lmk, and so on. The two rhotics are the most common consonants in C1 position. The alveolar trill or tap is the most common consonant in C1 position and it can be
followed by all C₂ consonants in Table 2.3. The retroflex rhotic is less common. The following examples illustrate the permitted clusters across syllable boundaries.

<table>
<thead>
<tr>
<th>Cluster Type</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NASAL + LAMINAL STOP</strong></td>
<td>a.mvrn.dha</td>
<td>‘NEUT.shoulder’</td>
</tr>
<tr>
<td>(not common)</td>
<td>marn.ja</td>
<td>‘VEG.bees’ eggs’</td>
</tr>
<tr>
<td>NASAL + PERIPHERAL STOP</td>
<td>men.ba</td>
<td>‘VEG.eye’</td>
</tr>
<tr>
<td>(not common)</td>
<td>karn.ba.la.ja</td>
<td>‘armband(NEUT)’ (Mac)</td>
</tr>
<tr>
<td></td>
<td>an.ka</td>
<td>‘NEUT. hip’</td>
</tr>
<tr>
<td></td>
<td>a.warn.ca.nye.rra</td>
<td>‘naughty’</td>
</tr>
<tr>
<td>LATERAL + PERIPHERAL STOP</td>
<td>-al.ba.rra</td>
<td>‘split’</td>
</tr>
<tr>
<td>(common)</td>
<td>-wal.ca-</td>
<td>‘to sneak up on’</td>
</tr>
<tr>
<td></td>
<td>al.kwa</td>
<td>‘NEUT.crab sp.’</td>
</tr>
<tr>
<td>LATERAL + PERIPHERAL NASAL</td>
<td>yi.mbal.ma</td>
<td>‘MASC.shell fish sp.’</td>
</tr>
<tr>
<td>(not common)</td>
<td>mu.wal.nga.ra</td>
<td>‘VEG.fish sp.’</td>
</tr>
<tr>
<td>LATERAL + DORSAL-LABIAL</td>
<td>a.yil.kbi.yil.kba</td>
<td>‘NEUT.desert’</td>
</tr>
<tr>
<td>(not common, unstable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHOTIC + LAMINAL STOP</td>
<td>-a.kbar.dha-</td>
<td>‘to be afraid’</td>
</tr>
<tr>
<td>(not common, unstable)</td>
<td>-a.karr.dha-</td>
<td>‘to bark’</td>
</tr>
<tr>
<td></td>
<td>-bar.ja-</td>
<td>‘to hit’</td>
</tr>
<tr>
<td></td>
<td>-lyi.karr.ja.wa-</td>
<td>‘to fall’</td>
</tr>
<tr>
<td>RHOTIC + PERIPHERAL STOP</td>
<td>yi.kar</td>
<td>‘MASC.woomera’</td>
</tr>
<tr>
<td>(very common, except for /ɻ/ + velar stop)</td>
<td>dhvrr.ba.ra</td>
<td>‘straight’</td>
</tr>
<tr>
<td></td>
<td>war.ca</td>
<td>‘work(NEUT)’ (Eng)</td>
</tr>
<tr>
<td></td>
<td>arr.ca.lha</td>
<td>‘on the other hand’</td>
</tr>
<tr>
<td></td>
<td>arr.ca.ra</td>
<td>‘NEUT.muscular pains’</td>
</tr>
<tr>
<td>RHOTIC + PERIPHERAL NASAL</td>
<td>a.wur.mvrr.ra</td>
<td>‘pretending’</td>
</tr>
<tr>
<td>(common, except for /ɻ/ + velar nasal)</td>
<td>me.mvrr.ma</td>
<td>‘VEG.back of neck’</td>
</tr>
<tr>
<td></td>
<td>-arr.nga-</td>
<td>‘to cut, break’</td>
</tr>
<tr>
<td></td>
<td>a.mv.lhvrr.ngwa</td>
<td>‘NEU. heel’</td>
</tr>
<tr>
<td>RHOTIC + PERIPHERAL NASAL+STOP</td>
<td>mar.mba</td>
<td>‘VEG.molar teeth’</td>
</tr>
<tr>
<td>(common, may be unstable)</td>
<td>-lharr.mba.ja-</td>
<td>‘to knock’</td>
</tr>
<tr>
<td></td>
<td>ar.ngka.wu.ra</td>
<td>‘forever’</td>
</tr>
<tr>
<td></td>
<td>lharr.ngkw-</td>
<td>‘things’</td>
</tr>
<tr>
<td>RHOTIC + DORSAL-LABIAL</td>
<td>a.mvrr.kba.lya</td>
<td>‘soft’</td>
</tr>
<tr>
<td>(/ɻ/+/kp/ is very common, all other combinations are rare and unstable)</td>
<td>a.mar.ngba</td>
<td>‘bold’</td>
</tr>
<tr>
<td></td>
<td>-we.rri.ku.marr.ngbi.ji-nyirr.ngmv-</td>
<td>‘to be friends with’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘to blow nose’</td>
</tr>
</tbody>
</table>

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5 Hamilton (1996: 161) hypothesises that there may be two languages in Australia that do not allow nasals in C₁ position, which are Enindhilyakwa and Tharrkari (Pama-Nyungan, North-West Australia). However, although not common, these data show that Enindhilyakwa does allow nasals in this position.

6 Hamilton (1996: 180) suggests that Enindhilyakwa does not permit a lateral in C₁ preceding a nasal. However, although not common, these data show that this sequence is permitted in the language.
Some clusters appear to be unstable. These are rhotics followed by a laminal stop or a complex
segment other than /kp/. They vary with simplified clusters, or with deletion of the coda.⁷

(4)  
- a.kbar.dha-  ~ - a.kba.dha-  ‘to be afraid’
- a.karr.dha-  ~ - a.ka.dha-  ‘to bark’
- lyi.karr.ka-  ~ - lyi.ka.ka-  ‘to fall’
- ar.mbar.mbrr.ya-  ~ - ar.mbr.mbrrr.nga-  ‘NEUT.blot, measles’
- lhrrr.mbrv.rru-  ~ - lhvr.mbrrr.wa-  ‘to crawl’
- ar.ngka.wu-  ~ - ar.ngka.wu.ra-  ~ - an.ka.wu.ra-  ‘forever, all the time’
- nyirr.ngmv-  ~ - nyirr.mv-  ‘to blow nose’
- we.rrri.kv.marr.ngbi.ji-  ~ - we.rrri.kv.ma.mbi.ji-  ‘to be friends with’

Schwa-epenthesis (rule P-1) is another strategy by which codas can be avoided:

(5)  
yirrma-  [jir.ma  ~  ji.r.ма]  ‘to swim’
amarrngka  [a.mа.ŋka  ~  a.ma.ŋга]  ‘NEUT.laugh’  (JS1 p.157)

Eschewing codas is a strong tendency in the language, as is also evidenced by the fact that all
words end in [a]. Even the codas that are permitted - apical liquids and nasals - may be turned into
an onset by schwa-epenthesis (see sections 2.5.6 and 2.5.7 for further discussion).

I propose in sections 2.5.6 and 2.5.7 that complex segments may have formed by bonding of
consonants across frozen morpheme boundaries. Consequently, syllable boundaries do not have to
align with (old) morpheme boundaries:

(6)  
- ngurrk+bilha-  ‘mouth+wide’  >  [ɲur. kpa.ŋa]  ‘to yawn’
- lyeng+ma-  ‘head+take’  >  [ɭae. ꟷma]  ‘to lead’
- lyang+bruartwa-  ‘head+disappear’  >  [ɭa. ꟷpa.ru.k’a]  ‘to be filled’

See Chapter 5 for a discussion of complex verbs stems and the difference with productively
incorporated body parts.

In sum, consonant clusters only occur across syllable boundaries. Whereas all consonant
phonemes occur intervocally in syllable onsets, those that occur in consonant clusters are
highly restricted. Only non-occlusive apicals appear as the first member of a cluster, and only the
peripheral consonants, and the two laminal stops, can occur as the second member. Even some
permissible clusters tend to be unstable to the effect that they vary with lighter clusters.

⁷ There are examples in the dictionary of reduction of the clusters /mp/ and /ŋk/ to /np/ and /ŋk/, respectively.
Examples are -harrmbaj-  ~ -hambaj-  ‘to knock’; -harrngkwiljaka-  ~ -hankwilyaka-  ‘to carry things’,
arrngka-  ~  anka  ‘NEUT.hip’. I find the reduced clusters unlikely sequences, first of all because they have different
places of articulation, whereas a nasal usually assimilates to the following consonant; and secondly, alveolar /n/ is very
rare as a phoneme in lexical roots. We would therefore expect the reduced versions to be -hambaj-, -hangkwiljaka- and
angka, respectively. In the case of /ŋ/, perhaps the nasal assimilates regessively to the alveolar (i.e. [ŋ]) and the trill is subsequently deleted. A more thorough investigation of Enindhilyakwa phonology is required
to determine what is going on here.
Furthermore, some consonant clusters have become unit phonemes and syllabify as onsets, rather than ambi-syllabically. The overall pattern of the language is a strong preference for open syllables.

2.4 Stress

Stress is the most complex part of the phonology. It is also critical to understanding important phonological processes, such as vowel epenthesis, and vowel reduction to schwa (section 2.6). The rules for assigning stress are complex, and there is a lot of variation, resulting from several competing factors that determine stress. There is a general penultimate stress target, but, as in other Arnhem Land languages (Baker 2008a), stress is also quantity-sensitive - which has thus far not been described for Enindhilyakwa. The vowels /a/ and /ɛ/ tend to be longer than the other vowels (as was also noted by Heath n.d.), so they attract the stress and possibly disturb the general pattern of penultimate stress assignment. Closed syllables are also heavy and likewise attract stress. The phonetic realisation of stress is a combination of pitch and amplitude (see also Leeding 1989: 139).

The following account is preliminary only and restricted to stress in isolated word forms. In connected discourse the stress patterns may be different due to higher-level targets. A more detailed investigation is necessary to more accurately describe the prosody of the language.

The following patterns can be discerned, where bolding and apostrophy indicate primary stress (examples marked with $\text{\&}$ in this chapter are accompanied by a sound recording; see the CD included with this thesis, and Appendix B):

- The penultimate syllable of words is the primary stress target (Stokes 1981; Leeding 1989):

  7. yibilyibilya $[\text{jji'pi'pi'ka}]$ ‘MASC.lightning’ (anin2_pw_au_002) $\text{\&}$
  makardu-wa $[\text{ma'kuwa}]$ ‘VEG.sea-ALL’
  awarruwalya $[\text{awaru'wa'a}]$ ‘NEUT.shade’
  amvdhilya $[\text{ama'bi'a}]$ ‘NEUT.cold in the chest’
  dhvnhvnhya $[\text{la'na'na}]$ ‘FEM.mosquito’

- Stress may be shifted away from penultimate to antepenultimate position if the former contains a vowel other than /a/ or /ɛ/, while the latter does contain /a/ or /ɛ/:

  8. erriberriba $[\text{eri'peripa}]$ ‘NEUT.bush’ (anin2_aw_au_001)
  anhvnga $[\text{a'na'na}]$ ‘NEUT.food’
  arrvra $[\text{a'ara}]$ ‘NEUT.wind’
  ekirra $[\text{eki'ra}]$ ‘NEUT.name’
  melhuwa $[\text{me'luwa}]$ ‘VEG.shellfish sp.’ (anin2_pw_au_002)
This pattern is explained by stress being quantity-sensitive: /a/ and /ɛ/ are significantly longer than the other vowels, and thus attract stress. The last two examples in (9) constitute minimal pairs with the two verbs in (10), where the penultimate vowel is [ɛ]:

(10) **nv-lharre-na** [nə,a'rena]  ‘3m/NEUT-take.out.of.fire-NP2’
**nv-lhekbe-na** [nə,e'kpəna]  ‘3m/NEUT-accuse-NP2’

In these two examples the stress can fall on the primary stress target, as this contains a long-ish vowel. These examples contrast with those in (9), where only the ante-penultimate syllable contains a long-ish vowel.

- Heavy syllables attract stress, where syllable weight is determined by the number of morae.
  Long vowels, diphthongs and closed syllables are bimoraic and are stress attractors. The examples in (8) and (9) illustrated how the long vowels /a/ and /ɛ/ diverge the stress away from penultimate position. Those in (11) show that closed syllables can also attract stress (the bimoraic vowel [ɛː ~ eɪ] only occurs in penultimate position and thus does not provide evidence for long vowels attracting stress).

(11) **yilherrkirra** [ˌji,lɛrkira]  ‘MASC.black mangrove’
**dhimirrmara** [ˌtɪˈmiɾməɻa]  ‘FEM.sandfly’

When the two principles of penultimate stress assignment and heavy syllables attracting stress compete, this may result in varying stress:

(12) **akina** [ˈakənə ~ aˈkina]  ‘that’
**miyamvra** [ˌmiˈjamaɻə ~ ˌmijaˈmaɻa]  ‘VEG.digging stick tree’
**dhimirrmara** [ˌtɪˈmiɾmaɻa ~ ˌtiˈmirmaɻa]  ‘FEM.sandfly’
**alhvka** [ˈaɻəka ~ aˈɻaka]  ‘NEUT.foot’

In **miyamvra**, for example, the ante-penultimate syllable contains the longish vowel /a/, which attracts the stress, competing with the principle of penultimate stress assignment. In **dhimirrmara**, the ante-penultimate is closed and therefore heavy, whereas the penultimate syllable contains /a/ which also contributes weight. In both examples, the speaker repeats the word with varying stress correlates. Positioning of stress is especially variable with certain inflectional suffixes on verbs: a tense/aspect suffix ending in /əә/ can occur in penultimate position when followed by e.g. the common suffix -ma (section 6.7). When the verb stem ends in /a/ or /ɛ/, stress varies between penultimate position and the antepenult due to the longish vowel:
An epenthetic vowel (rule P-1) never receives stress, no matter where it occurs in the word. Vowel epenthesis is especially common between affixes and stems, but it also occurs within lexical words.

Even when in penultimate position, as in these examples, an epenthetic vowel never receives stress.

In summary, as in other Arnhem Land languages, stress in Enindhilyakwa is quantity-sensitive. There is a general penultimate stress target, but this can be disturbed by heavy syllables.

### 2.5 Consonants

The consonant inventory was given in Table 2.1 above. Stops, nasals and the unitary homorganic nasal-stop clusters all have six points of articulation, plus a labialised velar series that involves more than one articulatory gesture: /kʷ/, /ŋʷ/ and /ŋkʷ/. Lateral liquids have four places of articulation. There is one vibrant liquid, which is an apico-alveolar segment whose normal manner of articulation is a tap [ɾ], but which can also be realised as a brief trill [r]. There are three glides or semi-vowels (labio-velar, palatal and retroflex).

There is no phonemic length contrast in the stops (unlike most languages in Arnhem Land, including virtually all the Gunwinyguan languages, but like Wubuy). However, Enindhilyakwa does seem to have some phonetic long stops, but this difference in length is not contrastive. These long stops appear to derive from stop clusters. A preliminary investigation of these stops is presented in Appendix C.

#### 2.5.1 Simple stops

The simple stops contrast at bilabial, velar, labio-velar, apico-alveolar, apico-retroflex, lamino-dental and lamino-palatal points of articulation (Heath n.d.; Stokes 1981; Leeding 1989). They do not contrast in length or voicing. Laminal stops, especially lamino-dental /ɬ/, tend to be phonetically voiceless and unaspirated before vowels, which is the only position in which they occur. Stops may be voiced for up to 40% of their duration following a vowel or nasal (Leeding 1989: 25). The oral portion of the prenasalised series may be voiceless or have a voiced onset. The following near-minimal pairs, most of them taken from Stokes (1981: 140), but using my orthography, illustrate the contrasts.
The labialised consonant /kʷ/ is treated as a unit phoneme because it is never broken up by an epenthetic vowel, whereas other heterorganic sequences can be (section 2.5.7). The labialisation can cause rounding of preceding vowels (e.g. *dhukwa [tukʷa] ‘maybe’ vs. *adhvka [aɭ̪a] ‘NEUT.anchovy’; *alhukwanja [aɭ̪uŋa] ‘NEUT.dance’ vs. *alhvka [aɭ̪a] ‘NEUT.foot’). The phoneme /kʷ/ has the same distribution as the other consonant phonemes, as it can occur word-initially:

(16)  
\[
\begin{align*}
\text{kwa} & \quad \text{[kʷa]} \quad \text{‘come!’} \\
\text{kweeyina} & \quad \text{[kʷeŋina]} \quad \text{‘send it!’}
\end{align*}
\]

Amongst the coronal stops, apico-alveolar /t/ is a marginal phoneme, with limited distribution. It mainly occurs in loanwords, such as *dhvrrabada ‘spear’ in (15) above (< Gupapyngu /cutapata/ ‘spear’ [Stokes 1981: 164]; Wubuy *dhurubada ~ *dhudabada ‘wire spear’ [Heath 1982]). It does not occur word-initially, with the exception of some borrowings that start with an alveolar stop in the donor language, such as *dirija ‘dress’, *damba ‘damper’, *dvraka ‘truck’ and *diya ‘tea’ from English. However, these all vary with the interdental /ɭ/ in word-initial position, by analogy with the FEM noun class marker /ɭ/.

In loanwords, a word-medial alveolar stop may vary with an apico-alveolar tap:

(17)  
\[
\begin{align*}
\text{[miticina ~ miricina]} & \quad \text{‘medicine’} \\
\text{[putpula ~ purpula]} & \quad \text{‘football’}
\end{align*}
\]

The variation in the second example may also be triggered by a block on stops in coda position, whereas rhotics are allowed. The scarceness of alveolar /t/ (as well as alveolar /l/, see below) has led Leeding (1989) to believe that the alveolar series was not part of the phonological system in Traditional Enindhilyakwa. Indeed, most entries in the dictionary that involve /t/ are loanwords. But not all of them are, which indicates that the alveolar stop should be taken as a proper
phoneme. Examples include (my orthography): wiyida ‘straight’; ardvardra¹² ‘hot’; eminda ‘NEUT.nose’; -mendi- ‘to make a fire’.

2.5.2 Simple nasals

As in almost all Australian languages (Dixon 1980), there is a nasal to every stop series. The following near-minimal pairs from Stokes (1981: 142) using my orthography illustrate the contrasts.

(18) mama [ˈˈmaːma] ‘no matter’
yinanga [jiˈnaːŋa] ‘MASC.grub species’
ngangwa [ˈŋaŋʷa] ‘daddy’
enena [ɛˈneːna] ‘this’
yingarna [jiˈnaːŋa] ‘MASC.snake’
yinhaha [jiˈnaŋa] ‘MASC.nail’
yarranya [jaˈraːŋa] ‘MASC.cicada’

The following is a near-minimal pair with contrasting retroflex and lamino-dental nasals:

(19) amvnrna [aməˈŋŋa] ‘NEUT.stingray’
amarnhvnha [aməˈpəna] ‘NEUT.ashes, coal’

Like the labialised stop /kʷ/, the labialised nasal /ŋʷ/ is treated as a single phoneme. It is never broken up by an epenthetic vowel, it can round a preceding high vowel (e.g. ajungwa [acuŋʷa] ‘NEUT.sickness’; dhungwarrika [tuŋʷarkʷa] ‘FEM.spine’), and it can occur word-initially in imperatives (see also Stokes 1981: 145):

(20) Ø-ngwadhev-na [2.IMP-cry-NP2] [ˈŋʷaɻəana] ‘cry!’
Ø-ngwanja [2.IMP-stop.NP1] [ˈŋʷaŋca] ‘stop!’

Whereas in the stop series the alveolar is rare, in the nasal series the lamino-dental is rare. This is a marginal phoneme in Wubuy and Ngandi too (Heath 1978b: 36), while it is completely absent in other Gunwinyguan languages. The majority of the lamino-dental nasals appear in homorganic nasal-stop clusters where they precede a lamino-dental stop. Examples include yimendha [jiˈmeŋ,tə] ‘MASC.turtle’; mandha [maŋ,tə] ‘VEG.heron’ (Wubuy: maanha(k) ‘heron’); and Enindhilyakwa [ŋiŋ,təˈakʷa] ‘NEUT.language name’. There are, however, a handful of words with an independent lamino-dental nasal, suggesting it is a proper phoneme. Besides yinhaha [jiˈpaŋa] ‘MASC.nail’ in (18), these include: anhnya [aŋŋa] ‘NEUT.food’; mnhnya [maŋŋa] ‘VEG.burrawang’; akunhnya [akuŋŋa] ‘rotten’; amnha [aməŋa] ‘NEUT.urine’;

¹² Leeding (1989: 366) writes this word with two retroflexes (original spelling: artirtarra). She claims that alveolar consonants were not part of the traditional inventory and are the result of loss of retroflexion.

The alveolar nasal is common in grammatical morphemes such as pronominal prefixes, and tense/aspect suffixes. It is also common in demonstrative roots but it is rare in other lexical roots. Leeding (1989) proposes that the alveolar nasal results from loss of retroflexion, as it sometimes varies with the retroflex (see section 2.5.8). She claims the alveolar nasal is absent in lexical roots (p.30-1), but this is an overgeneralisation, as evidenced by the following examples: **menba** [ˈmɛnpa] ‘VEG. eye’; **yina** [ˈjina] ‘MASC. knee’; **minimbaja** [miniˈmpaca] ‘VEG. white tussock grass’; **nara** [ˈnalə] ‘NEG’. It is nonetheless conceivable that these alveolars have developed from retroflexed nasals. In section 2.5.8 I show that front vowels are incompatible with retroflex consonants. The first three examples above maintain a front vowel, possibly at the expense of the retroflex. And regarding [nala], there is no word-initial contrast between apicals in Enindhilyakwa (as is common in Australian languages). The alveolar may thus have been a retroflex also, but in word-initial position the contrast is neutralised, again at the expense of the retroflex.

### 2.5.3 Laterals

The laterals contrast at interdental, apico-alveolar, lamino-palatal and retroflex points of articulation. The following near-minimal pairs from Stokes (1981: 142) illustrate the contrasts.

(21) **yimangala** [ˈjimaŋa] ‘MASC. wool’
    **marluwiya** [ˈmaɾluwiya] ‘emu’ (< marluwiya)
    **alha** [ˈa̞lə] ‘irritant, itchy’
    **alya** [ˈa̞lə] ‘wet’

The retroflex lateral is a marginal phoneme, which only occurs in a handful of loanwords, such as the Gupapuyngu loans marluwiya ‘emu’ (< marluwiya); barluwurra ‘grass species’ (< *rlawarr*); ajarrkarla ‘fish species’ (< wajarrkarli) (Stokes 1981: 143; Leeding 1989: 30). The only inherited Enindilyakwa word that I am aware of is **yuwarlkurra** ‘MASC. kneecap, Cyrene shell’\(^\text{13}\), but this word varies between [juwaɾkuɾa ~ juwalkuɾa]. Only older speakers seem to use the retroflex lateral.

By contrast, retroflex laterals are common in the Gunwinyguan languages. In Chapter 9 I propose that the Enindhilyakwa reflex of the proto-Gunwinyguan retroflex lateral is a lamino-palatal in onset position (e.g. pGN *kurlak > Enindhilyakwa*-ma+kulya ‘skin’), and an alveolar in coda position (e.g. Wubuy *murlku* ‘belly’ : Enindhilyakwa *mulkwa*). The change *rl > ly* in Enindhilyakwa can account for the fact that this is the only language in the region with a lamino-

\(^{13}\) Polysemy of body parts and flora/fauna terms in common in Enindhilyakwa: section 3.5.1.
palatal lateral: in the Gunwinyguan languages this shift has not taken place and the retroflex lateral is preserved.

The lamino-palatal is clearly a single segment. Firstly, it contrasts with the other laterals, as shown in (21). Secondly, it corresponds to a single segment in the Gunwinyguan languages (see pGN *kurlak : Enindhilyakwa -ma+kulya ‘skin’ above; many more correspondences can be found in Appendix P and Chapter 9). And thirdly, the lamino-palatal lateral can occur word-initially. This only happens for stems occurring without a prefix, as no prefix begins with *l. The only nominal stems without a prefix are loanwords, such as the Macassan loans in (22) (taken from Evans 1992). The only verb stems without a prefix are intransitive imperatives, as in (23).

(22) a. *lyelyinga ‘knife(NEUT)’ (< ladin ‘knife’)  
b. *lyvkbr’ra ‘tin, lid’ (< ?)14

(23) a. Ø-lyengme-na [IMP.2-lead-NP2] ‘lead!’ (Stokes 1982; anin2_pw-au_004)  
b. Ø-lyikbi-na [IMP.2-float-NP2] ‘float!’ (anin4_sml-au_002)

The alveolar lateral occurs only in syllable codas in traditional Enindhilyakwa. The lamino-dental occurs intervocally and in syllable onsets (Stokes 1981; Leeding 1989). In addition to those above, examples of the alveolar lateral in coda position include: *alkwa [al.kːa] ‘NEUT.bait crab’; *abalkaya [a.pal.k.i].ja ‘upwards’; *ayibiyilba [a.jil.pi.jil.pa] ‘NEUT.desert’. Examples of the lamino-dental in syllable onset are *thaka [j.a].ka ‘all right’; *alhvkrva [a.j.o.ka].a ‘NEUT.house’; *alhka [a.j.o.ka] ‘NEUT.foot’. However, in contemporary Enindhilyakwa the alveolar lateral contrasts with the lamino-dental because it can also occur intervocally in unassimilated loanwords (Leeding 1989).15 Examples include the Gupapuyngu loan *yimangala [ji.ma.ŋa].la ‘MASC.woomer’ (< mangal ‘woomer’) (Stokes 1981: 164), which also occurs in Wubuy: mangalng ‘woomer(MASC)’; and Macassan loans including balanda [pa.la.nte] ‘white fellow’ (< balanda, which ultimately derives from ‘Hollander’); bajikala [pa.ci.ki].la ‘billycan’ (< bassi kaley); balangwa [pa.la.n²].a ‘anchor’ (< balano ‘anchor’); dhvmbala [t.ŋ.mpa.la] ‘cloth, sail’ (< sombala2? ‘sail’). English loans include bulukwa [pu.lu.kʰ].a ‘bullock’ and budbula [put.pu.la] ~ burrbula [pur.pu.la] ‘football’. Thus, synchronically the alveolar is contrastive.

The alveolar lateral in syllable coda can assimilate to a following lamino-dental stop:

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14 This word is listed in the Waddy Dictionary as being of Macassan origin. However, the dictionary does not provide sources of loanwords and there is no attested correspondence in Evans’ (1992) list of Macassan words. Nonetheless, the noun looks foreign due to its lack of a noun class prefix.

15 Leeding (1989) provides a confusing account of the distribution of the dental and alveolar laterals. On the one hand she claims that in Traditional Enindhilyakwa, the apico-alveolar is an allophone of the lamino-dental, where the latter occurs in the syllable onset and the former in the coda (p.28). However, in her discussion of consonant clusters she claims that the initial consonant in a cluster in Traditional Enindhilyakwa can be /lh/, occurring in the coda (p. 63-4). As a result of these contradictory statements the same word may be transcribed differently on different pages, such as abalkaya ‘upwards’ (p.29), but abalkaya (p.63); and walkurra ‘kneecap’ (1996: 212) but walkurra (1996: 198). I agree with Stokes (1981) that only the alveolar /l/ occurs in syllable coda. However, the alveolar lateral can assimilate to a following lamino-dental stop, as in (24) below.
Homorganic clusters constitute the only instances of a lamino-dental lateral as a coda.

2.5.4 Vibrants

This class contains one apico-alveolar segment whose normal manner of articulation is a tap, [ɾ], which can also be realised as a brief trill, [r]. I follow Hamilton (1996) in distinguishing vibrant liquids as a natural class, distinct from glides. This goes against Dixon’s (1980) treatment of [ɾ/r] and the glide [ɻ] as a natural class defined by the feature [+rhotic] (which is also common practise in many grammatical descriptions). Hamilton (1996), following McGregor (1988), argues that there is no evidence of these two segments acting as a natural class to the exclusion of other oral sonorant segments. For example, the articulation of liquids (laterals and vibrants) involves contact rather than approximation of the articulators (see ibid: 73-4 for more arguments favouring this analysis).

Stokes (1981: 144) notes that the tap and the trill are in free variation, but that the trill tends to be used in precise speech and for emphasis. In my own recordings, the trill is rare and very distinct; it only occurs after deletion of a preceding vowel, as in (25). Both examples are repeated with the more common tap.

The alveolar tap can vary with the apico-alveolar /ɻ/, as in the loanwords budbula ~ burrbula ‘football’ and midijina ~ mirrijina ‘medicine’ in (17).16

2.5.5 Glides

Glides are oral sonorants involving articulatory approximation in the oral cavity but without contact of the articulators and without turbulence in the airstream (Hamilton 1996: 73). The three glide phonemes that are attested in the segmental inventories of almost all Australian languages also contrast in Enindhilyakwa: labio-velar [w], lamino-palatal [j] and apico-postalveolar [ɻ]:

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16 Leeding treats the apico-alveolar trill/flap as a laminal consonant, partly because she claims traditional Enindhilyakwa did not have a set of apico-alveolars (1989: 28). However, it is circular reasoning to assume that /ɾ/ cannot be apico-alveolar, because the traditional language had no apico-alveolars. Also, the variation with an alveolar stop would be difficult to explain under the assumption that the trill is a laminal consonant, as laminal trills and alveolar stops do not form a natural class. I therefore see no reason for treating /ɾ/ as anything other than apico-alveolar.
(26)  
_awa_ | [awa] | ‘NEUT.liver’
_ayama_ | [ajama] | ‘NEUT.beard’
_nara_ | [naɾa] | ‘NEG’

As is common in Australian languages (ibid) the apico-postalveolar glide [ɻ] does not have a direct vowel counterpart, whereas labio-velar [w] and lamino-palatal [j] do. The latter two are closely related to the homorganic vowels [u] and [i], respectively, as they condition these vowels. As in many Australian languages (Dixon 1980: 146), word-initial [wu] or [ji] may be pronounced [u] or [i]. In Enindhilyakwa the word-initial palatal glide can be dropped when the next consonant is a laminal (Stokes 1981: 143; Leeding 1989: 124):

(27)  
_yijarra_ | [jiˈ cara ~ iˈ cara] | ‘MASC.Silver Gull’ (VL1 p.124)
_yinhanka_ | [jiˈ na.na ~ iˈ na.na] | ‘MASC.nail’ (anin2_aw_au_001)
_yilyirriya_ | [jiˈiˈ rija ~ iˈiˈ rija] | ‘MASC.crushed coral’ (anin2_hw-au_001)  
_yiya_ | ['jija ~ iˈja] | ‘and’ (Fieldnotes)

Alternatively, [i] may be added in word-initial position preceding [ji]:

(28)  
_yina_ | [iˈjina] | ‘MASC.knee’ (anin4_kw_tr_001)

Dropping word-initial labio-velar [w] can happen when the following consonant is labial (Leeding p.37), as illustrated in (29).

(29)  
_wu-wayiji-na_ | [wuwaˈjicina ~ uwaˈjicina] | ‘open it!’ (VL1 p.81)
_wubvrra_ | [wuˈpəra ~ upəra] | ‘like’ (VL1 p.37)
_wu-mi-ya_ | [wumija ~ umija] | ‘pick it up!’ (VL1 p.37)

The words in these examples may phonetically start with [u], but this is not its underlying initial phoneme.

### 2.5.6 Homorganic nasal+stop segments

As in several other Arnhem Land languages (Baker 2008a), homorganic nasal+stop sequences behave like single segments in Enindhilyakwa. Leeding (1989) proposes they are complex phonemes, because they have the same distribution as other consonant phonemes: they can occur word-initially (although rare), and they occur in syllable onsets. I concur with Leeding that the homorganic nasal+stop sequences are best analysed as complex phonemes, for the following reasons:

1) Prenasalised stops have a similar distribution to other consonant phonemes. They can occur as the second member of a cluster, as illustrated in the following dictionary entries. The number of examples is small, due to the limited range of consonants that can occur as codas in
Enindhilyakwa, which is restricted to apical sonorants. The attested clusters all involve a liquid followed by a peripheral homorganic nasal+stop sequence.\(^{17}\)

\[(30)\]

\[\begin{array}{ll}
\text{ama} & \text{‘NEUT.laugh’} \\
\text{lrarrngku} & \text{‘things’} \\
\text{maya} & \text{‘VEG.edible root sp.’} \\
\text{marmba} & \text{‘VEG.molar teeth’}
\end{array}\]

(JS1 p.163)

In contrast to consonant clusters, the prenasalised stops can occur morpheme-initially in verb stems, as in the following dictionary entries:

\[(31)\]

\[\begin{array}{ll}
\text{-ngkaya-} & \text{‘to stay’} \\
\text{-ndhaddhilyi-} & \text{‘to lean over’} \\
\text{-njawudha-} & \text{‘to put on head’} \\
\text{-rndvrrka-} & \text{‘to grab’}
\end{array}\]

However, when trying to elicit these stems without a prefix, my informants avoided producing these clusters word-initially. The only verb stem with a zero prefix is the imperative (Chapter 4), but when cued for such forms, they did not produce them. Instead, they opted for the other available imperative prefix \(w-\):

\[(32)\]

\[/w-ɲcawu,ɛ-na/ [wiɲcawu,ɛna] \text{‘put it [on your head]!’} \quad (\text{anin4_mm_au_002})\]

Leeding claims that the prenasalised stops can occur in word-initial position, due to deletion of the initial syllable, although this is very rare. She lists the following examples (1989: 27).

\[(33)\]

\[\begin{array}{ll}
\text{yindhiyi} & \text{[ji,ɲ,ɭi ~ ɭ,ɭi]} \text{‘oh, I’m sorry!’} \\
\text{yindha} & \text{[ji,ɲ,ɭa ~ ɭ,ɭa]} \text{‘let me see!’} \\
\text{yinja} & \text{[jiɲca ~ nca]} \text{‘it’s my turn!’} \\
\text{vmmba} & \text{[əmpa ~ mpa]} \text{‘but’}
\end{array}\]

These are all interjections or particles.

2) As mentioned, prenasalised stops are syllabified as onsets, whereas other consonant clusters are ambi-syllabic (apart from the three heterorganic dorsal+labial clusters discussed in the next section). Leeding (1989: 27-8) notes that this is recognised by literate speakers, who treat the nasal-stop sequence as a unit in the syllable onset, but they insert a syllable break in between two heterorganic consonants. The tightness of the nasal-stop clusters can be observed in slow speech, where the prenasalised stop units appear in syllable onsets:

\(^{17}\) Ngalakgan is similar in this respect: the only attested examples of a continuant followed by a homorganic nasal+stop sequence in Ngalakgan are \(rrngk\) and \(rrmb\) (Baker 2008a: 28-9), involving only peripheral nasal+stop sequences, as in Enindhilyakwa. The only other possible trisegmental clusters in Ngalakgan are \(rrngm\) and \(rngm\). These also occur in Enindhilyakwa, but the \(ngm\) sequence is analysed as a complex segment, see next section.
Baker (2008a) proposes additional evidence for the syllabification of homorganic nasal+stop clusters as onsets in Ngalakgan and other Northern Australian languages, which is that they do not contribute weight to the preceding syllable. Stress in Northern Australian languages is typically quantity-sensitive, as it is in Enindhilyakwa (section 2.4). Since the homorganic nasal+stop clusters are not ambi-syllabic (with one half associated to the preceding syllable as a coda, and the other half to the following onset), but they are syllabified as onsets, they do not make the preceding syllable heavy. This is illustrated in the following tri-syllabic word examples from Ngalakgan (Baker 2008a: 179-80). Stress in Ngalakgan normally falls on the initial syllable, as in (35). Heavy syllables with a coda disturb this pattern because they attract the stress, as shown in (36). But when the medial cluster is homorganic, the preceding syllable does not attract the stress, as in (37) (stressed syllables are indicated by bolding and by a preceding apostrophe).

(34)  
\begin{align*}  
\text{yimendha} & \quad [jɪ.mi.ɲa] \quad \text{‘MASC.turtle’} \quad \text{(LL Book1 audio CD)} \\
\text{eminda} & \quad [ɛ.mi.ɲta] \quad \text{‘NEUT.nose’} \quad \text{(anin2_hw_au_001)} \\
\text{akambvmbarrvnga} & \quad [a.ka.mpə.mpə.ɾa.ɲa] \quad \text{‘sit down!’} \quad \text{(anin4_dl_au_003)} \\
\text{yibarungkwa} & \quad [jɪ.pa.ɰ.ɲʷa] \quad \text{‘MASC.mullet’} \quad \text{(anin4_kw_au_002)} 
\end{align*}

(35)  \begin{align*}  
/\text{picu}/ & \quad [ˈbiuɭ] \quad \text{‘big wind’} \\
/\text{kamala}/ & \quad [ˈgamala] \quad \text{‘sky’}  
\end{align*}

(36)  \begin{align*}  
/\text{putolko}/ & \quad [bʊˈɖɔlgə] \quad \text{‘brolga’} \\
/\text{luŋurwa}/ & \quad [lʊˈŋʊɾwa] \quad \text{‘vine sp.’}  
\end{align*}

(37)  \begin{align*}  
/\text{cakanta}/ & \quad [ˈɟaganda] \quad \text{‘female plains kangaroo’} \\
/\text{ŋurŋuc}/ & \quad [ŋʊɾʊŋdʒɪˈɛ] \quad \text{‘emu’}  
\end{align*}

The homorganic nasal-stop clusters in (37) behave like single segments in that they are weightless and thus must be syllabified as onsets.

Since Enindhilyakwa is also quantity-sensitive for stress the prenasalised stops are not expected to contribute weight to the preceding syllable. This hypothesis is hard to test, because there are several competing factors that determine stress, syllable codas being only one of them. Long vowels can also contribute to weight. And weight can be overruled by the default of stress falling on the penultimate syllable. In the following examples, the longish /a/ vowel diverts the stress away from the penultimate syllable, which is followed by a nasal+stop cluster:

(38)  
\begin{align*}  
\text{arimba} & \quad [ˈa.ɭ.mpa] \quad \text{‘NEUT.rough-skinned stingray’} \quad \text{(anin4_dl_au_003)} \\
\text{yibarungkwa} & \quad [jɪ.pa.ɰ.ɲʷa] \quad \text{‘MASC.mullet’} \quad \text{(anin4_kw_au_002)} \\
\text{mvilharrungkwa} & \quad [ˌmaɭɾəɲkʷa] \quad \text{‘VEG.white berry bush’} \quad \text{(anin2_pw_au_002)} 
\end{align*}
These examples support the claim that homorganic nasal-stop clusters do not contribute weight to the preceding syllable: if they did, we would expect the penultimate syllable to be stressed (as it would bear two stress-assigning factors: being penultimate plus being heavy). Compare the examples in (38) to those in (39), where the syllables preceding the homorganic nasal-stop segments appear in ante-penultimate position and do not shift the stress away from the penultimate position:

(39) **mvrungkurra** [ˌmaŋˈŋkura] ‘VEG.round yam’
**minimbaja** [ˌmiŋˈmpaca] ‘VEG.white tussock grass’

In these examples the stress is not diverted away from the penultimate syllable, so the ante-penult does not function as a stress attractor: therefore it must be light and the homorganic cluster syllabified in the onset.

3) As also observed by Heath (n.d.) and Leeding (1989), the homorganic nasal-stop clusters are never broken up by epenthetic vowels, whereas heterorganic clusters frequently are. The examples in (40) illustrate the variation involving the breaking up of heterorganic clusters by an epenthetic vowel (rule P-1), whereas in (41) there is no variation and the homorganic nasal-stop clusters are not broken up.

(40) **mulkwa** [mulkʷa ~ muˌlukʷa] ‘VEG.stomach’
- **yirrma** [jirma ~ jirima] ‘to swim’
- **amarngka** [amaŋka ~ amaŋŋka] ‘to laugh’

(41) **yingamba** [jiŋˈamba] ‘MASC.groin’
- **yimendha** [jimɛŋ,tja] ‘MASC.turtle’
- **angkarr**- [aŋkər] ‘to run’

In productive reduplication patterns, the prenasalised stops are not broken up either. When the stem begins with a stop, the reduplication template is monosyllabic C (section 2.7). When the stem begins with a homorganic nasal-stop cluster, this cluster is reduplicated as a unit, as illustrated with the following dictionary entries:

(42) - **rndv-rndarrka**- ‘RDP-grab’
- **mbv-mbawura**- ‘RDP-few’
- **ngkv-ngkulha**- ‘RDP-be stretched out’

When the stem begins with something other than a stop, reduplication is disyllabic C₁VC₂ when non-vowel initial (things are a bit more complicated with vowel-initial stems, see section 2.7). Again, nasal-stop clusters are never split up:
This pattern contrasts with that of heterorganic clusters such as /rk/ and /rkp/, which can be broken up when reduplicated:

The argument that tightness differentiates the homorganic nasal+stop clusters from heterorganic clusters is not a strong one, because the latter can also be reduplicated as a unit (e.g. -arrng-arrngalha- ‘RDP-itch’). However, at least the heterorganic clusters can be separated, whereas the nasal+stop clusters never are.

4) Treating the /ŋk̂/ sequence as one unit phoneme can explain the rounding of the preceding /i/ or /ə/ vowels (represented here as V):

If the nasal-stop sequence were two separate phonemes, the rounding of the preceding vowels would violate the principle of locality (e.g. Padgett & Ní Chiosáin 2001).

The homorganic nasal+stop sequences are thus best regarded as unit phonemes. They occur morpheme-internally and across historic morpheme boundaries. Examples of morpheme-internal nasal+stop segments are -ma+dhangkwa ‘meat’ (cf. pGN *dhangku); -arndaka- ‘to hunt with spear’ (cf. pGN *borndok ‘woomera’, Wubuy warndak ‘spear-thrower’); mandarra ‘VEG.fish sp.’ (Wubuy mandarra ‘fish sp.’); yembvrrkwa ‘MASC.tusk fish’ (Wubuy yambirrku ‘tusk fish’); and so on.

Historically, some of these homorganic nasal+stop unit phonemes may have arisen from bonding over morpheme boundaries (an idea originally proposed by Heath n.d.). For example, -manh+dharrka- ‘to point’ and -lhanh+dharrka- ‘to think’ in (43) are lexicalised complex stems consisting of the incorporated body parts mam- ‘hand’ and (an altered version of) lyang- ‘head’, respectively, plus the verb -lharrka- ‘send’ (that is, ‘finger+send’ = ‘point’, and ‘head+send’ = ‘think’). These verb stems are clearly lexicalised, as evidenced by their non-compositional meanings, and by the fact that the final consonant of the body part has assimilated in place to the following stem-initial consonant, something that does not happen with productively incorporated
nominals (see Chapter 7). The resulting homorganic nasal+stop sequence then became a unit phoneme by bonding across the old morpheme boundary. This historical sequence is illustrated in (46) for *-mandharrka- ‘to point’:

(46) *-mam-lharrka- [hand-send] > *-mam-dharrka- (hardening of continuant to stop; see Appendix D) > *-manh-dharrka- (assimilation of nasal to following stop) > *-manh+dharrka- (lexicalisation of compound) > -ma.nhdh.arrka- (bonding of segments across frozen morpheme boundary)

The bonding of the nasal and stop is supported by the failure of the cluster to be broken up when reduplicated, as was shown in (43).

Synchronically, bonding between homorganic nasal and stop sequences does not take place across active morpheme boundaries in productive affixation processes, something that was also noted by Heath (n.d.). When a nasal and a corresponding stop meet across an active morpheme boundary, an epenthetic vowel is inserted (rule P-1). This is illustrated in the following examples by the alienable possession (ALP) prefix ng- in (47a) and the VEG noun class prefix nvm- in (47b).

(47) a. n-envngv-karrawara
   3m-m.ALP-above
   ‘God’ (Lit: ‘he belonging to above’)

b. nvmv-bvdhv-na menba
   VEG-swell-NP2 VEG.eye
   ‘to have swollen eyes’ (GED p.161)

The bonding that has occurred across old, currently inactive, morpheme boundaries does not happen across active morpheme boundaries. The fact that these two processes only occur at frozen morpheme boundaries and not at active ones, suggests that Enindhilyakwa phonology has undergone some dramatic changes: the archaic stems suggest that at an earlier stage in the language codas were allowed, because clusters were not broken up by vowel-epenthesis. In the modern language codas are very limited: only apical liquids and nasals are allowed and even these are relatively rare. The codas in the frozen complex stems are avoided by bonding of the homorganic nasal+stop segment across the old morpheme boundaries into a single unit, which is syllabified in the onset. Codas originating in productive affixation patterns are avoided in a different way: by vowel epenthesis.

Baker (2008a) does not analyse the homorganic nasal+stop sequences that occur in the onset in other Northern Australian languages as complex unitary phonemes, but as clusters. This is because their distribution can be described in similar terms to clusters: they cannot occur word-initially and they are reduced following other obstruents (p.47). In Enindhilyakwa, the homorganic nasal+stop sequences also fail to occur word-initially (as was shown by the choice of the prefix w- rather than the zero prefix in the imperative in [32]). However, impossibility of word-initial occurrence is not
a fatal impediment to phoneme status, since for instance retroflexes do not occur word-initially either. Furthermore, only in word-medial positions is the full set of consonant contrasts available, in Enindhilyakwa (section 2.3.1) as well as elsewhere in Australia (see e.g. Hamilton 1996; Baker 2008a). As in Enindhilyakwa the homorganic nasal and stop constitute such a tight unit, in a language where otherwise consonant clusters are frequently broken up by vowel epenthesis, I will continue to treat them as single complex phonemes - which presumably have arisen due to the pressure to avoid codas. These complex segments can be further reduced to a simple stop, as noted by Leeding: e.g. miyambena [mijampəna ~ mijapəna] ‘what?’ (1989: 28).

2.5.7 Heterorganic dorsal+labial segments

There are three more clusters that behave like single segments: these are the heterorganic dorsal+labial sequences /kp/, /ŋm/ and /ŋp/. Heath (n.d.) treats them as ‘true’ clusters that are never broken up by an epenthetic vowel (as opposed to ‘orthographic’ clusters such as /ɾk/ and /lk/, which can be). Hamilton (1996), in his study on the phonotactics of Australian languages, interprets these heterorganic clusters as complex phonemes in Enindhilyakwa. His data come from Leeding (1989), and the only reason he gives for their phonemic status is their high frequency. These clusters, and /kp/ in particular, are very common indeed. The only other common heterorganic cluster is /ɾk/, but this is frequently broken up by epenthetic vowels, whereas the dorsal+labial clusters are not.

Besides their high frequency and their failure to be broken up by epenthetic vowels, there are additional reasons to regard the dorsal+labial clusters as complex segments:

1) Their distribution is similar to that of other consonant phonemes, apart from the fact that they cannot occur word-initially. They can follow a liquid in a consonant cluster, as illustrated by the following dictionary entries:

(48) amvrrkbalya ‘soft’ -amarngba ‘bold’
ayilkbilka ‘NEUT.desert’ (VL1 p.66) werrikumarrngbij ‘to be friends with’
-nyirrngmv- ‘to blow nose’ -errkbi- ‘to throw’ (VL1 p.481)

The heterorganic dorsal+labial sequences can occur morpheme-initially in verb stems, which other consonant clusters cannot:

(49) -kbaji- ‘to curse’
-kbilyaja- ‘to drop’
-ngmungwV- ‘to throw on the ground’

However, attempts to elicit these clusters word-initially, by means of an imperative form which takes a Ø-prefix, failed.
2) The heterorganic sequences are syllabified as onsets, as shown in (50).

(50) alhakba [aˈ.ʔa.Kpa] ‘NEUT.leg’
mamvngba [ˈma.mʊ.ʔpa] ‘VEG.hair’
 mangma [ˈma.ʃima] ‘VEG.brain’

The initial velar in /kp/ is unreleased, its constriction occurring very late so that it is co-articulated with the following bilabial. As we shall see in section 9.2.1.2.1, some /kp/ sequences correspond to long stops in Gunwinyguan languages.

To conclusively prove that the complex segments syllabify in onsets, we have to show that they fail to contribute weight to the preceding syllable. This is apparent in the following two examples.

(51) a. engbv\-
    dha [e.ʔpə.ʃa] ‘NEUT.strong’
 b. warrkv-na [ˈwar.kə.na] [IMP.2/NEUT-sew-NP2] ‘sew it!’

In (51a) stress does not fall on the syllable that precedes the complex segment. Instead, stress falls on the standard penultimate syllable. This contrasts with (51b), where the stress is shifted away from the penultimate to the antepenultimate syllable, which is super-heavy: it contains the long-ish vowel /a/ and it is closed.

The following minimal pair also illustrates that the complex segments do not influence the distribution of stress. In (52a), both /i/ vowels are short and the stress falls on the standard penultimate syllable. In (52b), by contrast, the vowel preceding the /kp/ segment is long and shifts the stress away from the penultimate position (these are imperatives, which have Ø-prefixes).

(52) a. errikbi-na [e.ɾi.ˈKpi.na] [IMP.2.throw-NP2] ‘throw (it)!’
 b. errekbi-na [e.ɾe.ˈKpi.na] [IMP.2.vomit-NP2] ‘vomit!’

These examples show that /kp/ sequence does not alter stress assignment: in (52a) the long /e/ attracts the stress away from the penultimate position, whereas in (52b) there are no factors that divert the stress away from penultimate position. This supports the hypothesis that the /kp/ sequence is not ambi-syllabic, but is syllabified as an onset.

3) As pointed out by Heath (n.d.), the heterorganic dorsal+labial segments are never broken up by an epenthetic vowel, whereas other heterorganic clusters can be. The tightness of the complex segment is illustrated in (53). Examples of other heterorganic clusters broken up by vowel epenthesis were given in (40).
(53) akba [ˈa.ʃpa] ‘NEUT. buttocks’
    engma [ˈɛ.ʃma] ‘rotten’
    mamvngba [ˈma.ʃə.ʃpa] ‘VEG. hair’

The complex segments are also never broken up in reduplication patterns, as illustrated by the dictionary entries in (54). The reduplication template for stems beginning with a vowel is complex, as the initial vowel can either be ignored or be included in the reduplicated segment (section 2.7). What is important to note here is that the complex segments form a tight unit:

(54) -ingm-ingmvrра  ‘RDP-fat’
    -a-ngmvr-ŋmekalhalhv-  ‘RDP-sit’
    -ingb-ingbvdhv-  ‘RDP-strong’
    -akb-akbardha-  ‘RDP-be afraid’
    -errekb-errekbijji-  ‘RDP-spit’

This contrasts with other heterorganic clusters, which can be broken up when reduplicated, as illustrated in the previous section.

The dorsal+labial clusters are thus best understood as single unitary segments. Such heterorganic clusters behaving as single sounds are unusual in Australia (though they are common phonemes in West Africa and northern Central Africa, and they are also found in several New Guinea languages [Ladefoged & Maddieson 1996]). These segments do however not occur word-initially. This is one of the reasons why Baker (2008a) treats homorganic nasal+stop clusters in Ngalakgan that also syllabify as onsets, as clusters rather than single segments. But, as was argued in the previous section, failure to occur in word-initial position is not considered an obstacle to phoneme status.

As with the homorganic nasal+stop segments, the heterorganic dorsal+labial segments may occur morpheme-internally and intra-morphemically. There are no attested corresponding forms in Gunwinyguan languages involving kb, ngk or ngm clusters. In Wubuy, velars /ŋ/ and /k/ do not occur on the surface as first members of a cluster, except in the important homorganic cluster /ŋk/ (Heath 1984: 22). Interestingly, the Enindhilyakwa /kp/ segment appears to correspond to /p/ in Wubuy, and to a geminate /pp/ in Gunwinyguan languages (e.g. Enindhilyakwa akbal- : Wubuy abarla : pGN *kabball ‘open plain’; see section 9.2.1.2.1 and Appendix P). As also noted by Leeding (1989: 26), [kp] may vary freely with [pp], and some speakers are aware of this variation. Younger speakers may pronounce this cluster as a single stop [p].

Intra-morphemic examples of the complex segments can be found in frozen complex stems such as those in (55). When reduplicated, these clusters stay intact, as shown in (56).

(55) -ngak+bdhv-  [mount+swell]  ‘to swell (of sea, wind)’
    -rreng+mungkwardhv-  [intestines+crawl]  ‘to crawl because of sickness’
The reduplication template for stems beginning with a sonorant is $C_1VC_2$; the fact that the dorsal+labial cluster is not broken up indicates it is treated as a single segment. Hence the two consonants have merged across a frozen morpheme boundary and become phonemes.

Synchronically, however, the labio-dorsals do not bond anymore across active morpheme boundaries. As with the homorganic nasal+stop clusters discussed above, vowel epenthesis occurs. This is illustrated in (57a) for the nominalising (NSR) prefix $k$-; in (57b) for the alienable possession (ALP) prefix $ng$-; and in (57c) for the pronominal prefix $nvng$- ‘1’.

(57) a. a-kv-bi-beka
    NEUT-NSR-RDP-drink
    ‘a drink’
  b. envngv-menba
    NEUT.m.ALP-eye
    ‘glasses’
  c. nvngv-bungurrv-dhv-na
    1-drunk-INCH-NP2
    ‘I am drunk’

The bonding that occurred across the archaic morpheme boundaries in (55) does not happen across active morpheme boundaries. This was also true for the homorganic nasal+stops discussed above. It thus appears that at an earlier stage in the language codas were allowed, as clusters were not broken up by vowel-epenthesis. Then these clusters became syllabified as onsets. The current strategy to avoid codas is vowel epenthesis (P-1), as was illustrated in (57).

2.5.8 Loss of retroflexion

Retroflexed consonants other than the glide and the stop are comparatively rare in Enindhilyakwa. Leeding (1989) proposes that this scarcity is due to a loss of retroflexion, which is a common process in the language. She claims that loss of retroflexion is responsible for the current alveolar nasal, which varies freely with the retroflex in some cases. Older speakers use the retroflexed forms more frequently than do younger speakers. The following examples illustrate this synchronic variation, for: a pronominal prefix (58a); a lexical root (58b); a tense suffix (58c); and a demonstrative root (58d).

(58) a. nvngkurnuwa ~ nvngkunuwa
    ‘2mdu.PRO’
  b. yimvrnrna [jimaˈnana]
    ‘MASC.stingray’
    (anin4_kw_au_002 )
  c. -lhwka-rna ~ lhwke-na
    ‘go-NP2’
  d. nvng-arna ~ nvng-ena
    ‘1-this here’
The apical contrast may be accompanied by a vocalic contrast: in (58c,d) the vowel [a] precedes the retroflex, while the alveolar is preceded by [ɛ] (see also Heath n.d.). This variation occurs in the tense suffixes of two conjugational classes (e.g. [58c] and Chapter 6), and in the demonstrative ena ‘this here’ (58d). The retroflex nasal varies with a prepalatalised nasal, which raises the preceding vowel from [a] to [ɛ]. A similar historical path has been proposed for some prepalatalised consonants in Arandic languages (Koch 1997). The vocalic contrast that accompanies the apical contrast is expected given the compatibilities between vowel place and apical place (Flemming 2003).

Loss of retroflexion is also responsible for the scarceness of the retroflex lateral. Retroflex laterals are common in Gunwinyguan languages. They correspond to a lamino-palatal lateral in Enindhilyakwa in onset position (e.g. pGN *kurlak : Enindhilyakwa -ma+kulya ‘skin’, and Wubuy rlong : Enindhilyakwa lyang ‘head’). In coda position, Gunwinyguan rl corresponds to alveolar l in Enindhilyakwa (e.g. pGN *warlkkarra : Enindhilyakwa alkvrra ‘fish sp.’, and Wubuy murlku : Enindhilyakwa mulkwa ‘belly’). The sound correspondences between Enindhilyakwa and the Gunwinyguan languages are investigated in more detail in Chapter 9.

Very occasionally, however, some (older) speakers do produce a retroflex lateral:

(59) a. yuwarlkurra [juwaɾkuɾa] ‘MASC.Cyrene shell’ (anin4_dl_au_004)  
    b. mulkwa [moɾkwa] ‘VEG.stomach’ (anin2_pw_au_001)

Yuwarlkurra in (59a) may relate to proto-Gunwinyguan *warlkkarra ‘fish sp.’ mentioned above. And the example in (59b) shows that there are still some traces remaining of the retroflex lateral present in Wubuy (even though all previous authors write this word with an alveolar l).  

Loss of retroflexion of the nasal is a synchronic process. Speakers very frequently pronounce a dictionary entry that involves rn, with an apico-alveolar n, as in (58b) and the following.

(60) a. amvndha [aɾmənta] ‘NEUT.shoulder’ (anin2_aw_au_001)  
    b. yimvnnrnna [jimaɾna ~ jiɾmaɾna] ‘VEG.stingray’ (anin4_kw_au_002)

The retroflex stop is a common sound. There is no attested variation between a retroflex and alveolar stop, or of Wubuy /ʈ/ corresponding to Enindhilyakwa /t/. Wubuy /ʈ/ usually corresponds to Enindhilyakwa /t/ (e.g. Wubuy marda : Enindhilyakwa amarda ‘NEUT.grass’; Wubuy lhaardu : Enindhilyakwa yilharda ‘MASC.mudwelk shell’).

2.6 Vowels

The vowel phoneme inventory was presented in Table 2.2 above and includes four vowels, which are all non-rounded and non-back: /i/, /ɛ/, /a/ and /a/. There is no phonemic length distinction in the

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18 Although we cannot rule out that this speaker is also fluent in Wubuy and thus pronounced it the Wubuy way.
vowels, though /a/ and /ɛ/ tend to be longer than /i/ and /ə/ (except for [a] in word-final position, which is not long). Since this difference in length is predictable it is not contrastive. Stress is quantity-sensitive, so these long-ish vowels are stress attractors.

The following examples illustrate the vowel contrasts in the environment ᵄ ᵄ m in (61) (but ᵄ ᵄ r for /ɛ/ due to lack of fitting data), and between two nasals in (62).

(61)  
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>arymba</td>
<td>[aɿ̐mpa ~ aɿ̐mpa]</td>
<td>NEUT.blister</td>
</tr>
<tr>
<td>arimba</td>
<td>[aɿ̐mpa]</td>
<td>NEUT.stingray</td>
</tr>
<tr>
<td>amvrama</td>
<td>[amaɿ̑ama]</td>
<td>‘quiet’</td>
</tr>
<tr>
<td>yingv-rerrv-ma</td>
<td>[ji nəɿ̑ɛɾama]</td>
<td>‘it(FEM) dried’</td>
</tr>
</tbody>
</table>

(62)  
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>yinhanka</td>
<td>[ji ɿ na ɿ na]</td>
<td>‘MASC.nail’</td>
</tr>
<tr>
<td>dhvnhvna</td>
<td>[jə ɿ na ɿ na]</td>
<td>‘FEM.mosquito’</td>
</tr>
<tr>
<td>enena</td>
<td>[ɛ ɿ nena]</td>
<td>‘this’</td>
</tr>
<tr>
<td>eminda</td>
<td>[ɛ ɿ minta]</td>
<td>‘NEUT.nose’</td>
</tr>
</tbody>
</table>

The round back vowel [u], which is typically phonemic in other Australian languages, is not contrastive in Enindhilyakwa. It only occurs directly preceding the rounded dorsals /kʷ/ and /ŋʷ/ (e.g. awurukwa [.awuɿ ɿ kʷa] ‘NEUT.billabong’, akungwa [.a ɿ kʊ ɿ a] ‘NEUT.water’), or contiguous to labio-velar /w/ (e.g. amamuwa [.ama ɿ muwa] ‘round’, awurukwa [.awuɿ ɿ kʷa] ‘NEUT.billabong’). Alternatively, [u] may directly follow phonetic non-rounded dorsals (e.g. amukurma [.amuɿ kura] ‘NEUT.face’, angura [.aɿ ɿ ɿ u ɿ a] ‘NEUT.fire’). These are the only environments that [u] occurs in.

Following an idea originally suggested by Heath (n.d.), I propose that the rounding of [u] is an underlying feature of contiguous rounded dorsal consonants. This rounding can be obtained in one of two ways: (i) by assimilation to a following rounded dorsal, as in akungwa [.a ɿ kʊ ɿ a] ‘NEUT.water’; or (ii) by absorbing the rounding of a preceding rounded dorsal, as in angura [.aɿ ɿ ɿ u ɿ a] ‘NEUT.fire’. This means that the dorsal is underlyingly rounded, i.e. /ŋʷ/, but this rounding is transferred to [u].

Evidence for the above claims comes from the minimal pairs in (63) and in (64). The former illustrates the assimilation of [u] to the following labio-velar /w/:

(63)  
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. alhakby-lhangwa</td>
<td>[aɿ ɿ kɒ,ɿ aŋ ɿ a]</td>
<td>NEUT.leg-ABL’</td>
</tr>
<tr>
<td>b. alhakbu-wa</td>
<td>[aɿ ɿ kɿuwa]</td>
<td>‘NEUT.leg-ALL’</td>
</tr>
</tbody>
</table>

When followed by a non-conditioning consonant such as /ɿ/ in (63a), the underlying quality of the vowel is maintained, in this case /ə/. When followed by labio-velar /w/, by contrast, as in (63b), /ə/ assimilates in rounding and place and is realised as [u]. (In word-final position, /ə/ is realised as [a]: alhakba [aɿ̐a kɒ̑a].)

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19 More research is needed to determine the quantity of these long(ish) vowels, whether they are bimoraic or not.
The examples in (64) illustrate how [u] is generated by absorbing the rounding of a preceding rounded dorsal.

(64) a. mamvrukwa  [mamǒkʷa]  ‘VEG.road’
    b. mamvruku-hangwa  [mamǒku₂anʷa]  ‘VEG.road-ABL’

In (64a) the /kʷ/ segment is followed by [a] in word-final position, as all words end in [a]. This [a] is not present underlyingly because it does not show up when followed by a suffix, as in (64b) (word-final [a] is due either to ephenthesis, formalised as rule P-7A in section 2.6.3.1, or to conversion of a different vowel to [a], rule P-7B). When followed by a suffix, we do not get [kʷa] but [ku], where the rounding of the consonant is transferred to the vowel [u]. A similar analysis where the rounding of [u] is interpreted as an underlying feature of consonants has been presented for Arrernte (e.g. Breen 1977; Henderson 1998; Wilkins 1989).

One question that arises is, what is the quality of the vowel underlying [u]? It cannot be /a/, because this vowel does not absorb the rounding of the preceding dorsal (cf. [64a]). It cannot be /ɛ/ either, because this vowel can also follow rounded dorsals (e.g. [mukʷena] ‘VEG.heat’). This leaves /i/ and /əә/ as potential candidates. Since the sequences [kʷi], [kʷo], [ŋʷi] and [ŋʷə] are unattested in the language (whereas we do find [kʷa], [kʷɛ], etc.), I propose in section 2.6.7 that [u] is a shared allophone of /i/ and /əә/. The underlying phoneme will be represented as /V/ in this thesis where it is impossible to decide between the two.

The hypothesis that [u] is generated by absorbing the rounding of a preceding dorsal consonant can explain why this vowel is only contrastive when following non-rounded dorsals, as in the following data from Stokes (1981) and the dictionary:

(65) makarra  [ma’kara]  ‘VEG.thigh’
    mvrngkvrра  [mɔŋkəra]  ‘VEG.sinker’
    awilyikerra  [awili’kəra]  ‘far away’
    mikira  [mi’kira]  ‘VEG.edible root’
    amukurra  [amu’kura]  ‘NEUT.face’

The pattern can be accounted for by assuming that the dorsal in amukurra is rounded in its presurface form: /amVkʷVra/. The first [u] is formed by assimilation to the following rounded dorsal, whereas the second [u] is formed by absorbing the rounding of the preceding /kʷ/, becoming [ku]. We cannot tell whether the underlying phoneme is /i/ or /əә/. The dorsals in the other examples, by contrast, are non-round underlyingly.

Table 2.4 presents the vowel allophones in Enindhilyakwa, the locations of which are predictable. The phonetic symbols are given in bold and their orthographic representations in parentheses. In most cases, the orthographic symbol represents the underlying phoneme. The only
exceptions are $u$ and $ee$, which do not represent phonemes. The underlying phonemes of these sounds are given as well.

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i (i),</td>
<td>u (u),</td>
<td>/ʊ/, /æ/</td>
</tr>
<tr>
<td></td>
<td>e (ee)</td>
<td>/ai/</td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td>η (i, a, e, v)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-mid</td>
<td>e (e, a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>æ (a)</td>
<td>a (a)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.4: Enindhilyakwa vowel allophones (orthographic symbols given in parentheses)

In what follows, I will first summarise the previous analyses before going into more detail of the account proposed here.

### 2.6.1 Previous analyses

As mentioned in the introduction, the analysis of the Enindhilyakwa vowels is controversial. The main problem appears to be that on the one hand, the distribution of the high vowels and schwa seems to be mostly predictable: [i] occurs contiguous to lamino-palatal consonants (e.g. ['jina] ‘MASC.knee’, [,ama',i'j'a] ‘NEUT.common cold’); [u] occurs next to labio-velars and labialised velars/rounded dorsals (e.g. [,awu,'uk'wa] ‘NEUT.billabong’, [,a'kun'wa] ‘NEUT.water’); and [ə] occurs next to retroflex consonants and the alveolar rhotic (e.g. ['təəŋʈ'əəŋʈ'a] ‘FEM.strychnine tree’, ['aŋə] ‘NEUT.wind’). But on the other hand, this cannot be the full story because these vowels occur in other environments also (e.g. [mipina] ‘VEG.same’, [aŋŋə] ‘NEUT.food’). All authors recognise a “central indeterminate vowel” (Stokes 1981: 154), but none of them takes it to be contrastive.

The previous accounts of Heath (n.d.), Stokes (1981) and Leeding (1989) differ in: (i) the number of vowel phonemes; (ii) whether these vowels are present underlyingly or due to epenthesis; (iii) the quality of the vowels; and (iv) their orthographic representation. In his sketch grammar, Heath (n.d.) proposes that there is only one ‘real’ vowel, /a/, and two parasitic or distributionally restricted vowels, /e/ and /æ/. These vowels are considerably longer phonetically than [i], [u] and [ə], which he takes to be epenthetic. For instance, [aŋŋə] ‘NEUT.food’ has a very brief medial [ə], and [jaruŋk'wa] ‘yesterday’ a very brief medial [u]. Heath represents these words as anhnga and yarrngkwa, respectively, with vowel epenthesis breaking up the underlying consonant clusters. He notes that the epenthetic vowels are all rather brief and indistinct, and that fluctuation between [i], [u] and [ə] is common, even in repeating the same word. Clear [u] vowels,
on the other hand, consistently occur adjacent to the labialised velars /w/, /kʷ/ and /ŋʷ/, and to phonetic velars [k] or [ŋ] for which an underlying representation as a labialised velar is possible (p.1-9). Heath proposes that epenthetic vowels may absorb the labialisation of an adjacent labialised consonant, so that [kʷ] plus an epenthetic vowel becomes [ku], and /ŋʷV/ becomes [ŋu].

Stokes (1981) proposes four vowel phonemes: /a/, /e/, /i/, /u/, with only a marginal contrast between the two high vowels. She does not discuss any difference in length between these vowels. She presents several (sub-)minimal pairs that contrast these vowels, such as:

    c. *arimba* [aɭɪmpa] ‘NEUT.stingray sp.’


The contrast between the high vowels is evidenced by pairs such as the following:

(68) a. *arupu* [aɭʊpʊ]a ‘strong’  b. *aɭiki* [aɭɪkɪ]a ‘NEUT.house’

Stokes proposes that the high vowels form a phonetic continuum from /i/ to /u/. An /u/ vowel contiguous to /m/ or /p/ may vary between [ʊ] and [u], as in /aɭʊma/ [aɭʊma ~ aɭʊma] ‘big’.

The “central indeterminate vowel […] which is difficult to identify with either end of the continuum” for native speakers (p.153-4), is assigned to /u/ when contiguous to /m/ or /p/, as in (68a), and to /i/ elsewhere, as in (68b):

In short, /u/ is taken to be phonemic because of the marginal contrast attested when contiguous to a bilabial or a velar consonant.

Leeding’s (1989) account comprises only two vowel phonemes: high central /i/ and low central /a/. She does not mention any difference in length between these two vowels. The two phonemes have a rich inventory of allophones, conditioned by the surrounding consonants and vowels by numerous phonological rules for fronting, rounding, backing and lowering. These phonological rules are often optional, which is one of the reasons for the huge free variation in vowel quality.

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20 Stokes uses the symbol /e/ for the ‘non-high front vowel’, where I use /ɛ/. It is however unclear in her paper whether /ɛ/ stands for phonetic [ɛ] or [e]. Only [ɛ] is included in her list of allophones (1981: 176), but in many of her transcriptions, /ɛ/ is realised as [ɛ] (e.g. /ɛra/ [ɛra] ‘vomit’ and /ɛma/ [ɛma] ‘this’ (p.151)). In other cases it is realised as [ɛ] (e.g. /ɛkira/ [ɛkira] ‘name’ (p.153). I conclude that in Stokes’ transcriptions, the vowel /ɛ/ represents either [ɛ] or [e]. Interestingly, Leeding appears to suffer from the same confusion, as pointed out in fn22 below.

21 It is also often unclear how the phonetic realisation of /u/ should be interpreted in Stokes (1981). It is often transcribed as [ʊ], as in [aɭʊmpa] here. However, [ʊ] is not listed as a possible allophone in the list on p.176 of her paper. Moreover, elsewhere /u/ is transcribed as [u], as in /jɪnurma/ [jɪnurma] ‘fish sp.’ (p.150), without providing any explanation for this variation. Since [ʊ] is not listed as an allophone of /u/, I conclude that [ʊ], in fact, stands for [u]. I will therefore use [ʊ] where Stokes uses [ʊ]. Stokes’ phonetic transcriptions of /u/ as [i ~ u] or [ʊ ~ u], as in the examples below, will be left unchanged.
that is observed in the language. Many rules can be applied iteratively, and most rules are strictly ordered. The vowel [ɛ] is not phonemic in Leeding’s account, but an allophone of /a/. It is generated by a high front vowel in the following syllable:

(69) /ji.ʌɾpi/ [ji.ɛɾpa] ‘MASC.Livingstone Palm’ (VL1 p.43)

Due to the lack of /ɛ/, Stokes’ minimal pairs in (66) are homographs in Leeding’s analysis: marra (66a), mibina (66b), and arimba (66c). The phonetic differences arise because these words differ in their underlying structure according to Leeding: merra ‘VEG.blood’ for example is underlyingly /mˈɛɾa/+, while marra ‘VEG.tree species’ is /mˈaɾa/.

Leeding also notes that a clear [u] only occurs contiguous to rounded consonants, and it is generated from /i/ by either a following rounded consonant (Vowel Rounding Rule 1) or by a preceding rounded consonant (Vowel Rounding Rule 2).

Table 2.5 lists the different treatments of the Enindhilyakwa vowels by the previous authors, plus the one proposed in this thesis. Table 2.6 illustrates these different treatments with some examples, using the original orthographies and transcriptions.

<table>
<thead>
<tr>
<th></th>
<th>[a]</th>
<th>[ɛ]</th>
<th>[æ]</th>
<th>[o]</th>
<th>[i]</th>
<th>[u]</th>
<th>[o]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heath (n.d.)</td>
<td>phoneme</td>
<td>parasite</td>
<td>parasite</td>
<td>epenthetic</td>
<td>epenthetic</td>
<td>epenthetic</td>
<td>epenthetic</td>
</tr>
<tr>
<td>/a/</td>
<td>/ɛ/</td>
<td>/æ/</td>
<td>[o]</td>
<td>[i]</td>
<td>[u]</td>
<td>[o]</td>
<td></td>
</tr>
<tr>
<td>Stokes (1981)</td>
<td>phoneme</td>
<td>phoneme</td>
<td>allophone of /a/</td>
<td>allophone of /a/</td>
<td>phoneme</td>
<td>phoneme</td>
<td>allophone of /u/</td>
</tr>
<tr>
<td>/a/</td>
<td>/ɛ/</td>
<td>[æ]</td>
<td>[o]</td>
<td>/i/</td>
<td>/u/</td>
<td>/u/</td>
<td></td>
</tr>
<tr>
<td>Leeding (1989)</td>
<td>phoneme</td>
<td>allophone of /a/</td>
<td>allophone of /a/</td>
<td>allophone of /i/</td>
<td>allophone of /i/</td>
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</tr>
<tr>
<td>/a/</td>
<td>[ɛ]</td>
<td>[æ]</td>
<td>[o]</td>
<td>/i/, [i]</td>
<td>[u]</td>
<td>[o]</td>
<td></td>
</tr>
<tr>
<td>This thesis</td>
<td>phoneme</td>
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<td>allophone of /a/</td>
<td>phoneme and epenthetic and allophone</td>
<td>phoneme and allophone of /a/</td>
<td>allophone of /i/ and /o/</td>
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</tr>
<tr>
<td>/a/</td>
<td>/ɛ/, [ɛ]</td>
<td>[æ]</td>
<td>/o/, [o]</td>
<td>/i/, [i]</td>
<td>[u]</td>
<td>[o]</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.5: Overview of different previous analyses of Enindhilyakwa vowels

---

22 It is unclear which vowel Leeding refers to with [ɛ]. This transcription is used for phonetic [ɛ], [ɛ], and [æ]. For instance, Vowel Fronting Rule 2 generates “the low front allophone [æ]” from /a/, but this vowel is often transcribed as [ɛ] (see e.g. pp.42-4). She also transcribes the same word with different vowels on different pages (e.g. [ɛˈka] ‘tree’ (p.47) vs. [æˈka] (p.87)). I conclude that in Leeding’s transcription, [ɛ] represents either [ɛ], [ɛ] or [æ].
Table 2.6: Examples of different analyses and transcriptions by the different authors

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>face</td>
<td><em>amkw</em>rra</td>
<td><em>amukwura</em></td>
<td><em>amwikwira</em></td>
<td><em>amukurra</em></td>
</tr>
<tr>
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<td>/amkw*ra/</td>
<td>/amukwura/</td>
<td>/amwikura/</td>
<td>/amukura/</td>
</tr>
<tr>
<td></td>
<td>[amukura]</td>
<td>[amukura ~ amukura]</td>
<td>[amukura]</td>
<td>[amukura]</td>
</tr>
<tr>
<td>herring</td>
<td><em>alkrra</em></td>
<td><em>alkirra</em></td>
<td><em>alkirra</em></td>
<td><em>alkvrra</em></td>
</tr>
<tr>
<td></td>
<td>/alkra/</td>
<td>/alkira/</td>
<td>/alkira/</td>
<td>/alkara/</td>
</tr>
<tr>
<td></td>
<td>[alkara]</td>
<td>[alkira ~ alkura]</td>
<td>[alkara]</td>
<td>[alkara]</td>
</tr>
<tr>
<td>name</td>
<td><em>ekrra</em></td>
<td><em>ekirra</em></td>
<td><em>akirra</em></td>
<td><em>ekirra</em></td>
</tr>
<tr>
<td></td>
<td>/ekra/</td>
<td>/ekira/</td>
<td>/aki*ri/</td>
<td>/ekira/</td>
</tr>
<tr>
<td></td>
<td>[ekara]</td>
<td>[ekira]</td>
<td>[ekira ~ ekira]</td>
<td>[ekira]</td>
</tr>
<tr>
<td>house</td>
<td><em>ahkra</em></td>
<td><em>alikira</em></td>
<td><em>alhikira</em></td>
<td><em>alhvkr</em></td>
</tr>
<tr>
<td></td>
<td>/a<em>lk</em>ãa/</td>
<td>/a<em>liki</em>ãa/</td>
<td>/a<em>liki</em>ãa ~ a<em>li</em>ku*ãa</td>
<td>/a<em>la</em>ãa/</td>
</tr>
<tr>
<td></td>
<td>[a<em>la</em>ãa]</td>
<td>[a<em>li</em>ka~a ~ a<em>lu</em>ku*ãa]</td>
<td>[a<em>la</em>ãa]</td>
<td>[a<em>la</em>ãa]</td>
</tr>
<tr>
<td>big</td>
<td><em>arma</em></td>
<td><em>aruma</em></td>
<td><em>arimwa</em></td>
<td><em>arvma</em></td>
</tr>
<tr>
<td></td>
<td>/a<em>mu</em>ãa/</td>
<td>/a<em>mu</em>ma/</td>
<td>/a<em>mu</em>wa/</td>
<td>/a<em>mu</em>ma/</td>
</tr>
<tr>
<td></td>
<td>[a<em>mu</em>ãa ~ a<em>mu</em>ma]</td>
<td>[a<em>mu</em>ma ~ a<em>mu</em>ma]</td>
<td>[a<em>mu</em>ma ~ a<em>mu</em>ma]</td>
<td>[a<em>mu</em>ãa ~ a<em>mu</em>ma]</td>
</tr>
</tbody>
</table>

As can be seen from these tables, the different authors sometimes propose different vowel qualities in the same word. The transcriptions of the non-low vowels in ‘house’, for example, range from mid-central [ɔ] (Heath) to high-central [i ~ u] (Stokes) to high-back [u] (Leeding). This variation could be due to the different underlying qualities that they assume: Stokes and Leeding take it to be an underlying high vowel, and therefore the allophone remains high. Heath believes this vowel to be an epenthetic schwa, which can obtain rounding from the following bilabial.

There are problems with each of the previous accounts. Firstly, [i], [ə] and [u] are not always short and indistinct, as Heath claims them to be, but they can also be full, non-reduced vowels that receive primary stress. This makes them unlikely to be epenthetic. Secondly, [i] and [ə] also appear in non-conditioning environments: in fact, [i] occurs everywhere except preceding retroflex consonants and rounded velars; and [ə] occurs everywhere except preceding lamino-palatals and rounded velars. This suggests that /ə/ and /i/ are both phonemic, with the contrast neutralised preceding retroflexed consonants (where only [ə] occurs), and preceding lamino-palatals (where only [i] occurs). The vowel [ɛ] also occurs in virtually every environment, except preceding retroflexes. It contrasts with all other vowels, so there is no reason to analyse it as an allophone, as Leeding claims. The environments in which [u] occurs, on the other hand, are limited, and its distribution is fully predictable. Following Heath and Leeding, but contrary to Stokes, I analyse it as an allophone. The next sections present a revised analysis of Enindhilyakwa vowels.

### 2.6.2 A four-vowel system

Table 2.7 (p.53) and Table 2.8 (p.54) lay out the distribution of the Enindhilyakwa vowels (due to space limitations the glosses of the frozen noun class markers are omitted here). Table 2.7 displays...
the various vowels that can be found preceding the existing consonants (disregarding the complex segments), and Table 2.8 the vowels that follow the consonants. The tables only include inherited words, as loanwords may be phonologically aberrant. Most examples involve open syllables, as these are by far the most common.

For vowels preceding /l/, /ɭ/, /ɾ/ and /n/, which are the only permitted codas, two examples are given where available: in the first one the apical occurs in the onset (i.e. the syllable is open), and in the second example the apical is a coda and the syllable is closed. Alveolar /l/ can only occur in coda position. Alveolar /t/ and retroflex /ɭ/ are very rare.

Several things stand out from Table 2.7. First of all, /a/ is the only phoneme that occurs in every environment. All other vowels are restricted in their distribution. Secondly, apart from [a], only [u] can precede labio-velar /w/ and labialised velars /ɛw/ and /ɛŋw/; [i] and [ə] cannot, and [ɛ] is rare here (there are only a few examples of [ɛkʷ], and no *[ɛw] or *[ɛŋw]). Thirdly, [ʊ] never appears before a palatal consonant. And fourthly, [ɛ] and [i] never appear before a retroflex. In the other environments all vowels occur; the gaps in the data preceding /t/ is presumably due to the scarcity of this consonant, which can also be said of the absence of [ə] preceding /l/.

These observations suggest that some of the contrast [a], [i], [u], [ɛ] and [ə] are neutralised in certain environments: preceding the labio-velar and labialised velars only [a] and [u], and perhaps also [ɛ] occur, preceding palatals only [a], [i], [u], and [ɛ] occur; and preceding retroflexes only [a], [ə], and [u].

Having a closer look at [u] reveals that when this vowel precedes consonants other than /w/, /kʷ/ or /ŋw/, it always follows a velar or /w/. This velar can be shown to be underlyingly labialised. Consider the following pairs:

(70) a. yu-ku-na [jukuna] ‘1/2-give-NP2’
    b. yu-kwa [jukʷa] ‘1/2-give.PST’

(71) a. na-jungu-na [nacuŋuna] ‘NEUT-die-NP2’
    b. narri-jungwa-ji-na [nariuŋwacina] ‘3a/NEUT-die-CAUS-NP2’

In the (a) examples we find a velar consonant followed by [u]. In the (b) examples this velar is labialised and followed by [a]. Besides contiguous to /w/, this is the only environment where [u] can occur: following phonetic velars with an underlying representation as a labialised velar, as in the (a) examples, or preceding labialised velars.
<table>
<thead>
<tr>
<th>Consonant</th>
<th>a ~ æ</th>
<th>ɛ</th>
<th>ɔ ~ ʊ</th>
<th>i ~ i</th>
<th>u</th>
</tr>
</thead>
</table>
| labio-velar | _k | a'jak' a  
‘word’ | ju'wek' a  
‘mudskipper’ | [juk' a  
‘maybe’] | |
| _ŋ | g'jaŋ'  
‘1.PRO.POSS’ | | | | |
| _w | a'rawa  
‘inside’ | | | | ama'muwa  
‘round’ |
| velar | _k | ji'aka  
‘diggeridoo’ | ek'ãa  
‘burnt bush’ | 'mamäka  
‘bandicoot nest’ | mama'jika  
‘east wind’ | muku'muk' a  
‘deep sea’ |
| _ŋ | miči'anja  
‘ship’ | ene'mina  
‘breast’ | a'ŋenha  
‘head’ | mama'cinka  
‘murder’ | -cu'nu-na  
‘die-NP’ |
| _c | ja'jaca  
‘goanna’ | mi'jcca  
‘paddle’ | a'wica  
‘mist’ | 'kuca  
‘look!’ |
| _n | ak'a'ra  
‘soft’ | e'ŋa  
‘runny nose’ | ja'niŋa  
‘bristle worm’ | a'ŋuŋa  
‘pus’ |
| _ʃ | a'k'aa  
‘fish’ | miči'je'ā  
‘beach’ | ama'li'ā  
‘a cough’ | ama'ku'ua  
‘skin’ |
| _j | ɲajuwa  
‘1 SG.PRO’ | jeja  
‘footsteps’ | ja'mpija  
‘throat’ | | |
| retroflex | _l | ma'kaṭa  
‘sea’ | j̪aṭa  
‘supplejack’ | akutu'kuta  
‘taboo’ |
| _ŋ | ji'ŋaṇa  
‘snake’ | amo'ŋena  
‘stingray’ | ju'kuna  
‘bailer shell’ |
| _l | maļu'wiJa  
‘emu’ | juwa'kura  
‘kneecap’ | amarōga  
‘heron’ | | 'moj' a  
‘belly’ |
| _t | ek'ãa  
‘burnt off bush’ | ma'maŋmpa  
‘bold’ | a'ja'japa  
‘bone’ | a'maŋja  
‘dark’ |
| _p | eni'ŋapa  
‘good’ | e’mepa  
‘song’ | a'p'ŋepa  
‘soon’ | a'ŋpe  
‘dry land’ | apa'kupa  
‘over there’ |
| _m | ji'jama  
‘bug’ | me'ma  
‘this’ | a'joma  
‘big’ | jima  
‘faeces’ | apo'kuma  
‘creek lily’ |
| interdental | _d | 'ma`ja  
‘ear’ | e'jara  
‘mouth’ | i'ŋaja  
‘strong’ | -i'ja-  
‘to chop’ | juku'uku'ja  
‘chest’ |
| _p | ji'ni`apa  
‘nail’ | ji'me` mẽ`a  
‘tortoise’ | jë`no`a  
‘mosquito’ | ji'nu`apa  
‘nail’ |
| _l | a'ŋ a'la  
‘crab’ | me'juwa  
‘shell sp.’ | ma'moja  
‘gills’ | ji'jaca  
‘half moon’ | ju'ŋu'ja  
‘treapang’ |
| alveolar | _t | ʧora pata  
‘spear’ | wi'jita  
‘straight’ | | |
| _n | anka  
‘hip’ | ʧli'  
‘salt’ | me'na`  
‘fall-NP’ | eŋe'mina  
‘breast’ | -cu'nu-na  
‘die-NP’ |
| _l | mi' jär`a  
‘low tide’ | jiłpi' jiłpa  
‘desert’ | | apu'kuma  
‘creek lily’ |
| _r | 'mara  
‘wattle tree’ | me' 'mepa  
‘eye’ | a'lkara  
‘herring’ | mo'irpa  
‘back’ | a'nu  
‘very’ | ma'kuk' a  
‘pandanus’ |

Table 2.7: Vowel distribution in Enindhilyakwa by following consonant
Table 2.8: Vowel distribution in Enindhilyakwa by preceding consonant

<table>
<thead>
<tr>
<th>Consonant</th>
<th>Vowel</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a ~ æ</td>
<td>μ</td>
<td>'fish'</td>
</tr>
<tr>
<td>e</td>
<td>μ</td>
<td>'heat'</td>
</tr>
<tr>
<td>ə ~ ɔ</td>
<td>ə</td>
<td>'daughter in law'</td>
</tr>
<tr>
<td>i ~ i</td>
<td>ə</td>
<td>'water'</td>
</tr>
<tr>
<td>u</td>
<td>aw</td>
<td>'bad'</td>
</tr>
<tr>
<td>k &lt; sup&gt; w &lt; sub&gt;</td>
<td>a'k &lt; sup&gt; w &lt; sub&gt; ə &lt; sup&gt; a</td>
<td>'coral'</td>
</tr>
<tr>
<td>ɲ &lt; sup&gt; w &lt; sub&gt;</td>
<td>a'ɲ &lt; sup&gt; w &lt; sub&gt; ə &lt; sup&gt; a</td>
<td>'baby boy'</td>
</tr>
<tr>
<td>w</td>
<td>w</td>
<td>'water'</td>
</tr>
<tr>
<td>k</td>
<td>a'k &lt; sup&gt; a</td>
<td>'to look at'</td>
</tr>
<tr>
<td>ɲ</td>
<td>a'ɲ</td>
<td>'language name'</td>
</tr>
<tr>
<td>c</td>
<td>a'ɲa</td>
<td>'nail'</td>
</tr>
<tr>
<td>j</td>
<td>ja</td>
<td>'fish'</td>
</tr>
<tr>
<td>l</td>
<td>ma</td>
<td>'necklace'</td>
</tr>
<tr>
<td>n</td>
<td>aŋ</td>
<td>'again'</td>
</tr>
<tr>
<td>p</td>
<td>a'mpaka</td>
<td>'lid'</td>
</tr>
<tr>
<td>m</td>
<td>ma</td>
<td>'wattle tree'</td>
</tr>
<tr>
<td>ɬ</td>
<td>ama ɬə &lt; sup&gt; nk &lt; sub&gt; a</td>
<td>'meat'</td>
</tr>
<tr>
<td>n</td>
<td>ji,na</td>
<td>'nail'</td>
</tr>
<tr>
<td>l</td>
<td>ji, ɬ</td>
<td>'half moon'</td>
</tr>
<tr>
<td>t</td>
<td>atɔ</td>
<td>'hot'</td>
</tr>
<tr>
<td>n</td>
<td>naŋ</td>
<td>'baby boy'</td>
</tr>
<tr>
<td>l</td>
<td>ma'rák</td>
<td>'coral'</td>
</tr>
</tbody>
</table>

Table 2.8: Vowel distribution in Enindhilyakwa by preceding consonant
Following Heath (n.d.) and Leeding (1989), I propose that [u] is not a phonemic vowel in Enindhilyakwa, but is generated by surrounding round consonants. When following a labialised velar, this labialisation is absorbed by [u]. This claim is supported by the data in Table 2.8: [u] only occurs following non-labialised velars, where it contrasts with all other vowels. [u] is absent after [kʷ] and [ŋʷ]. The fact that [i] and [ə] are also absent here suggests that these are the underlying phonemes from which [u] is generated. Only [a] and [ɛ] can follow [kʷ] and [ŋʷ]. The semi-vowel /w/, however, is different: firstly, it preserves its rounding when followed by [u]. And secondly, it can be followed by [i] - but only when followed by a conditioning palatal consonant. Thus, whereas *[kʷi] and *[ŋʷi] are unattested combinations in Enindhilyakwa, the sequence [wi] is possible.

Table 2.8 also shows that [ɛ] and [i] can follow retroflex consonants (whereas they cannot precede them in Table 2.7). The gap in the data following /ɭ/ is due to this consonant being extremely rare. However, [i] after a retroflex is rare, and only happens when a palatal consonant is involved. The semi-vowel /ɭ/ is different, because here [i] can occur without a conditioning factor.

2.6.2.1 Distinctive features

These complex patterns are expressed in the following sections as phonological rules. Here it is helpful to represent the phonemes involved in terms of units below the level of the phoneme: distinctive features. A phoneme can be represented as a bundle of features in a feature matrix, as first formalised by Jakobson (1941) and further elaborated in Chomsky & Halle (1968). These features are needed so that rules can make reference to classes of sounds (Carr 1993: 154). The matrices with the required features for the Enindhilyakwa rules are presented in Table 2.9 (vowels) and Table 2.10 (consonants) on the next page. The vowel table includes both phonemes and allophones. The most relevant features for the phonological rules are place features. Concerning the consonants, no distinction is needed between dentals and alveolars.

Labio-velar /w/, the labialised velars /kʷ/, /ŋʷ/, /ŋkʷ/, and the complex segments /kp/, /ŋp/, /ŋm/ are a problem, because they have the dual articulation labial+velar, so they are [-anterior] and [+anterior]. These segments are distinguished from /kp/, /ŋp/, /ŋm/ by making the latter [+anterior, +high], to reflect their dual nature where neither place of articulation is primary. The labialised velars are labelled [-anterior, +high], which mirrors the principle that the velar stop is the primary articulation, with labialisation being secondary (the rounding is represented for both sets of consonants by an additional feature [+labial]. Although this overlaps with the feature [+anterior], it is necessary to distinguish between the rounded velars /kʷ/, /ŋʷ/, /ŋkʷ/ and the unrounded velars /k/, /ŋ/, /ŋk/). Labio-velar /w/, then, is labelled [-anterior, +high] as well, on a par with the labialised velars.
Table 2.9: Distinctive features: vowels

<table>
<thead>
<tr>
<th></th>
<th>high</th>
<th>low</th>
<th>front</th>
<th>labial</th>
<th>back</th>
<th>long</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>e</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>u</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>o</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ə</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ɛ, æ</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>a</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 2.10: Relevant distinctive features: consonants

The phonological system treats the vowels /a/, /ɛ/ and [e] as long, because they attract the stress. The feature [long] is also needed for the phonological rules, to distinguish /i/ and /ɑ/, which are [-low, -labial, -long], from /ɛ/, which is [-low, -labial, +long]. Some phonological rules apply to the former but not to the latter. Note that the vowel feature [front] is equivalent to the consonant feature [anterior].

With the distinctive features in place, the rounding of [u] can be expressed as the following two rules:

(72) P-2: vowel rounding and backing 1
\[
V_{[-\text{low, -labial, -long}] > V_{[-\text{labial}]}} / \underline{C_{[-\text{anterior, +high, +labial}]}}
\]
  i.e. /i/ and /ɑ/ assimilate in place to a following labialised velar consonant

(73) P-3: vowel rounding and backing 2
\[
C_{[-\text{anterior, +high, +labial}] V_{[-\text{low, -labial, -long}] > C_{[-\text{anterior, +high, -labial}] V_{[-\text{labial}]}}}
\]
  i.e. /i/ and /ɑ/ absorb the labialisation of a preceding labialised velar consonant, which loses its rounding

For example, the underlying form of [amukura] ‘NEUT.face’ is /amVkwVra/, where /V/ represents /i/ or /ɑ/. The first /V/ assimilates to the following rounded velar (P-2) and is realised as [u], while the second /V/ absorbs the rounding of /kʷ/, which loses its rounding (P-3): /kʷV/ > [ku].
Before rounded dorsals, only [u] occurs; before unrounded dorsals only [i] and [ə] occur, as illustrated in (74). The vowels [a] and [ɛ] are the only vowels that can precede rounded and non-rounded consonants:

(74) ayakwa [ajakʷa] ‘NEUT. word’  
   ekwa [ekw³a] ‘NEUT. head support’  
   mamanka [mamaka] ‘VEG. bandicoot’s nest’  
   mamarika [mamarika] ‘VEG. southeast wind’  
   mamukwa [mamukʷa] ‘VEG. spirit’s eye’

There are some complications to the rounding and backing rules, namely when there are also palatal consonants involved. These complications are addressed in section 2.6.5.

2.6.3 The phoneme /a/ and its allophones [æ], [aʊ], [ə], [ɛ]

Low-central [a] is the only vowel that occurs in every environment. The distribution of all the other vowels is restricted. [a] may vary with [æ] when adjacent to a lamino-palatal consonant (see also Leeding 1989: 46):

(75) ayakwa [ajakʷa ~ æjakʷa] ‘NEUT. word’  
   yaraja [jəːka ~ jæːka] ‘MASC. goanna’  
   awinyamba [awıɲampa ~ awıɲępma] ‘NEUT. anger’

This variation is expressed as vowel-fronting rule P-4:

(76) P-4: vowel fronting rule 1 (optional)  
\[ V^{[-low, +front]} > V^{[-low, +front]}/ \]  
\[ C^{[+coronal, +high]} \]  
\[ C^{[+coronal, +high]} \]  
\[ i.e. /a/ is fronted to [æ] by an adjacent lamino-palatal consonant \]

Furthermore, [a] may also assimilate in place to a following labio-velar or labialised velar and produce the offglide [aʊ].

(77) Enindhilyakwa [ɛnĩɲiːkʷa ~ ɛnĩɲiːkʷkʷa] ‘NEUT. language name’  
   jarrangwa [karaŋ¹a ~ karaŋ⁷¹⁸a] ‘horse(NEUT)’ (< Mac jarrang)  
   arrawa [aɾawa ~ aɾaw⁹wa] ‘inside’

The assimilation of /a/ to following labialised velars supports the unit phoneme status of the latter. Several authors transcribed the language name with the offglide: Andilhaugwa (Capell 1942), Enindiljaugwa (Worsley 1954a,b), Anindilyaugwa (Moody 1954), Ānindiljaugwa (Turner 1974).

When /a/ appears in an unstressed syllable, it may be reduced to [ə]. However, since /a/ is rather long and thus functions as a stress attractor, this is rare; it only happens when two consecutive syllables both contain /a/ and one attracts the stress.
The [a] vowels in these examples do not obtain rounding from the contiguous consonants, as they are an underlying /a/, and not /əə/. An /a/ vowel may be conditioned by a high front vowel in the next syllable and raise to become [e]. This is especially common in the pronominal prefixes (79), but also happens in lexical words, as in (80):

(78)  a-m+akulya  [ˌamaˈkuːa ~ ˌamaˈkuːa]  ‘NEUT-INALP+skin’
    mamarika  [ˌmanaˈʃika ~ ˌmanaˈʃika]  ‘VEG.south east wind’

This pattern is expressed as i-umlaut rule P-5 (reminiscent of Leeding’s Vowel Fronting Rule 2):

(81)  P-5: i-umlaut: (optional)
V [+low, -front] > V [+low, +front] / ___ C(C)V [+front]

i.e. /a/ is fronted by [i] or [e] in the next syllable

There is another variation between [a] and [e], which is accompanied by an apical contrast (section 2.5.8). The tense/aspect suffixes of some conjugational classes vary between ...a-na and ...e-na, where the retroflex nasal is preceded by a low vowel, and the alveolar nasal by a front vowel (these vowels are analysed as belonging to the verb stem rather than to the suffix - see Chapter 6). Both variants exist alongside each other, such as -lhvka-rna ~ -lhvke-na ‘go-p2’. It is impossible to tell what the underlying phoneme is, but we can observe that the vowel contrast [a] - [e] that accompanies the apical contrast is expected given the compatibilities between vowel place and apical place (i.e. anterior coronals may condition vowel fronting and retroflex coronals may condition vowel retraction; Flemming 2003).

When /a/ comes into contact with /i/ across a morpheme boundary, the two vowels merge to become [ɛ] or [ɛ: ~ e:]. There is some variation between the two, but the choice between them appears to be primarily dependent on stress: [ɛ: ~ e'] mostly occurs in penultimate position, which receives primary stress, and [ɛ] mostly occurs in prefixes, which have secondary stress. The contraction of the two vowels can be best observed for stems starting with /i/ with flexible prefixes, such as verbs, demonstratives and adjectives. The stem forms change when the NEUT noun class prefix a- is involved, compared to the stem form when combined with the other noun classes or gender prefixes: the NEUT prefix merges with stem-initial /i/ to become [ɛ], whereas the
stem-initial /i/ is maintained for the other prefixes. This is illustrated here for the demonstrative -ibina ‘that (unseen)’ (see section 3.4.1 for the noun class and gender prefixes paradigms).

(82)  NEUT:  /a-ipina/  ['ɛpina]  FEM/3f:  /ję-pipina/  ['jępipina]
VEG:  /m-ipina/  ['mipina]  COLL/3a:  /wu-r-pipina/  [wu'ripina]
MASC:  /j-ipina/  ['jipina]

The NEUT class stem contrasts with stems starting with /a/, as this is unchanged for NEUT class nominals. This is illustrated in (83) for the adjective arvma ‘big’:

(83)  NEUT:  /a-arvma/  [aɾɨma]
VEG:  /m-arvma/  [maɾɪma]
MASC:  /j-arvma/  [jaɾɪma]

To account for these data, I propose the following phonological rules (cf. Heath n.d.):

(84)  a. /a + a/ > [a]
     b. /a + i/ > [ɛ]  (to be modified in [89] below)

These rules also apply to nouns. The noun class prefix on a noun is lexicalised and cannot be replaced or omitted. However, there are some pairs of nouns that formally differ only in their class marker. Usually they have a related meaning. In the following sets of examples the NEUT class nouns involve [ɛ] and the VEG class nouns [mi].

(85)  ekirra  [ɛkɪɾa]  ‘NEUT.name’  (i.e. /a+ikɪɾa/)
      mikirra  [mɪkɪɾa]  ‘VEG.spike rush’  (i.e. /m+ikɪɾa/)

(86)  engeemina  [ɛɲɛmɪna]  ‘NEUT.breast’  (i.e. /a+ɲɛmɪna/)
      mingeemina  [miɲɛmɪna]  ‘VEG.undeveloped breast’  (i.e. /m+ɲɛmɪna/)

The underlying stem forms of these nominals are analysed as involving a stem-initial /i/. Although synchronically the noun class prefix is inseparable from the stem, historically the initial [ɛ] of some NEUT class nouns results from a merger of the class prefix /a/ plus stem-intial /i/.

Further evidence for the rule in (84b) comes from prefixes on the verb. For example, the intransitive ‘1’ and ‘3a’ pronominal prefixes are /naŋ/ and /na/, respectively. As usual, an epenthetic vowel is inserted when two consonants meet at the boundary between a prefix and a stem, as in (87a). This does not happen for prefixes ending in a vowel (87b). For some verbs, however, the ‘3a’ prefix becomes [nɛ], as in (88b).

(87)  a. /naŋ-]akaka/  [naŋaŋ,akaka]  ‘I am going’
     b. /na-,]akaka/  [na,]akaka]  ‘they are going’
a. /naŋ-ŋinkaŋa/ [niŋŋikaŋa] ‘I broke’
b. /naŋ-ŋinkaŋa/ [neŋkaŋa] ‘they broke’

The stem -ingkarrnga ‘break’ in (88) has an initial /i/ vowel. When combined with the prefix nvng- this /i/ is preserved and triggers raising of the central vowel in the prefix to [i] (i-umlaut P-5). When following the prefix na-, the two vowels combine and become [ɛ].

There is one noun that behaves differently in that its prefix is [eɪ ~ eː], not [ɛ]. This is [e'ka ~ eːka] ‘NEUT.tree, wood, log’. To my knowledge this is the only nominal that has a word-initial diphthong [eɪ] varying with a long vowel [eː], rather than an [ɛ]. Interestingly, Tindale (1926) writes this word as eiga, Heath (n.d.) as ayika, while Stokes notes that the word eka [e'ka] has a permissible but rare alternative [e'jika] (1981: 155). I suggest that these alternative pronunciations in fact confirm the phonological rule in (84b) above, if one refinement is made:

(89) P-6: merger of /a/ and /i/
   a. /a + i/ > [ɛ] (in secondary stress position, e.g. prefixes)
   b. /a + i/ > [eɪ ~ eː] (in penultimate, primary stress position)

The noun [e'ka ~ eːka], although synchronically frozen, historically derives from the noun class marker /a/ plus the stem /ika/. The long vowel/diphthong [eɪ ~ eː] always occurs in a primary stress position. Compare eeka to ekalhara ‘NEUT.burnt off bush’, which presumably contains the same morpheme /ika/:

(90) eeka [ˈeɪka ~ ˈeːka] ‘NEUT.tree, wood, log’
    ekalhara [ˌɛkaˌlaʃa] ‘NEUT.burnt off bush’

The first syllable of [eʃaˌlaʃa] receives secondary stress and is realised as [ɛ]. The alternative representations [ajika] (Heath) and [eʃjika] (Stokes) support the analysis of /a+ika/ [e'ka ~ eːka], because these may represent the same word before merging of the two vowels. In other words, Heath’s and Stokes’ informants did not yet apply this rule. The semi-vowel /j/ is often put between two vowels in the orthographies of all authors, but in some cases it is almost inaudible. It seems that /j/ is only present to show that the two vowels do not form a diphthong, but that they are two individual vowels. [ajika] and [eʃjika] then both represent /a+ika/, without application of the phonological rule. In Stokes’ transcription [eʃjika] the noun class marker /a/ is raised by the following /i/. This would then be an intermediate stage between [ajika] and [eʃika].

The incorporated nominal ika- ‘fire, firewood’ (Wubuy: yika- ‘fire’) further confirms the existence of the morpheme [ika]:

(91) a. ...warnv-k-ika-waraki=yadha...
   3a.m-NSR-fire-carry=PURP
   ‘…so they could carry the fire [with them]’ (GED p.198)
b. *yirr-ikeka-ngamba-ju-wa-ma*  
1a/NEUT-RDP-fire-bathe-CAUS-P2  
‘we put out the fire with water’  

(‘Awurukwa’ w40)

In the last example, the morpheme *ika-* is reduplicated /ika-ika/ [ikɛka].

The morpheme [ika] is also attested as the ‘emphatic’ clitic =ika (see Stokes 1982; Leeding 1989; WD). This clitic can be added to any type of word, and creates the diphthong [eɪ] or long vowel [eː], as in (92).

(92)  
a. /aɭəәma=ika/ [aɭəika ~ aɭme:ka] ‘very big’ (anin3_dl_au_001)  
b. /amakwVəme:ka=a=ika/ [amakuɭeika ~ ...e:ka] ‘enormous’ (anin3_dl_au_001)

Stokes (1982: 134-5) interprets this clitic as =ka, where the /k/ raises and fronts the preceding /a/ to [eː]. However, /a/ vowels are not normally raised and fronted when followed by a [-coronal, +high] consonant, but merely when followed by [+coronal, +high] consonants (rule P-4). I propose that the emphatic clitic is =ika, and that the contraction of /a/ and /i/ applies here as well. The diphthong/long vowel occurs in penultimate position and receives primary stress.

To summarise, the phoneme /a/ has five allophones:

- [a] in all environments
- [æ] when preceding [+coronal, +high] consonants (P-4: e.g. [ajakwa ~ æjakwa] ‘word’)  
- [aʷ] when preceding [-anterior, +labial, +high] consonants (e.g. [eniŋiŋakwa ~ eniŋiŋaŋwa])  
- [œ] in unstressed syllables (e.g. [,amaˈkuːa ~ ,amaˈkuːa] ‘skin’)  
- [ɛ] by i-umlaut (P-5: /na-peqki-na/ [nɛpɛkina] ‘3a-drink-NP2’)

These allophones are represented as their underlying quality in the orthography. When /a/ is followed by /i/ these vowels coalesce, resulting in e [ɛ] (non-primary stress) or ee [eɪ ~ eː] (primary stress) (P-6).

### 2.6.3.1 Word-final [a]

Since all words end in [a], we need a rule that a rule that adds [a] for words ending in a consonant (P-7A). We also need a rule that converts underlying different word-final vowels to [a] (P-7B).

(93) P-7A: Ø > a / C__ #  
i.e., epenthetic [a] occurs where words would otherwise end in a consonant  
e.g. /jara/ [jara] ‘fall.NP1’

---

23 This word is interpreted and glossed differently in the original material. What I take to be a reduplicated form *ikeka-ikə-ika/ [iɪkɛka], is interpreted as *kek-, which is glossed as ‘light source’. The vowels at both sides of *kek- are interpreted as epenthetic vowels, so that in the original material this verbal word is written as *yirri-keki-ngambajuwama, with both i vowels being epenthetic (i can stand for [a] in the Stokes/Waddy orthography). In my analysis the incorporated morpheme is *ikeka-, where the final /a/ vowel is unstressed and can be realised as [ə].

24 Again, it is unclear whether e stands for [ɛ] or [e] in the Stokes/Waddy orthography. I presume here it means [e].
The existence of these rules receives some support from Tindale’s (1926) list of about 500 vocabulary items (mostly nouns).25 Most of these end in [a], but not all. Some end in a consonant, such as (original orthography): matt ‘ear’ (current spelling: madha) and iyungder ‘backbone’ (current spelling: ?). These words support the existence of rule P-7A that inserts word-final [a] in the modern language. Other items in Tindale’s list end in a vowel other than [a]: e.g. ilyaku ‘honey’ (current spelling: yilyakwa), towateru ‘white cockatoo’ (currently: dhuwedhvrra), mempe ‘eye’ (currently: menba), and yokoroko ‘frogmouth’ (currently: yukurrkwa). These vocabulary items support the existence of rule P-7B that converts word-final vowels to [a].

The underlying status and quality of the word-final [a] is often hard to determine, which may be expected given that it can be epenthetic. We can investigate this by looking at the behaviour of the vowel when followed by a suffix. If it is underlying /a/, it is not expected to assimilate to a following consonant, or only just slightly (e.g. /a/ may be realised as [a] when followed by /w/); whereas non-low vowels are expected to fully assimilate in place. The suffix needs to be monosyllabic, because the vowel in question should receive primary stress (in unstressed positions, any vowel may be realised as [ə]). Primary stress usually falls on the penultimate syllable of the word, never on word-final [a].26

There are only two monosyllabic suffixes: the common ‘1st person focalisation marker’ -ma on verbs (section 6.7), and the allative case suffix -wa. The underlying quality of the suffix-final vowel is relatively straightforward for the verbal tense/aspect suffixes: an underlying /a/ is preserved when followed by -ma, whereas an underlying /i/ may assimilate to [ʊ]. This is illustrated in (95) for the form -ngambe-na [ŋampe-na], which is ambiguous between a non-past and a past reading. However, when followed by the -ma suffix, these tense suffixes are distinct:

(95) a. -ngambe-na [ŋampe-na] ‘bathe-TENSE’
    b./ŋampe-na-ma/ [ŋampe-nama] ‘bathe-NP2-ma’
    c./ŋampe-na-ma/ [ŋampe-nama ~ ŋampe-noma] ‘bathe-P2-ma’

For the NP2 suffix [a] quality is preserved, whereas the underlying quality for the P2 suffix turns out to be /a/. This is the approach taken in Chapter 6, which examines the tense/aspect suffixes.

25 Tindale makes no orthographic distinction between apico-alveolars and lamino-dentals, or between the retroflex and apico-alveolar rhotic. Furthermore, it is unclear whether his o represents [o] or [u]. The Wubuy correspondence to Tindale’s yokoroko ‘MASC.frogmouth’ (current spelling: yukurrkwa) is yikurrku ‘owl’, suggesting Tindale’s o could represent [u].

26 Or more precisely: stress rarely falls on word-final [a]. There are some di- or tri-syllabic words where the final [a] may have some energy, but only when the preceding vowels are /i/ or /I/. Examples are dhvrrvkba [d₃uᵽᴚkpa] ‘FEM.plover’ and yikba [jᵽkpa] ‘MASC.pheasant’ (anin2_pw_au_002). Note that both final [a] are preceded by the complex consonant kb.
The situation is less clear for nominals, because there is a lot of variation (as also noted by Stokes 1981 and Leeding 1989). Whereas in lexical roots [a] readily appears before a labio-velar, as in [awa] ‘NEUT.liver’, which possibly exhibits only minor assimilation (i.e. [a⁰wa]), in word-final position [a] is not so stable. When followed by the ALL suffix -wa, the final [a] of a noun stem often varies between [a ~ a⁰] and [u], as in the following data.

For a handful of nouns, however, my informant only approved of one form (ani4_dl_au_004):

This pattern, of some stem-final vowels varying between [a ~ a⁰ ~ u] when followed by a suffix starting with /w/, while others only show [u], is difficult to explain, because the vowel /a/ normally does not assimilate to a following round consonant. My guess is that the nouns that show the variants have an underlying /a/ vowel, which can optionally - and exceptionally - assimilate to the following /w/ and become [u]. Those nouns that only show [u] when followed by the -wa suffix have a different underlying vowel, probably /i/ or /a/, which always assimilates to [u].

For the forms ending in a labialised velar plus a vowel, such as [ama,taŋkʰa] ‘meat’ in (97c), this hypothesis is confirmed by corresponding forms in other languages, which also do not end in [a]. The Wubuy form of ‘meat’ is [ŋaŋku], and the reconstructed proto-Gunwinyguan form is *[ŋaŋku] (Alpher, Evans & Harvey 2003) (*[ŋ] > [ŋ] in Wubuy is a regular sound change; see Chapter 9). The final /ku/ in the Gunwinyguan languages has been reanalysed as /kʰV/ in Enindhilyakwa: when word-final, it becomes [kʰa], due to rule P-7B, but elsewhere it is invariably realised as [ku] due to rule P-3 (e.g. [ama,ŋaŋkuwa]). In non-final position [ku] contrasts with [ka ~ ko] and [ka]:

It has however not been tested whether [a,âkamaŋca] and [ɛːkomança] are also accepted by speakers. I conclude that, except for words ending in [kʰa], [ŋʰa] and [ŋkʰa], where the surface [a] does not represent the underlying quality, it often impossible to tell whether the word-final phonetic [a] is also its underlying quality. There are three possibilities: (i) the surface vowel could
represent the underlying quality; (ii) it could be an epenthetic vowel inserted by rule P-7A; or (iii) it could be a different vowel converted to [a] by rule P-7B. I will thus represent this vowel as a in word-final position, and as its surface quality when followed by a suffix.

2.6.4 The phoneme /ɛ/
The vowel /ɛ/ is the least common of all phonemes. This vowel was argued above to be an allophone of /a/ due to i-umlaut (rule P-5), or to result from a merger of /a/ + /i/ (P-6). However, [a] and [ɛ] also contrast, as noted by all previous authors (data are from JS1 p.152; VL1 p.61):

<table>
<thead>
<tr>
<th>(99)</th>
<th>marra</th>
<th>[mara]</th>
<th>‘VEG.pale-barked wattle tree (Acacia auriculiformis)’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>merra</td>
<td>[mɛra]</td>
<td>‘VEG.blood, string, rope’</td>
</tr>
<tr>
<td>(100)</td>
<td>arra</td>
<td>[aɾa]</td>
<td>‘NEUT.forehead’</td>
</tr>
<tr>
<td></td>
<td>erra</td>
<td>[ɛɾa]</td>
<td>‘NEUT.vomit’</td>
</tr>
<tr>
<td>(101)</td>
<td>mandha</td>
<td>[maŋp,a]</td>
<td>‘VEG.heron’</td>
</tr>
<tr>
<td></td>
<td>yimendha</td>
<td>[jimeŋp,a]</td>
<td>‘MASC.turtle’</td>
</tr>
<tr>
<td>(102)</td>
<td>adhvrra</td>
<td>[aɾəɾa]</td>
<td>‘NEUT.some’</td>
</tr>
<tr>
<td></td>
<td>edhvrra</td>
<td>[ɛɾəɾa]</td>
<td>‘NEUT.mouth’</td>
</tr>
<tr>
<td>(103)</td>
<td>karra</td>
<td>[kara]</td>
<td>‘do you agree?’</td>
</tr>
<tr>
<td></td>
<td>kerra</td>
<td>[kɛɾa]</td>
<td>‘oh, you’re hurt!’</td>
</tr>
<tr>
<td>(104)</td>
<td>angamba</td>
<td>[anŋampa]</td>
<td>‘where?’</td>
</tr>
<tr>
<td></td>
<td>angemba</td>
<td>[anŋɛmpa]</td>
<td>‘NEUT.place’</td>
</tr>
</tbody>
</table>

[ɛ] also contrasts with the other vowel phonemes, and with [u]:

| (105)    | mebina       | [mpipina] | ‘VEG.wattle tree’                                  |
|          | m-ibina      | [mɨpina] | ‘VEG-that.same’                                    |
| (106)    | e-memberrkwa | [emɛmpərkʷa] | ‘NEUT-ten’                                         |
|          | mabarrkwa    | [maŋpərkʷa] | ‘VEG.fighting stick’                               |
|          | membvrrkwa   | [mɛŋpərkwa] | ‘VEG.ironwood tree’                                |
|          | mangkurrkwa  | [maŋɛkʷarkwa] | ‘VEG.pandanus’                                     |
| (107)    | yuwekwa      | [juwɛkʷa] | ‘MASC.mudskipper’                                  |
|          | dhukwa       | [tukʷa]  | ‘maybe’                                              |

These minimal pairs suggest that /a/ and /ɛ/ are contrastive phonemes, which is the approach taken here. The contrast is neutralised preceding retroflex consonants, where only [a] occurs (Table 2.7).

Leeding proposes a different analysis, in which [ɛ] is an allophone of /a/ due to i-umlaut (her Vowel Fronting Rule 2). In Leeding’s account, an [ɛ] vowel is always followed by a syllable containing [i] in the presurface form. For example, [ɛɾa] ‘NEUT.vomit’ is underlyingly /aɾi/. The final central vowel is first fronted to [i] by a rule that fronts morpheme-final /i/. Then /a/ in the
preceding syllable harmonises and becomes [ɛ]. Finally, the word-final high vowel is converted to [a]: /ari/ > /ari/ > /ɛri/ > [ɛra]. The word-initial surface contrast between [ɛra] ‘NEUT.vomit’ vs. [ara] ‘NEUT.forehead’ thus in effect involves an underlying word-final contrast in Leeding’s analysis: /ari/ vs. /ara/, respectively.

Such derivations are however highly hypothetical. Leeding claims that [a] and [ɛ] vary freely throughout a sizeable proportion of the data (1989: 62), but this is only true in environments where my (optional) i-umlaut rule P-5 applies, as was described in section 2.6.3. It is not true for all of the above examples; there is no variation [mɛra ~ mara] ‘VEG.blood’, for example. There is also no synchronic evidence in the language for the existence of morphemes such as /ari/ ‘NEUT.vomit’ or /mari/ ‘VEG.blood’, from which respectively [ɛra] and [mɛra] would be derived. These are phantom morphemes that Leeding postulates to account for the presence of the surface [ɛ]. It is also unlikely that the contrast involved pertains to the final vowels (e.g. /ari/ - /ara/), because this contrast is always neutralised on the surface, at least in word-final position. Finally, the word-final /i/ posited by Leeding does not always pan out. For example, [mɛra] ‘VEG.blood’, which Leeding assumes is underlying /mari/, is realised as [mɛra] wa ~ mɛruwa when followed by the ALL case suffix -wa (see [96b] above). The first variant suggests that the underlying form ends in /a/ (which I have proposed can exceptionally assimilate to the following labio-velar and become [u]). Leeding cannot account for this form.

A more plausible view is to take /ɛ/ as a contrastive phoneme in Enindhilyakwa, as Heath (n.d.) and Stokes (1981) also do. Yet Leeding’s account may provide an interesting possible historical scenario, because there is evidence that suggests that the phoneme /ɛ/ may have developed from /a/ through vowel harmony. This evidence comes from Wubuy, which lacks /ɛ/. Wubuy correspondences to Enindhilyakwa [ɛ] often involve aC(C)i. An example is Wubuy mandhabi, which corresponds to Enindhilyakwa mendheba ‘sedge sp.’. The word-final /i/ present in Wubuy could then have caused the preceding /a/ vowels to raise and front in Enindhilyakwa. Word-final /i/ was subsequently converted to [a] in Enindhilyakwa. Further evidence for the diachronic vowel harmony hypothesis comes from older previous work, which sometimes has a for what is currently e. For example, Tindale (1926) writes abinga ‘termite nest’ for what is synchronically ebinga.

The vowel harmony hypothesis is worked out in more detail in section 9.2.2.2.1.

27 In his sketch grammar, Heath also sometimes writes a where Stokes/Waddy write e and Leeding posits [ɛ]. An example comes from the pronominal prefixes on verbs; where these synchronically involve [ɛ], as in 3m/12a ngarren- or 3m/3a nen-, Heath posits [a] (i.e. ngarren- and nan-, respectively). During his brief fieldwork in the 1970’s with only one Enindhilyakwa speaker, Heath hypothesised that [ɛ ~ a] was “in the process of splitting away from /a/ as a phoneme” (p.1-4). This could mean that i-umlaut affecting /a/ already existed in Heath’s time, but it had not fully permeated the speech of his informant.

The orthographic representation of the language name [eniŋa] ćak*a confirms the diachronic i-umlaut hypothesis. Even though the previous scholars agree on the phonetics, they all represent this word with an initial a. This is curious, for Heath and Stokes/Waddy include /ɛ/ in their vowel inventories (Stokes/Waddy: e, Heath: ā). Perhaps this
To summarise, contra Leeding (1989), I propose that /ɛ/ is a contrastive vowel phoneme of Enindhilyakwa. However, although synchronically contrastive, this vowel may be the result of a variety of comparatively recent developments, summarised in Table 2.11.

<table>
<thead>
<tr>
<th>Process</th>
<th>Diachronic examples</th>
<th>Synchronic examples</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>i-umlaut (P-5)</td>
<td>Tindale (1926): abinga ‘termite nest’; currently ebinga</td>
<td>/ma-m-ikira/ [memikira] ‘VEG-INALP-name’</td>
<td>2.6.3</td>
</tr>
<tr>
<td></td>
<td>Wubuy malihwa: Enindhilyakwa melhuwa ‘shellfish sp.’</td>
<td>(cf. /ma-m-ajarka/ [mamajarka] ‘VEG-INALP-hand’)</td>
<td>9.2.2.2.1</td>
</tr>
<tr>
<td>merger of /a/ + /i/ (P-6)</td>
<td>/a+ikira/ [ikira] ‘NEUT+name’ (cf. /m+ikira/ [mikira]</td>
<td>/a-ipina/ [epina] ‘NEUT-that.unseen’ (cf. /m-ipina/ [mipina]</td>
<td>2.6.3</td>
</tr>
<tr>
<td></td>
<td>[mikira]’VEG+spike rush’)</td>
<td>‘VEG-that.unseen’)</td>
<td></td>
</tr>
<tr>
<td>loss of retroflexion</td>
<td>*narr-en- [3a-m] &gt; *narn- &gt; nen- [nɛn] ‘3mdu’ (cf.</td>
<td>nvng-arna ~ nvng-ena ‘1-this’</td>
<td>2.5.8,</td>
</tr>
<tr>
<td></td>
<td>narr-ŋg- [3a-f] ‘3fdu’)</td>
<td></td>
<td>4.2.1</td>
</tr>
</tbody>
</table>

Table 2.11: Overview of synchronic and diachronic processes that can generate [ɛ]

All processes that may have generated [ɛ] diachronically, are also synchronically productive. This does not mean that [ɛ] is synchronically always an allophone of /a/, for these vowels also contrast (e.g. marra ‘VEG.wattle tree’ - merra ‘VEG.blood’), and in many cases [ɛ] is a stable vowel that does not vary with [a]. Furthermore, there often is no conditioning [i] vowel left on the surface.

Leeding’s synchronic vowel harmony analysis will be proposed in section 9.2.2.2.1 to be more plausibly viewed as a diachronic scenario.

### 2.6.5 The phoneme /i/ and its allophone [a]

The vowel [i] contrasts with [a], [ɛ], [a] and [u] in stressed positions, as was illustrated in (65) and (74) above, as well as in the following examples.

(108) yinhanha dhvilhingena engeeminina
      [ji ’na,na] [jo,i’ena] [enɛ’mina]  ‘MASC.nail’  ‘FEM.salt’  ‘NEUT.breast’

(109) a-wilyaba emeba ariba angakuba
      [a,wi’apa] [ɛ’mɛpa] [a, ’upa] [anɛ’upa] ‘NEUT-one’  ‘NEUT.song’  ‘NEUT.dry land’  ‘that(over there)’

(110) marrakba -erreki- -errikbi-
      [ma ’ra kpa] [ɛ’re kpi] [ɛ’ri kpi] ‘please’  ‘to vomit’  ‘to throw’

---

orthographic anomaly is due to older work, when the current [ɛ] may still have been [a]. Capell (1942) writes Andiljaungwa, with an initial a (though Worsley [1954] writes Enindiljaungwa, which suggests there may have some fluctuation already then). The old spelling of the language name could have made its way into the current spelling. I will, however, represent the name as as phonetically realistic as possible, and hence write Enindhilyakwa.
These data indicate that /i/ is a vowel phoneme of Enindhilyakwa, the distribution of which cannot be predicted. This phoneme resists conditioning by surrounding bilabial consonants in lexical words: *emimba* [ɛ´mimpa] ‘NEUT.blind’; *ariba* [a´rpa] ‘NEUT.dry land’. These examples also show that [i ɪ] cannot be epenthetic, as suggested by Heath, because it receives primary stress. It also does not have the expected quality of an epenthetic vowel, because in that case we would expect some rounding due to the adjacent bilabials. In addition, [i] in penultimate position can be drastically elongated and receive a very high pitch, a stylistic device to indicate continuity of action (Leeding 1989: 138-9). An example is *bi...ya* [piːːja] ‘and then...’. It is unlikely that [i] is due to epenthesis here.

As observed by all previous scholars, a clear [i] most frequently occurs contiguous to lamino-palatal consonants:

(111) *yambiya* [ja´mpi`ja ~ ja´mpi`ja] ‘MASC.throat’

*amwθiliya* [a´mpa] ‘NEUT.cold in the chest’

*yini`ya* [ji´ni`ja] ‘MASC.bristle worm’

*aw`i`ja* [a´wica] ‘NEUT.mist’

Its pervasiveness in this environment has led Leeding to believe that [i] is an allophone of /i/. But, as demonstrated above, [i] can also occur in non-conditioning environments.

/i/ is the only vowel that can occur stem-initially in pre-surface form. This was already mentioned in section 2.6.3 above, where it was shown that this /i/ merges with /a/ of the prefix, and becomes [ɛ] (rule P-6). Some more examples are presented below.

(112) a. /na-ikpi`arθa/ [nekpi`arθa] ‘NEUT-fall.NPST’
   b. /ŋ-ikpi`arθa-ŋoma/ [ŋekpi`arθaŋoma] ~ /a-ikpi`arθa-ŋoma/ [e̱ki`arθaŋoma] ‘NEGNP-fall-NP3’

(113) a. /na-ikpařVŋ`V-na/ [nekporukuna] ‘3a-disappear-NPST’
   b. /a-ŋm-ŋmora/ [emŋmora] ‘NEUT-RDP-fat’
   c. /na-ŋm`a-ŋa-na/ [neŋm`aŋona] ‘3a-strong-INCH-NP2’

However, speakers do not tend to produce an [i] vowel word-initially, i.e. with a zero prefix. The only possible verb stem with a zero prefix is the imperative form, but for stems starting with /i/, speakers opt for the alternative w- available for transitive imperatives, as in (114a), and they insert /j/ for intransitive imperatives, as in (114b).

(114) a. /w-ŋpici-ja/ [wíŋpicija] ‘IMP.2/NEUT-lick-NP1’ (= ‘lick it!’) (anin4_dl_au_005)
   b. /O-ikpi`arθa/ [ji Kpi`arθa] ‘IMP.2-fall.NP1’ (= ‘fall!’) (anin4_dl_au_005)

When asked if [ŋpicija] was acceptable, the speaker repeated it as [jiŋpicija] ‘lick me!’ (underlyingly /j-iŋpici-ja/ ‘IMP.2/1-lick-NP1’). Thus she eschewed word-initial [i].
The vowels /i/, /əә/ and /ɛ/ do not contrast preceding retroflex consonants, where only [ə] (and [a]) occur (Table 2.7). Backing of front vowels in a retroflex environment is common cross-linguistically (Flemming 2003). Vowels of [i]-quality following retroflex consonants are also rare in Enindhilyakwa: this is only possible when following the semi-vowel /ɻ/, as in [aɻipa] ‘NEUT.dry land’ (Table 2.8). It is possible for [i] to follow a retroflex stop, but this needs to involve a further conditioning palatal consonant, as in -wardi- yi- [watiji] ‘hit-RECP’. There are no attested examples of a retroflex nasal or lateral followed by [i], but this may be due to the scarceness of these consonants: /ɻ/ is rare in general, and /ɳ/ is rare in environments where it can be followed by a palatal consonant in the next syllable (e.g. in stem-final position, where it can be followed by a suffix such as RECP -yi-).

The contrast between /i/ and /əә/ is also neutralised preceding lamino-palatal consonants, where only [i] occurs. Both vowels can follow a lamino-palatal, but for [əә] this needs to be followed by a conditioning retroflex consonant or /i/, as in enyrrra [ɛŋəə] ‘NEUT.runny nose’.

In unstressed syllables, /i/ is frequently realised as [əә]. The underlying phoneme can be heard in slow speech. For example, the demonstrative akina ‘that there’ is most often heard as [əkəna], where the initial /a/ attracts the stress, but in slow speech this is [akina].

In sum, following Stokes/Waddy, but contra Heath and Leeding, I propose that /i/ is a vowel phoneme of Enindhilyakwa, the distribution of which cannot (fully) be predicted based on the surrounding consonants.

2.6.6 The phoneme /əә/ and its allophones [ə], [u] and [i]
The vowel [ə] contrasts with [a], [ɛ], [i] and [u] in stressed positions, as was illustrated in e.g. (74) above, and the following.

(115) angwarnda  [aˈŋʷan[ə]a] ‘NEUT.stone’
angwrnda  [aˈŋən[ə]a] ‘NEUT.chin’
angurnda  [aˈŋuŋ[ə]a] ‘NEUT.ankle’

(116) adharrba  [aˈɻəpə] ‘NEUT.short’
memerrba  [mɛmɛrpa] ‘VEG.calf’
memvrurma  [mɛˈmaɾma] ‘VEG.back of neck’
mvrirrba  [məˈɻɪɾpa] ‘VEG.back’

(117) yinhana  [jiˈnaŋa] ‘MASC.nail’
akena  [aˈkena] ‘but’
dhvnhvnha  [Joˈnə na] ‘FEM.mosquito’
angubina  [anuˈpina] ‘NEUT.cloud’
-buku-na  [puˈkuna] ‘blow-NP2’
Based on these data, and in contrast to all previous work, I propose that /əә/ is a vowel phoneme of Enindhilyakwa. The allophone [u] is generated from this vowel by adjacent labio-velars and labialised velars, as will be demonstrated in the next section. Schwa can also optionally obtain some rounding from contiguous bilabial consonants, and be realised as [o]. This variation is illustrated in (120) and formalised in (121) as rule P-8.

(120) /əә́ma/ [əә́ma ~ aә́ma] ‘NEUT.big’
/mә́ra/ [mә́ra ~ mә́ra] ‘INSTR case suffix; first person focalisation marker’

(121) P-8: vowel rounding and backing 3 (optional)
\[V_{[-\text{high}, -\text{front}, -\text{back}] > V_{[+\text{high}, +\text{labial}, -\text{back}]}} / \text{___} C_{+[\text{labial}, -\text{high}]} ; C_{+[\text{labial}, -\text{high}]} \text{___}\]

i.e. /əә/ may assimilate in rounding to a contiguous bilabial consonant and become [o]

The mid-central vowel is highly susceptible to vowel harmony. This is especially true for the pronominal prefixes.

(122) a. /nәә-,әә́ka-ca/ [.nәә,әә́kәca] ‘1-go-NP2’
b. /nәә-wuә-әna/ [.nәәwәuә ~ nәәwәuә ~ nәәwәuә] ‘1-climb-NP2’
c. /nәә-jika-ca/ [.nәәjiika ~ nәәjiika] ‘1/NEUT-fetch-NP2’

The vowel between the prefix and the stem is epenthetic (rule P-1), as also suggested by Heath and Stokes/Waddy. This vowel is short and never receives stress. In non-conditioning environments, such as when followed by a lamino-dental in (122a), it surfaces as its underlying quality [əә]. In conditioning environments epenthetic schwa always assimilates: it is realised as [u] when followed by a labio-velar or labialised velar, as in (122b) (rule P-2), and as [i] when followed by a lamino-palatal in (122c). The latter process can be formalised as rule P-9:

(123) P-9: vowel fronting 2:
\[V_{[-\text{high}, -\text{front}, -\text{back}] > V_{[+\text{high}, +\text{front}]} / \text{___} C_{+[\text{coronal}, +\text{high}]} ; C_{+[\text{coronal}, +\text{high}]} \text{___}\]

i.e. /əә/ obligatorily assimilates to a contiguous lamino-palatal and becomes [i]

As epenthetic schwa always assimilates it is represented in the orthography with its phonetic quality. By contrast, the schwa inside the /nәә/ prefix in (122) is phonemic. This /əә/ optionally harmonises to the epenthetic vowel in the next syllable, either by i-umlaut or by regressive vowel
harmony. An i-umlaut rule was presented above as rule P-5 to account for the fronting of /a/. We can adjust this rule to account for the fronting of /ə/ as well:

(124) P-5: i-umlaut: (optional)
\[
V [-\text{front}] > V [+\text{front}] / _\text{C(C)V} [+\text{front}]
\]

i.e. a vowel is fronted by a front vowel in the next syllable

Regressive vowel harmony is formalised as rule P-10:

(125) P-10: regressive vowel harmony: (optional)
\[
V [-\text{high, low, front}] > V [+\text{high, round}] / _\text{C(C)V} [+\text{high, round}]
\]

i.e. /ə/ is raised and rounded to [u] by a round vowel in the next syllable

Harvey (2003b: 483) notes that vowel harmony involving affixal vowels is much more common cross-linguistically than of root vowels being harmonised to affixal vowels. He claims this “reflects the universal preference for maintaining the integrity of phonological material in the root over phonological material in the affixes”. Vowel harmony is also common in Enindhilyakwa for pronominal prefixes involving the vowel /a/.

The contrast between /i/ and /ə/ is neutralised preceding lamino-palatals, as only [i] occurs here (Table 2.7), due to rule P-9 in (123). The contrast between /i/ and /ə/ is also neutralised preceding retroflex consonants, as only [ə] occurs here. There is no evidence for a synchronic underlying /i/ vowel that becomes [ə] through assimilation. That is, there are no affixes with a retroflex consonant that could generate [ə] from /i/. Therefore, I will not express this neutralisation as a phonological rule.

However, /ə/ could historically be an allophone of /i/. The surrounding languages, including most of the Gunwinyguan languages, lack /ə/. Wubuy correspondences to Enindhilyakwa [ə] may involve an /i/-vowel followed by a retroflex or tap/trill. An example is Wubuy yambirrku ‘tusk fish’ vs. Enindhilyakwa yembwrrkwa ‘MASC.tusk fish’. It is therefore possible that Enindhilyakwa /ə/ developed from /i/ in a conditioning retroflex/rhotic environment. This analysis will be worked out in section 9.2.2.2.2.

Some [ə] vowels in apparent non-conditioning environments sometimes seem to involve a retroflex. That is, some words are written in the previous work without a retroflex, but occasionally some retroflexion can be heard. Examples are dhvnhvnha ‘FEM.mosquito’ (Stokes, Leeding: dhinhinha)\(^{28}\) and mvnhvnga ‘VEG.burrawang’ (Stokes: munhinga, Leeding: mwinhinga).

(126) a. [Ɂəna ~ Ɂəna] ‘FEM.mosquito’
\[
\text{(anin2\_pw\_au\_002)}
\]

b. [mənəna ~ mənəna] ‘VEG.burrawang’
\[
\text{(anin2\_pw\_au\_002)}
\]

\(^{28}\) It is unclear to me whether this word involves a lamino-dental or an alveolar nasal; Stokes and Leeding write a lamino-dental, but in (126a) I hear an alveolar.
Some retroflexion can be heard on the first [ə] of each word when the speaker first says the word, but less so when she repeats it. This may suggest that the occurrence of the schwa vowel in the first syllable is in fact due to conditioning by a following retroflex. Retroflexion subsequently neutralised with the alveolar.

Conversely, some words are represented with a retroflex consonant by the previous authors, where I only hear a non-retroflex consonant preceded by a clear [ə]. An example is the long stop [t̪:], which is represented as involving a retroflex of some sort by all previous authors (a detailed analysis of Enindhilyakwa long stops is beyond the scope of this thesis, but some discussion can be found in Appendix C).

(127) marrvngvmrdha [marəŋmaː负责任] ‘VEG.bush currant’

Preceding the phonetically long lamino-dental stop is a clear [ə]. This goes to show that /ə/ as a phoneme may derive historically from a different vowel that occurred contiguous to a retroflex consonant. Retroflexion can be lost in the current language. A traceable source of /ə/ in terms of a conditioning environment may be expected, as Enindhilyakwa is one of the few languages in the region to have a mid-central vowel phoneme; Rembarrnga and Dalabon are the only other languages to display a phonemic central vowel (which is schwa in Rembarrnga, but a high central vowel in Dalabon). The central vowels in these languages are also strongly conditioned by retroflex environments (Alpher, Evans & Harvey 2003; Baker 2004). See section 9.2.2.2.2 for further discussion.

2.6.7 The allophone [u]

As can be seen in Tables 2.7 and 2.8, [i] and [ə] are in partial complementary distribution with [u]. Of these three vowels, only [u] precedes labio-velar /w/ or labialised velars /kʷ/ and /ŋʷ/, as in (128), or phonetic velars [k] or [ŋ] for which an underlying representation as a rounded velar is possible, as in (129). [i] and [ə] never occur here.

(128) dhukwa [t̪ukʷa] ‘maybe’
akungwa [akunʷa] ‘NEUT.water’
nungkuwa [nuŋkuwa] ‘2.PRO’

(129) mukumukwa [mukumukʷa] ‘VEG.deep sea’
munguna [munjuna] ‘VEG.morinda tree’

When an [u] vowel is followed by a consonant other than a round velar, it is always preceded by a phonetic unrounded velar, or by /w/: 29

29 Stokes and Leeding often transcribe a clear [u] as preceded by a rounded velar (e.g. [akwunwa] ‘water’; [jukwu] ‘chest’; [anwura] ‘very’. However, this [w] is often inaudible. Leeding calls the rounding of
There is no other environment in which a clear [u] occurs. These data suggest that [u] is an allophone that obtains its rounding from contiguous consonants, as expressed by rules P-2 and P-3, respectively. The question of what is the underlying quality of this vowel is often unanswerable. Since neither [i] nor [ə] occur in the environments depicted above, it appears that [u] is a shared allophone of /i/ and /ə/.

The rounding and backing rules are synchronically active. In other words, it is not the case that, while [u] can be traced back to an historical source, it is now a phonemic vowel (as I hypothesised in the preceding sections for the phoneme /e/ and perhaps also /ə/). That these rules are productive can be seen in reduplication patterns, and in some verb stems when followed by a suffix. When stems ending in [kʷa] and [ŋʷa] are reduplicated, the reduplicated segments end in [ku] and [ŋu], respectively.

Since all words end in [a], and since this vowel does not absorb the labialisation of the preceding velars, the rounding of the velars is preserved word-finally. Note that this means that rule P-7B, which converts word-final vowels into [a], must apply before P-3, which allows a non-low vowel to absorb the labialisation of a preceding velar.

Similar -kwa# ~ -ku- and -ngwa# ~ -ngu- alternations can be observed in verb stems. The rounding of the velars is preserved word-finally, as in the following (a) examples. When followed by a tense/aspect suffix, however, the rounding is absorbed, as in the (b) examples.

consonants that occur before a rounded vowel ‘simultaneous’ rounding, which is “very short” and “hard to hear”. This is opposed to ‘sequential’ rounding which is long and easy to hear (1989: 32). The first [w] in [akwʉɾa] is an instance of ‘simultaneous’ rounding in her account, and the second [w] an instance of ‘sequential’ rounding. Stokes notes that [k] may vary with [kw] when preceding [u], as in [amukwuɾa ~ amukura] ‘face’ (1981: 150-1). I suspect that Stokes includes a [w] in her transcriptions of [u] to distinguish this vowel from the central vowel that she also assigns to /u/. So the [w] in amukwuɾra ‘face’ serves to distinguish the clear [u] vowels from e.g. the second u in wuburra [wubura] ‘like’ in her system, which is centralised. These words are represented as amukurra and wubvrra, respectively, in my system.
I interpret these data as involving the sequences /k\textsuperscript{w}V/ and /ŋ\textsuperscript{w}V/, where V represents /i/ or /\textipa{ə}/. Vowel-conversion to [a] applies in word-final position and the rounding of the velar is preserved. In non-final position P-3 applies and the underlying /V/ absorbs the rounding of the preceding velar and is realised as [u].

[u] contrasts with [i] and [\textipa{ə}] only following phonetic velars (data from Stokes 1981: 150-1):

<table>
<thead>
<tr>
<th>(134)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>amakulya</td>
<td>[amaˈkuɭa]</td>
<td>‘NEUT.skin’</td>
</tr>
<tr>
<td>alyakilya</td>
<td>[aɭəˈkiɭa]</td>
<td>‘NEUT.fish sp.’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(135)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>amukurra</td>
<td>[amuˈkura]</td>
<td>‘NEUT.face’</td>
</tr>
<tr>
<td>mikirra</td>
<td>[ˈmikira]</td>
<td>‘VEG.edible root’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(136)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>yuku’urna</td>
<td>[juˈkunya]</td>
<td>‘MASC.baler shell’</td>
</tr>
<tr>
<td>w-angkvr-na</td>
<td>[ˈwanŋkəna]</td>
<td>‘IMP.2/NEUT-fetch-NP2’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(137)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>murngkurrna</td>
<td>[mʊɾˈŋkura]</td>
<td>‘VEG.yam sp.’</td>
</tr>
<tr>
<td>mvrnvngkrrra</td>
<td>[mʊɾəˈŋkəra]</td>
<td>‘VEG.sinker’</td>
</tr>
</tbody>
</table>

When followed by [i] or [\textipa{ə}], the velars are taken to be underlyingly unrounded, whereas when followed by [u] they are assumed to be underlyingly rounded.

The above analysis predicts that phonetic [wV], [k\textsuperscript{w}V] and [ŋ\textsuperscript{w}V], as well as [Vw], [Vk\textsuperscript{w}] and [Vŋ\textsuperscript{w}], will not occur in Enindhilyakwa (where [V] represents [i] or [\textipa{ə}]).\textsuperscript{30} This is prediction is borne out, except for [wi], which does occur:

<table>
<thead>
<tr>
<th>(138)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>=wiya</td>
<td>[wiya]</td>
<td>‘pergressive clitic’</td>
</tr>
<tr>
<td>awija</td>
<td>[awica]</td>
<td>‘NEUT.mist’</td>
</tr>
<tr>
<td>-wilyaba</td>
<td>[wiɭapa]</td>
<td>‘one’</td>
</tr>
<tr>
<td>awinyamba</td>
<td>[awɪŋampa]</td>
<td>‘NEUT.anger’</td>
</tr>
</tbody>
</table>

[i] is followed by a lamino-palatal consonant here, which prevents P-3 from applying.

We find the reverse for the rounded velars. When /V/ is preceded by /k\textsuperscript{w}/ or /ŋ\textsuperscript{w}/ and followed by a lamino-palatal, it is only affected by the former:

<table>
<thead>
<tr>
<th>(139)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>angunya</td>
<td>/ŋ\textsuperscript{w}Vɲa/</td>
<td>[ŋuɲa]</td>
</tr>
<tr>
<td>amakulya</td>
<td>/amak\textsuperscript{w}Vɭa/</td>
<td>[amakuɭa]</td>
</tr>
<tr>
<td>-ngujvra</td>
<td>/ŋ\textsuperscript{w}Vɟɭa/</td>
<td>[ņuɭa]</td>
</tr>
</tbody>
</table>

\textsuperscript{30} Stokes, however, lists [iw], [ikw] and [iŋw] in her inventory of vowel + consonant sequences (1981: 166). The only examples in her data that exhibit one of these sequences are [jiŋwa] ‘crow’ (p.153), and /mamuɭikwa ~ mamuɭikwa/ ‘road’ (p.174). In a later paper, however, she transcribes the latter as /mamuɭikwa/ only (1982: 149). This is also how I know this word, so I do not consider it a problem for my analysis. The word [jiŋwa] ‘crow’ is potentially problematic, as my analysis predicts it to be [junya]. Indeed, Leeding gives two alternative pronunciations for this word: [jiŋwa ~ jəŋwa] (1989: 58). When I elicited this word, my speakers said [yɪŋuwa], with an epenthetic vowel between [ŋ] and [w]. This way, the /i/ preceding the velar nasal does not need to assimilate and can stay [i]. Hence I do not consider this word to be a problem either.
These two sets of examples show that we need to distinguish /w/ from /kʷ/ and /ŋʷ/; for the latter two consonants, the rounding is always absorbed by the following non-low vowel to create [u], regardless of the consonant that follows. Whereas /w/ does not round [i] when this is followed by a conditioning lamino-palatal consonant.

### 2.6.8 Summary of vowels

The different phonemes and their allophones are summarised in Table 2.12.

<table>
<thead>
<tr>
<th>phoneme</th>
<th>allophones</th>
<th>environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>/a/</td>
<td>[a]</td>
<td>everywhere</td>
</tr>
<tr>
<td></td>
<td>___ j</td>
<td>(e.g. [aɛjakwa ~ ajakwa] ‘NEUT.word’; /na-jama/ [næjama] ‘3a-say’)</td>
</tr>
<tr>
<td></td>
<td>j</td>
<td>(e.g. [jaʃaça ~ jaʃaça] ‘MASC.goanna’)</td>
</tr>
<tr>
<td></td>
<td>jiC</td>
<td>(e.g. [ji_pa_na ~ ji_næ па] ‘MASC.nail’)</td>
</tr>
<tr>
<td>/æ/</td>
<td>___ Ci</td>
<td>(i-umlaut)</td>
</tr>
<tr>
<td></td>
<td>e.g. /kampira/ [kɛmpira] ‘then’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>___ Ce</td>
<td>(vowel harmony)</td>
</tr>
<tr>
<td></td>
<td>/na-pəki-na/ [nepəkina] ‘3a-drink-NP2’</td>
<td></td>
</tr>
<tr>
<td>/ɛ/</td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td></td>
<td>/a/ + /i/ → [eː ~ e']</td>
<td>(primary stress, e.g. suffixes on verbs)</td>
</tr>
<tr>
<td></td>
<td>/a/ + /i/ → [ɛ]</td>
<td>(secondary stress, e.g. prefixes)</td>
</tr>
<tr>
<td>/ə/</td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td>/ɜ/</td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td>/i/</td>
<td>everywhere, except before retroflexed consonants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td>/ʊ/</td>
<td>everywhere, except before retroflexed consonants and /w/, /kʰw/ and /ŋʷ/. Common before lamino-palatal consonants (e.g. [iʃiriŋa] ‘MASC.crushed coral’)</td>
<td></td>
</tr>
<tr>
<td>/u/</td>
<td>__ labio-velars, labialised velars (assimilation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e.g. /ʃVkʰa/ [ʃukʰa] ‘maybe’; /aŋʃVwa/ [aŋʃuwa] ‘NEUT.bloodwood’ velars __ (absorbing labialisation of rounded velars)</td>
<td></td>
</tr>
<tr>
<td>/ʊ/</td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td>/ɜ/</td>
<td>___ /kʰw/, /ŋʷ/ or /w/</td>
<td>e.g. [aɾaˈwa] ‘inside’; [ɛn_i_p_iʃaˈkʰwa]</td>
</tr>
<tr>
<td>/a/</td>
<td>everywhere, except before lamino-palatal consonants, or contiguous to /w/, /kʰw/ and /ŋʷ/. Common before retroflexes and rhotics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>contiguous to /m/ or /p/</td>
<td>e.g. [mamaka ~ mamɔka] ‘VEG.bandicoot’s nest’</td>
</tr>
<tr>
<td>/i/</td>
<td>___ Ci (i-umlaut)</td>
<td>e.g. /næŋ_jika-ca/ [næŋ_iʃiʃka~næŋˌʃiʃka] ‘1-bring-NP2’</td>
</tr>
</tbody>
</table>

Table 2.12: Summary of vowel phonemes and allophones
The distribution of the four vowel phonemes in Enindhilyakwa, /a/, /ɛ/, /i/ and /əә/, can often not be predicted based on the surrounding consonants, though some observations can be made:

- /a/ is the only vowel that occurs in every environment
- /ɛ/ is much less common than /a/, and also occurs in every environment, except before retroflexed consonants
- /i/ also occurs in every environment, except before retroflexed consonants and round(ed) velars
- /əә/ also occurs in every environment, except before lamino-palatals and round(ed) velars; it is also used as an epenthetic vowel

To account for the distribution of the vowels, this chapter proposed the following phonological rules:

• P-1: schwa-epenthesis: $\emptyset > a / C ___ C$ (where CC is a cluster)
• P-2: vowel rounding and backing 1: $V[-\text{low}, -\text{labial}, -\text{long}] > V[+\text{labial}] / ___ C[-\text{anterior}, +\text{labial}, +\text{high}]$
  i.e. a non-low vowel obligatorily assimilates in height and rounding to a following labialised velar
• P-3: vowel rounding and backing 2: $C[-\text{anterior}, +\text{labial}, +\text{high}] V[-\text{low}, -\text{labial}, -\text{long}] > C[-\text{anterior}, -\text{labial}, +\text{high}] V[+\text{labial}]$
  i.e. a non-low vowel obligatorily absorbs the rounding of a preceding labialised velar
• P-4: vowel fronting rule 1 (optional): $V[+\text{low}, -\text{front}] > V[+\text{low}, +\text{front}] / ___ C[+\text{coronal}, +\text{high}] ; C[+\text{coronal}, +\text{high}] ___$
  i.e. /a/ is fronted to [æ] by an adjacent lamino-palatal consonant
• P-5: i-umlaut (optional): $V[-\text{front}] > V[+\text{front}] / ___ C(C)V[+\text{front}]$
  i.e. a vowel is fronted by a front vowel in the next syllable
• P-6: merger: /a/ + /i/ > [ɛ] or [eː ~ eɪ]
• P-7: word-final [a]
  • P-7A: word-final [a] epenthesis: $\emptyset > a / C ___ #$
  • P-7B: word-final vowel conversion: $V > a / C ___ #$
• P-8: vowel rounding and backing 3 (optional): $V[-\text{high}, -\text{front}, -\text{labial}, -\text{back}] > V[+\text{high}, +\text{labial}, -\text{back}] / ___ C[+\text{labial}, -\text{high}] ; C[+\text{labial}, -\text{high}] ___$
  i.e. /a/ may assimilate in rounding to a contiguous bilabial consonant and become [ʊ]
• P-9: vowel fronting 2: $V[-\text{high}, -\text{front}, -\text{back}] > V[+\text{high}, +\text{front}] / ___ C[+\text{coronal}, +\text{high}] ; C[+\text{coronal}, +\text{high}] ___$
  i.e. /a/ obligatorily assimilates to a contiguous lamino-palatal and becomes [i]
P-10: regressive vowel harmony (optional):

\[ V\,[\text{-high, -low, -front}] > V\,[\text{+high, +round}] / \_\_C(C)V\,[\text{+high, +round}] \]

i.e. /\text{a/} is raised and rounded to [u] by a round vowel in the next syllable

Some of these phonological rules are illustrated here with the neutral past (P-2) tense suffix -nv of the verb -lharr- ‘to fall’ (data from anin4\_dl\_au\_005).

\[(140)\text{a. } \text{[ləɾ}\text{-nə/}} \quad \text{P-7B: } [\text{ˈləɾəɾə}n\text{ə}] \quad \text{‘fall-p2’} \]
\[ \text{b. } \text{[ləɾ}\text{-nə-ma/}} \quad \text{P-8: } [\text{ˈləɾəɾən}\text{ə-mə} \sim \text{ˈləɾəɾən}\text{ə-mə}] \quad \text{‘fall-p2-ma’} \]
\[ \text{c. } \text{[ləɾ}\text{-nə}=\text{jə}nə/} \quad \text{P-9: } [\text{ˈləɾəɾən}\text{i}\text{jə}n\text{ə}] \quad \text{‘fall-p2=purp’} \]
\[ \text{d. } \text{[ləɾ}\text{-nə-wa/}} \quad \text{P-2: } [\text{ˈləɾəɾən}\text{n}\text{uwa}] \quad \text{‘fall-p2-all’} \]
\[ \text{e. } \text{[ləɾ}\text{-nə-ənəŋʷə/}} \quad \text{P-9: } [\text{ˈləɾəɾən}\text{ənəŋʷə}] \quad \text{‘fall-p2-ABL’} \]

In all examples epenthetic [ə] is inserted between the two consonants of the affix and the stem according to rule P-1. Being epenthetic, this vowel does not receive stress. When word-final, the tense suffix /na/ is realised as [na] (P-7B) in (140a). When followed by the suffix -ma (section 6.7), /ə/ optionally assimilates to the following bilabial and varies with [u] (P-8) in (140b). When followed by the purposive clitic =yadha (Appendix H), /ə/ obligatorily assimilates to the following palatal and is invariably realised as [i] (P-9) in (140c). The preceding epenthetic schwa in this example presumably undergoes i-umlaut, but this vowel is so short and indistinct that this is hard to hear. When followed by the allative case suffix -wa in (140d), /ə/ obligatorily obtains rounding from the following labio-velar consonant (P-2) and is invariably realised as [u]. Finally, in non-conditioning environments, such as when followed by /l/ of the ablative suffix -lhangwa, /ə/ surfaces with its underlying quality (140e).

2.7 Reduplication

Reduplication occurs at the beginning of stems, with verbs for prolongation, repetition or intensification of the event, and with nouns for plurality (Heath n.d.; Leeding 1989). The reduplication template depends on the stem-initial sound: for stems beginning with a stop the template is monosyllabic, and for stems beginning with a sonorant it is disyllabic (Heath n.d.). The point where the reduplicated segment goes is determined by morphology and characteristically directly follows the inflectional prefix.

The reduplication template for stems beginning with a stop is C₁, where C can be simple or complex. An epenthetic /ə/ appears between the two consonants of the reduplicated segment and the stem. Data in this section come from Leeding (1989) and the dictionary.
For stems beginning with a stop, reduplication applies at a lower level than the syllable: for example, the first syllable of the ‘grab’ verb is *rdarr*, with a coda, but reduplication only applies to the onset.

The reduplication template for stems beginning with a sonorant consonant is $C_1V_1C_2(C_3)$. In this case, the reduplicated segment may include a consonant cluster. The examples in (142) illustrate reduplicated segments involving $C_2$ only (which may be a complex phoneme), and those in (143) with the cluster $C_2C_3$:

(142) *mv-lhvky-lhvkarrku-wilyarra*  ‘VEG-RDP-road-middle’  (VL p.106)  
*miyi-mijikeeyi-*  ‘RDP-search’  
*marnvy-marndarrka-*  ‘RDP-point’  
*lyikbi-lyikbi-*  ‘RDP-float’  
*rrengmv-rreng+mungkwardhv-*  ‘RDP-intestines+crawl’ (= ‘crawl due to sickness’)  
*wilyu-wilyaka-*  ‘RDP-carry’

(143) *ngurrkby-ngurrk+balha-*  ‘RDP-mouth+wide’ (= ‘yawn’)  
*murrvk-murrvkulha-*  ‘RDP-lye.down’

The consonant clusters in (143) involve an apical liquid+stop, which, together with an apical nasal+stop, are the only permitted consonant clusters (section 2.3.2). One reason for regarding homorganic nasal+stop sequences and heterorganic dorsal+labial sequences as unit phonemes is their failure to be broken up in reduplication patterns (sections 2.5.6 and 2.5.7). This argument is weakened by the existence of some clusters that also stay intact when reduplicated, as those in (143). However, in contrast to the complex segments, these clusters can be broken up when reduplicated, as illustrated in (144), showing the regular $C_1V_1C_2$ reduplication pattern for sonorant-initial stems. This contrasts with the complex segments, which are never broken up, as shown in (145).

(144) *wurrv-myrv-yrkk+balya*  ‘3a-RDP-soft’  (GED p.82)  
*me-merrv-merrku-wilyarra*  ‘VEG-RDP-sun-middle’

(145) *-ingy-ingyme*  ‘RDP-fat’  
*-akb-akhardha-*  ‘RDP-be.afraid’

The reduplication pattern for stems beginning with a vowel is more complex. The initial vowel can either be ignored, or be included in the reduplicated segment. In both cases, the template is
monosyllabic when the consonant following the vowel is a stop, and bi-syllabic elsewhere. The following examples illustrate reduplicated segments that ignore the initial vowel. In (146) the consonant following the stem-initial vowel is a stop and the reduplication template is $C_1$. In (147) this consonant is a sonorant and the template is $C_1V_1C_2(C_3)$.

(146) -abarumv- ‘search’ -a-bv-barvmv- ‘a-RDP-search’
-ambarr- ‘sit’ -a-mb-ambarr- ‘a-RDP-sit’
-ardhvr- ‘spear’ -a-dhvh- ‘a-RDP-spear’

(147) arakba=wiya ‘compl.act=PRG’ -a-rakby=ragba=wiya ‘a-RDP-compl.act=PRG’
n-angariya ‘3m-baby’ -narr-angary-ngariya ‘3a-a-RDP-baby’
-awinyamba-dhv- ‘angry-INCH’ -a-winyu-winyamba-dhv ‘a-RDP-angry-INCH’
-arvmv-dhv- ‘big-INCH’ -a-rvmv-rvmv-dhv ‘a-RDP-big-INCH’

Given that the stem-initial vowel is excluded from the reduplicated segment, we may expect a morpheme boundary between the initial vowel and the remainder of the stem. But the available evidence in fact points to the contrary: the initial vowel belongs to the root. The reason for excluding the stem-initial vowel from the reduplication template is, as of yet, unclear.

The following examples illustrate reduplicated segments that do include the stem-initial vowel. The template is $V_1C_1(C_2)$ when the first consonant of the stem is a stop, as in (148), and $V_1C_1V_2C_2(C_3)$ elsewhere, as in (149).

(148) -ingbvdha ‘strong’ -ingb-ingbvdha ‘RDP-strong’
-akum- ‘to put’ -ak-akum- ‘RDP-put’
-ambyla- ‘to stay’ -amb-ambyla- ‘RDP-live’
-akbardha- ‘to be afraid’ -akb-akbardha ‘RDP-be afraid’

(149) amvrndvrra ‘slowly’ amvrnd-amvrndvrra ‘RDP-slowly’
errekbiji- ‘spit’ errekb-errekbiji- ‘RDP-spit’
iminingka ‘different’ iminingka ‘RDP-different’

There are some exceptions to the above rules. These involve irregular mono-syllabic reduplicated segments where we would expect them to be di-syllabic:

(150) -alyybar- ‘eat’ -a-lye-lyybar- ‘a-RDP-eat’
-miji- ‘wait’ -mv-miji- ‘RDP-sneeze’
-nyirrngmv- ‘sneeze’ -nyi-nirrngmv- ‘RDP-sneeze’
-ngayindha- ‘want’ -ngv-ngayindha- ‘RDP-want’
-lhva- ‘go’ -lhv-lhva- ‘RDP-go’
-lharrdha- ‘walk close together’ -lhv-lharrdha- ‘RDP-walk close together’

Other instances of reduplication that depart from the above rules involve the insertion of a consonant which is absent in the stem:
The last example is highly irregular; -angkarr- ‘run’ is a common verb, but I have never heard it being reduplicated. It is therefore represented here as it occurs in the Dictionary (which means that the i’s could represent [ə], and d could represent [d]).

Another irregular reduplication pattern for verbs involves inclusion of the tense suffix. This happens with a few common verbs; the nasal of the tense suffix induces hardening of the following continuant.

In sum, the shape of the reduplicated segment can be predicted to a large degree, but there are some irregularities. These idiosyncratic reduplications are possibly archaic and frozen.

The reduplication template in Wubuy is very similar, with a monosyllabic template for stop-initial stems and a disyllabic one elsewhere (Heath 1984). In no other language in the region is the reduplication template dependent on whether the stem starts with a stop or not.

2.8 Summary

Enindhilyakwa exhibits close to the maximum Australian inventory of consonants, with six places of articulation for both stops and nasals, a lateral in each coronal series, one apico-alveolar tap or trill, and three glides (labio-velar, palatal and retroflex). In addition, the consonant inventory includes three series of complex consonants: (i) two labialised velars /kʷ/ and /ŋʷ/; (ii) six homorganic nasal+stop sequences (one for each stop/nasal); (iii) three heterorganic dorsal+labials /kp/, /ŋm/ and /ŋp/.

The four-vowel phoneme inventory /a/, /i/, /ɛ/ and /ə/ diverges from the common Australian pattern of three cardinal vowels, as well as from the typical Arnhem Land inventory of five cardinal vowels. Although the quality of the high vowels and schwa largely depends on the surrounding consonants - which has caused some controversy in the previous work as to the number of vowel phonemes - it was shown that /i/ and /ə/ are also proper phonemes of Enindhilyakwa. The rounding of [u], on the other hand, was argued to be an underlying feature of the surrounding consonants. Although the four vowel phonemes are clearly contrastive synchronically, there are some indications that /ɛ/ and /ə/ may have evolved rather recently from other vowels, /ɛ/ by i-umlaut, and /ə/ due to conditioning retroflex consonants. This hypothesis will be elaborated in Chapter 9, where I will look at correspondences of these vowels in other languages.
Another feature that sets Enindhilyakwa phonology apart from the surrounding languages is the pressure to avoid codas, as is evidenced by: (i) all words ending in [a]; (ii) frequent vowel epenthesis to break up consonant clusters; and (iii) syllabification of the homorganic nasal+stop segments and heterorganic dorsal+labial segments in the onset, rather than ambi-syllabically. The only permitted codas are apical liquids and nasals. It was proposed that the constraints on syllable structure resulted in the formation of the complex segments, which have bonded across morpheme boundaries that are synchronically frozen. Such bonding does not occur across synchronically active morpheme boundaries - here, codas are avoided by vowel epenthesis.

Homorganic nasal+stop clusters behaving like single segments is not unique to Enindhilyakwa: Baker (2008a) argues that these clusters are syllabified as onsets in several Arnhem Land languages, including some Gunwinyguan languages. The heterorganic dorsal+labial sequences behaving as single sounds is typologically more unusual.

The Enindhilyakwa consonant inventory (though not the vowels) is very similar to the Wubuy inventory. One thing that stands out is the shared lamino-dental lateral, which is absent in all other Arnhem Land languages. In Chapter 9 I propose that the sharing of the lamino-dental lateral, which has not been noted in the literature before, constitutes important evidence for a shared phonological innovation between Enindhilyakwa and Wubuy.