Mirniny Phonotactics
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Abstract

Australian languages are among the most critically endangered in the world. At the time of European invasion there were an estimated 250 languages spoken across the continent. Today, linguists believe less than 20 are taught as a first language. In the Goldfields region of Western Australia, the status of languages is defined as sleeping, critically endangered, endangered or living (Austin, 1986). Speakers, with linguists, at the Goldfields Aboriginal Language Centre Aboriginal Corporation (GALCAC), are working to document and revitalise the sleeping languages.

The last 30 years has seen a growth in language revitalisation, and the success of language reclamation programs such as those used by the Kaurna in South Australia, demonstrate that a language can be revived, even if it hasn't been actively spoken for many years (Amery, 2016). Where the language is not spoken as a living language, it is common to find wordlists and secondary research materials that can be used in recovery. Such is the case with Mirniny, a language spoken by First Nations people whose speakers occupied a thing strip of land along the southern coast of the continent.

Many Mirniny people are partial speakers using words and phrases. GALCAC linguists have been unable to locate fluent speakers to conduct primary research. The limited corpus held by GALCAC consists of secondary material in the form of wordlists collected by laypersons, a small number of language recordings and short grammars by linguists. This situation is not ideal, but far from unique. Compared to many others whose language has lain dormant for some time, Mirniny is in a better position than most for reclamation and rejuvenation, thanks to the existence of voice recordings and a significant corpus of historical records.

1.0 Introduction

This paper identifies morpho-phonemic rules in Mirniny using historical wordlists, secondary research materials and the few available audio recordings.

In 2013, Petter Naessan published a sketch analysis of Mirniny, based on Geoff and Alix O'Grady's Mirniny wordlist. In his sketch, Naessan identified the phonemic inventory and morphological rules used in Mirniny. It is not clear whether Naessan's sketch analysis was based only on O'Grady & O'Grady's material, or used other historical Mirniny material. However, it suggests the former as Naessan's paper details phonemic and morphological rules that are at times contradictory to other Mirniny material in the GALCAC database. Where the phonology or morphology of lexical items held by GALCAC do not agree with Naessan's sketch analysis, triangulation has been used to reconcile differences. Triangulation compares trusted written sources of Mirniny, language recordings, and comparison to neighbouring languages. This has informed the creation of a rules-based approach examining said contradictions. The phonotactic rules resulting from this triangulation can be applied in GALCAC's framework for Mirniny revitalisation.

This paper identifies the phoneme inventory, pronunciation and distribution rules. Rules of distribution are used to inform a Mirniny orthography.

One of the issues with using historical materials is orthographic differences between sources (Amery, 2016). This paper identifies the alternate orthographies and provides a contemporary orthography.

2.0 Phonemic Inventory

Table One: Consonants

		Non-peripheral					
		Apical		Lamino		Peripheral	
		Alveolar	Retroflex	Dental	Palatal	Velar	Bilabial
Stops		t	rt	tj		k	p
Nasals		n	rn		ny	ng	m
Laterals		l	rl		ly		
Rhotics		rr	r				
Semi-vowels	Glides			y			
	Approximants						w

Table Two: Vowels

	Front	Middle	Back
Close	i i:	u u:	
Open			a a:

2.1 Vowels

As with neighbouring languages such as Ngadju, Wirangu and Kukuta, Mirniny has six vowel phonemes, three short: */a/; /i/* and */u/,* and three corresponding long vowel phonemes: */aa/; /ii/* and */uu/.* These phones remain constant, with the exception of assimilation within certain environments (this is discussed further in section 2.1.1.3). Vowels occur in initial, medial or final position and there are no requirements towards consonant-initial lexemes.

2.1.1 Short vowels

2.1.1.1 /a/

Short vowel /a/ is open and backed, and may occur in word-initial, medial or final position. It is pronounced like the /**a**/ in **a**bout. However, it can become nasalised within a nasal environment such as, before nasals and after a bilabial approximate. See (10) and (13).

2.1.1.2 Word-initial /a/

Naessan (2013) argues /a/ cannot appear word-initially, however the GALCAC database includes headwords beginning with this phone.

1. **a**linytjirra *north*

Entries for *north* include compounds

2. **a**linytjirra kakarrara *north east*
3. **a**linytjirra wilurarra *north west*
4. **a**linyanil *north wind*

Given that this lexeme appears in Western Desert Languages (WDL) as alinytjirra and yalinytjirra (yalinytjirra in dialects with a consonant initial rule), and the GALCAC Mirniny toolbox contains multiple entries for *north* including kayala, wilurarra and yilungu, it is likely this word is borrowed from WDL and therefore is part of the lexicon of Mirniny.

The below examples found in historical documentation have been recorded as vowel-initial. Word-initial semi-vowel glides and approximates can be difficult to hear and may not have been written in historical materials. However without audio examples, this is difficult to prove or disprove

5. **a**lyirti *shrub species*
6. **a**ngapirla *star*
7. **a**pu *mill stone*

Until such time as advice is received from a Mirniny speaker, these lexemes shall continue to be written as vowel-initial.

2.1.1.3 Word-medial /a/

Certain phonemic environments will affect the pronunciation and length of a vowel (Platt, 1972; Yule, 1996). Nasals (or continuants) can be held longer than stops and this in turn affects the length of a vowel within a nasalised environment.

Following a bilabial approximate, word-medial /a/ is held longer than it is following velar stops /p/ and /k/.

8. w**a**marlu *down, bird feathers*
9. w**a**ri *road, path*
10. w**a**rta *wood*

The following example contrasts the length of the /a/ following a stop.

11. /a/ following a voiced velar stop before a voiced velar stop k**ak**arra *east*
12. /a/ following a voiced bilabial stop before a voiced velar stop p**a**kurri INTER
13. /a/ following a voiced velar stop before a bilabial nasal k**a**mpu bone, stick, back

Following a bilabial approximate, word-medial /a/, is more open and backed. As the mouth finishes producing the bilabial approximate, the vocal apparatus moves easily into the production of the retroflex stop, giving the impression of a longer vowel. It should be noted that even though the vowel is held longer, it still does not approach the length of /aa/ (Platt, 1972).

Concerning the length of vowel /a/ word medial the following rule applies;

A short vowel is held for longer when it follows an approximate.

Historical wordlists, have recorded k**a**mpu *bone, stick, back* as kombu, however elicited language recordings reveal short /a/, is assimilating to the bilabial nasal that follows. Vowels will assimilate towards nasals, where they precede a nasal (von Brandenstein, in Yule, 2004). In this environment, word-medial /a/ becomes nasalised in anticipation of the following (bilabial) nasal (Crystal, 1997; Lord, 1966). This linguistic phenomenon is attested and allows us to write the following rule.

Medial vowel /a/ the following rule applies:

Vowel /a/ becomes nasalised when it precedes a nasal.

2.1.1.4 Word-final /a/

In contrast to above, the length of word-final /a/ is not affected by preceding consonants. However, in ordinary conversational speech, we can expect it to assimilate to the first phone of the word immediately following it (Yule, 2004; von Brandenstein, n.d.)

14. kutjarr**a**	*two*
15. mirr**a**	*hole*

Final vowel /a/ the following rule applies:

Final /a/ is always a short vowel.

2.1.2 /i/

Short vowel /i/, is fronted and close. It occurs in word-initial, word-medial and word-final positions and sounds like /**i**/ in t**i**n and b**i**n.

2.1.2.1 Word-initial /i/

16. **i**karnu	*wild dog*

Vowels are characterised as unobstructed sounds and consonants, obstructed sounds. This means they will behave in the same manner within the same environments. At (11) and (12) I established that vowels are shorter within a stop-like environment, and this can be applied to (16) above. Even though there are no audio samples of this lexeme, it is fair to expect word-initial /**i**/ will be appear shorter before a stop, just as with short /a/.

2.1.2.2 Word-medial /i/

17. p**i**rri	*nail*
18. w**i**paru	*snake, generic*

Just as with word-medial /a/, the word-initial stop in (17) means the medial /**i**/ is shorter than in different environments. The same is so in (18) even though it is sandwiched between a bilabial approximate and a bilabial stop. It would appear that the production of a stop outweighs the nature of an approximate when it comes to affecting vowel length. Compare (17) and (18) with the two examples below.

19. w**i**ntu	*hair*
20. w**i**ya	*nothing*, *no, negative*

In (19) and (20) the vowel is surrounded by an approximate and a nasal, and an approximate and a glide. The nature of these consonants (all of which are held for longer than a stop) has the effect of lengthening the vowel.

2.1.2.3 Word-final /i/

In word-final position /**i**/ is always short.

21. mut**i**	*fish, generic*
22. warnt**i**	*child, small boy*

2.1.3 Short vowel /u/

Short vowel /**u**/ is middle and close. It appears in word-initial, medial and final positions and sounds like **u** in p**u**t.

2.1.3.1 Word-initial /u/

Word initial /u/ is permissible, but rare. The GALCAC Mirniny database contains fewer than ten lexemes beginning with this phone.

23. **u**mpara	*fly, insect*
24. **u**pi	*tree root*
25. ***u**la-	*cry, to*

The Mirniny gloss for *cry, to* is sometimes written as **u**la- or **u**rla-. Analysis of audio samples reveal this is actually w**u**la-. The initial bilabial approximate assimilates towards the middle, close vowel immediately following. The result is a short /u/ that is held for longer than the usual time, but still shorter than a long /uu/ [as established at examples (8), (9) and (10)] The example at (25) agrees with the rule; *A short vowel is held for longer when it follows an approximate.*

2.1.3.2 Word-medial /u/

26. ng**u**karra	*armpit*
27. k**u**ya	*negation*

2.1.3.3 Word-final /u/

Word-final /u/ is sometimes written as /oo/.

28. kurrk**u** *owl*

Written historical records include koorrgoo, goorgoo, kurrkoo and koorrgoo, however audio records reveal the correct pronunciation as kurrku. In fact, it is very rare to find a long vowel in any position, other than the first syllable. Long vowels, when they occur, are always in the first syllable (Susan Hanson, personal communication, 28 June, 2022). This is because stress patterns in Australian languages dictate that stress always falls on the first syllable (Sharp, 2004). Further, in natural speech the vocal apparatus is already moving towards the first phoneme of the next word. This means final phones will be shorter and, depending on the environment, assimilating towards the phoneme of the following word (Yule, 2004). Stress patterns for long vowels are discussed further in section, 2.1.2.

29. kurnt**u** *breast*

Historical records include a variation on the above orthography using the long /o/ in word final position, which I have shown to be incorrect. Hence:

Word-final /oo/, can be written as /u/.

2.1.2 Long vowels

Long vowels are only found in word medial position. They do not occur word initially or word finally.

2.1.2.1 Word-medial /aa/

Long /**aa**/ is held slightly longer than /**a**/ in words like r**a**ther and f**a**ther.

30. m**aa**tu *on top of*
31. m**aa**rra *cloud, type of*

Long vowels always appear in the first syllable. The GALCAC lexical database has one example of /**aa**/ in the second syllable.

32. *karl**aa**tja *in the fire*

CV/CV/CV – three syllables

This lexeme is made up of two parts; the nominal ‘fire’, karla, and locative suffix -tja. It is not clear why the second /a/ has been added. There are no -a- or -atja suffixes in the lexical database. Regardless, stress pattern rules allow us to disregard the long vowel in the second syllable. In Australian Languages, stress always falls on the first syllable (Dixon, 2002). Long vowels are distinguished from short vowels thanks to stress pattern rules (Sharp, 2004).

These stress patterns rules are predictable. Additionally, it is impossible for stress to be held on both the first and second syllable.
Therefore, the example at (32) should be written as karlatja.

2.1.2.1 Word-medial /ii/

/**ii**/ is slightly longer than /**i**/ and sounds like the /**e**/ in **ee**l.
There is only one example of /**ii**/ in the database.

33. m**ii**l *eye*

GALCAC linguists initially believed this lexeme to be borrowed from another language, however it has since been confirmed as belonging to Mirniny by a member of the language community.

Example (33) is a single syllable lexeme. Single syllable lexemes must have a long vowel in order to meet length requirements (Sharp, 2004). Bi-syllabic and tri-syllabic lexemes are exempt from this rule because they are longer utterances. Where long vowels occur in a bi-syllabic or tri-syllabic word, they will always appear in the first syllable [see (30) and (31)].

2.1.2.3 Word-medial /uu/

/**uu**/ is slightly longer than /**u**/ and sounds like /**oo**/ in c**oo**l or p**oo**l.
There is only one example of /**uu**/ in the database.

34. p**uu**na- *to blow*

Long vowels are simply longer versions of their short counterparts. In Mirniny, they only appear in the first syllable, and rarely at that. Stress pattern rules in Australian Languages allow us to make this claim with certainty (Sharp, 2004).

Long vowels are present in 0.5% of lexemes in the GALCAC Mirniny database.

2.2 Consonants

In contrast to vowels, which may occur in any position, consonants are restricted as to where they may appear within a lexeme. There are also restrictions as to what place they may take in a consonant cluster (CC). This section will discuss each consonant and their permitted place within a word.

2.2.1 Velar stop, /k/

The standardised orthography for Goldfields Aboriginal Languages uses the set of voiceless stops k, p, t. The phoneme /k/ is on a continuum between the voiced /g/ and voiceless stop /k/, depending on the place in the morpheme. In Standard Australian English (SAE), these are two different phones, but in Goldfields languages, they are the same phoneme with 30% being more voiced and 70% being less voiced. When producing the velar stop in Mirniny, the velar stop is more like a voiced /k/, than a /g/.

The voiced velar stop, /**k**/ appears in word-initial and medial positions. It cannot take word-final position.

2.2.1.1 Word-initial /**k**/

35. **k**ama- *melt, to*
36. **k**irti *tree, sandalwood*
37. **k**upi-**k**upi *whirlwind*

In example (37), the first segment is reduplicated. It is written with a hyphen, so as to indicate the stress is on the first syllable of each element. This way, the speaker knows to pronounce each segment with the stress on the first syllable (Jones, 2011). In this example, the second /**k**/ is not considered to be word-medial, but word-initial.

Consider the following reduplication.

38. **k**alu-**k**alu *fibre, balls of fibre from the sea*

This lexeme has been written historically as kalu galu. The transcriber has used the voiced velar stop /g/ word-initially in the repeated segment to indicate that stress should also be placed upon the first syllable in this segment (Jones, 2011). GALCAC linguists have written this lexeme as a hyphenated reduplication, kalu-kalu, to indicate the stress on the first syllable of the repeated segment.

The same can be said for (39) below.

39. historical orthography **k**aldagalda *shark, species of*
    contemporary orthography **k**alta-**k**alta

The Mirniny label for shark, is a reduplication. As with kalu-kalu, the voiced velar nasal /g/ acts to represent stress on the first syllable of the repeated lexeme hence, kalta-**k**alta.

The difference between the *reduplication* of a morpheme, as above, and a *reduplicated* morpheme is that reduplication occurs with identifiable lexical items, such as (37), (38) and (39). The hyphen indicates an identified lexeme and a consequential secondary stress that is placed on the first syllable of the reduplication in accordance with stress rules.

A reduplicated morpheme is not hyphenated. It is a frozen form where each reduplicated element is not an identifiable lexeme. For example,

40. tjutju *dog*

In example (40) the CV pattern is repeated however, each reduplicated element is not an identifiable lexeme. We cannot analyse tju+tju as distinguishable lexemes.

2.2.1.2 Word-medial /k/

41. ka**k**u *crow*
42. ma**k**uru *wind* or *breeze*

2.2.1.3 Velar Stop Consonant Cluster Restrictions.

A consonant cluster (CC) occurs in Mirniny with the phoneme /k/ e.g. nga**rnk**urr. In nga**rnk**urr, the retroflex nasal, /rn/, takes the first position within the cluster (C1). The velar stop /k/ is in second position (C2).

The velar stop may only appear in the second position (C2).

43. ngarn**k**urr	*beard*
44. tjul**k**ala	*big, heavy*

In (43) the retroflex nasal is in C1 and the velar stop C2. In (44) the alveolar lateral is in C1. The velar stop is in C2.

Consider the following,

45. ma**k**urlu	*big*
46. parl**k**a	*head*

In example (45) the short /u/ placed in between the two consonants, /**k**/ and /rl/ allows the speaker to produce the second consonant. It is not possible for a speaker to pronounce a cluster like /krl/. However, when the consonants are inverted and the stop takes C2, as in example (46) it becomes a phone the speaker is able to produce.

The plosive nature of the stop makes it impossible to produce another consonant immediately after. The following rule applies;

Stops, when they occur in a CC, will only appear in C2.

2.2.2 Alveolar lateral /l/

/**l**/ sounds like the /**l**/ in **l**amp, **l**ake.

The alveolar lateral /**l**/ may appear in word-medial and word-final position. Naessan (2013) argues that it cannot appear word-initially, other than as the first letter of a suffix or case marker such as ergative -lu and locative -la. However the GALCAC database contains one example of this phone word-initially.

2.2.2.1 Word Initial /**l**/

47. **l**arra?	*really*?

This lexeme was supplied by a member of the Mirniny community. This speaker does not claim to be fluent, but like many others, is someone who remembers words or phrases that were passed onto her by elders and family members. In the context in which it was collected, larra was being used as an interjection.

It should be noted that in WDL languages, this lexeme is a men's word and as such, restricted for women. When recorded, the speaker warned against the use of this lexical item outside of Mirniny country.

2.2.2.2 Word-medial /**l**/

48. ma**l**u *shade*
49. nga**l**a *forehead*

2.2.2.3 Word-final /**l**/

50. yurrkuwi**l** *to steal*
51. pintja**l** *star*

2.2.2.4 Alveolar lateral Consonant Cluster Restrictions.

Within a CC, laterals will take C1. See below examples where the alveolar lateral is in C1.

52. tjini**l**ka *shrub, species*
53. nga**l**ti *finger*

2.2.3 Palatal lateral /ly/

The palatal lateral sounds like the /ll/ in mi**lli**on but not in si**lly** or bi**lly**.
The palatal lateral occurs in word-medial position only. It cannot take word-initial or word-final position.

2.2.3.1 Word-medial /**ly**/

54. tjiru**ly**ita *bird, mountain thrush*
55. wa**ly**a *eaglehawk*

2.2.3.2 Palatal lateral Consonant Cluster Restrictions.

The palatal lateral may only occur in C1 within a CC.

56. karra**ly**ka *bark from a tree*

Historical wordlists have this lexeme recorded as karrada. The CC /lyk/ could be heard as a voiced dental stop in fast, natural speech. Other entries within the GALCAC database using the same gloss, have used the above CC to transcribe the word and so we can ascribe the /**ly**k/ CC rather than the voiced alveolar stop. As discussed above, GALCAC uses voiceless /p/, /t/ and /k/ in place of voiced /b/, /d/ and /g/. Therefore, a simple orthographic swap for karrada is karrata, however in this instance, that is not the case.

This is one example of how difficult it can be to decipher century-old wordlists, especially when there is no recorded audio, or speakers to consult as to the correct phoneme in difficult environments (Amery, 2016). In some lexical cases, despite the best efforts of a linguist, the process of reclaiming a language will be to identify the most likely form, after rules, examples and comparison of surrounding codes have been utilised.

2.2.4 Bilabial nasal /m/

The bilabial nasal sounds like the /**m**/ sound in **m**ore and sli**m**. This consonant may occur in word-initial and word-medial positions, but not word-final.

2.2.4.1 Word-initial /m/

57. **m**inyaka	*tomorrow morning*
58. **m**anytjali	*food that is not meat*

As above (2.1.1.3), kampu, and the contemporary rule regarding the nasalisation of vowels preceding a nasal, the first /**a**/ in m**a**nytjali takes on a nasal quality, being that it is surrounded by nasals.

2.2.4.2 Word-medial /m/

59. mu**m**arta-	*to burn*
60. wa**m**urlu	*feather*

2.2.4.3 Bilabial Nasal Consonant Cluster Restrictions.

The bilabial nasal has more distribution than other consonants, as it is able to take both C1 and C2 in a CC.

2.3.5.3.1 C1

61. ka**m**pu	*bone, back, stick*
62. ka**m**purn	*heat*
63. ka**m**pirti	*stomach*

2.3.5.3.2 C2

64. kan**m**ara	*firestick*

Rather than a short, plosive production (as found in stops), nasals have a continual quality. This enables the bilabial nasal to take both C1 and C2 in a CC.
It should be noted that while the bilabial nasal may occur in either C1 or C2, there are still restrictions as to when and with what other consonants will be in the CC. In C1 as with examples (61), (62) and (63) it only occurs in homorganic clusters. That is, consonants with the same place of articulation (the bilabial stop /p/). In C2 that is with alveolar nasal /n/, as shown in (64) (Naessan, 2013).

2.2.5 Alveolar nasal /n/

The alveolar nasal sounds like the /**n**/ in **n**ight and ca**n**. It can appear in word-initial, word-medial and word-final positions.

2.2.5.1 Word-initial /**n**/

65. **n**anpa	*string*
66. **n**apa	*ashes*
67. **n**arra	*skin*

2.2.5.2 Word-medial /**n**/

68. nga**n**a-	*go, to*
69. pa**n**a	*DEM*

Historical records show that in medial position and in certain environments, /**n**/ is sometimes recorded as /**nh**/: nga**nh**a-; pa**nh**a, which indicates a dental nasal consonant. As with the examples above, the phone immediately following is /a/. Analysis of recorded language held in the GALCAC archives has shown that in this environment, rather than aspirating the consonant, the speaker is producing a wide, backed vowel. As the vocal apparatus completes the alveolar nasal and prepares to produce the vowel, the mouth is positioned to produce a wide, backed vowel.
Consider the following examples,

70. nga**n**arri	*go IMP*
71. pa**n**artu	*that one*

The retroflex following the vowel emphasises the wide, backed quality of /a/. In this environment the mouth is perfectly set up to create the wide backed vowel, which has been confused for an aspirated consonant.

2.2.5.3 Word-final /n/

72. kurna**n**	*heat*

2.2.5.4 Assimilation of /n/ in word-final position

At (13), I demonstrated that certain phones will assimilate to other phones in their immediate environment, both morphemically and sententially. In conversational speech, the alveolar nasal (in word-final position) will assimilate to other nasal phones occurring immediately after it, due to anticipatory assimilation (von Brandenstein, n.d.).

2.2.5.5 Alveolar Nasal Consonant Cluster Restrictions

The alveolar nasal takes C1 position only.

73. mi**n**ta	*ant's nest*
74. ka**n**mara	*firestick*

2.2.6 Velar nasal /ng/

The velar nasal sounds like the /**ng**/ phoneme at the end of Standard Australian English (SAE) words si**ng** and bri**ng**. This phoneme is commonly found in SAE words medially and finally, but in Mirniny it can appear word-initially or word-medially.

2.2.6.1 Word-initial /ng/

75. **ng**atju	*1sg*
76. **ng**ana-	*go, to*

77. **ng**arntany *sick*

2.2.6.2 Word-medial /ng/

78. nga**ng**i *bird, species*
79. ngura-**ng**arra *fly, species*

2.2.6.3 Word-final /ng/

The velar nasal cannot take word-final position, but has been recorded in this position in historical written records, possibly due transcription error. Careful study of the phonemic environment in which this occurs, and comparison with lexemes of a similar environment indicates a vowel in word-final position.

Consider the following examples

80. kurro**ng**, karo**ng**u *jasper* should be kara**ng**u.

The Mirniny term for jasper, also flint stones made from jasper, is sometimes recorded as at (80). Comparison to other records shows the correct orthography is kara**ng**u. Furthermore, audio recordings are in agreement with this (vowel-final) written record. Where linguists have access to more than one written record, which can be confirmed with audio records, this kind of reconciliation is simple. Unfortunately, this is not always the case and linguists (or anyone) involved in the business of language reconstruction, must do what they can with the information available (Amery, 2016). Concerning word-final /ng/, comparison of written records containing word-final velar nasal, to lexemes where the velar nasal is in the final segment, (but not actually word-final) reveals a pattern in the phonemic environment. Where audio records are available, these have been analysed and are in agreement with my hypothesis regarding a final vowel.

81. boondo**ng**, bundo**ng** *stones* becomes purnta**ng**u
82. suffix –marro**ng** *ABL* becomes marra**ng**u

As with (80), (81) and (82) have more than one source. In this case we have taken the most reliable, that is purntangu and -marrangu as the correct form, based on phonological rules. Lexemes boondong, bundong and -marrong contain similar environments that permit another rule regarding /ng/ final; *Words ending in /ong/ and /ung/ are actually word-final /ngu/.* This rule is in part thanks to the environments discussed above and also the rule discussed at 2.1.1.3, *Vowel /a/ becomes nasalised when it precedes a nasal.*

Linguists are now able to realise the correct ending to other words finishing with the velar nasal. See examples below;

83. koggalo**ng**, kokalo**ng** *cockatoo* becomes kakala**ng**u
84. nabbalo**ng** *heat* becomes napala**ng**u

The velar nasal is a common ending for words in SAE. However, for speakers whose first language is not an Australian Language (AL), it can be quite difficult to discern this consonant from other nasals such as /n/ and /ny/, the latter also being common in AL, but not

SAE. The palatal nasal /ny/ is only found word-medially in SAE but can occur word-initially, medially and finally in most ALs. The follow lexemes are examples where the palatal nasal has been mistaken for the velar nasal in word-final position.

85. meeni**ng**, mini**ng**	*man* becomes mirni**ny**.
86. jeri**ng**, jirring	*sand* becomes tjirri**ny**
87. weedi**ng**, wirti**ng**	*long* becomes wirti**ny**

These lexemes contain similar phonetic environments that create a rule, based on the above.

Word-final /ing/ is realised as /iny/.

The palatal nasal is discussed in more detail in section 2.2.7.

2.2.6.4 Velar Nasal Consonant Cluster Restrictions

The velar nasal may occur in both C1 and C2 positions within the CC. The velar nasal, along with the bilabial nasal are the only consonants that are able to appear in both C1 and C2 (Naessan, 2013). All other consonants are restricted to either C1 or C2.

2.2.6.4.1 Velar nasal in C1

88. inytja**ng**ku	*tea tree*
89. mungu i**ng**ku	*evening star*

2.2.6.4.2 Velar Nasal in C2

The velar nasal and the bilabial nasal are the only two consonants that may appear in both C1 and C2. I am unable to provide examples of this consonant in C2, as the GALCAC database does not have data on this position.

2.2.7 Palatal Nasal /ny/

The palatal nasal sounds like o**n**ion, ca**ny**on and bu**ny**ip. It may appear word-initially, word-medially and word-finally.

2.2.7.1 Word-initial /ny/

90. **ny**ina-	*sit*
91. **ny**iru	*seed, non-specific*
92. **ny**a-	*see, to*

2.2.7.2 Word-medial /ny/

93. pi**ny**irti	*sea sponge*
94. nya**ny**tju	*horse*

2.2.7.3 Word-final /ny/

95. mirni**ny** *man*
96. martari**ny** *round, shape*

As discussed above in section 2.2.6.3 the palatal nasal can be difficult to hear for language learners and those who speak ALs as a second language. This is especially so in word-final position. The GALCAC database contains several instances where this consonant has been incorrectly transcribed in word-final position.

Consider the following examples;

97. koonain *excrement* is realised as kuna**ny**
98. ngandain *sick* is realised as ngarnta**ny**
99. thalain *mouth* is realised as tjaala**ny**
100. ngalguing *far* is realised as ngalku**ny**

In (97), (98) and (99) the palatal nasal has been mistaken for a complex vowel. The same mistake has occurred in (100), albeit a different complex vowel. Complex vowels are not present in the phonemic inventory of Mirniny. Where some transcribers have historically included a complex vowel, analysis has consistently shown this to be a glide (see sections 2.2.16.2 and 2.2.17.2 for more information regarding complex vowels). In the above examples it would be quite simple to replace the complex vowel with the glide, however comparison of (97) and (98) to other written and audio sources shows the phonemic environment /ain/ to be /any/ and /uin/ as /uny/. This pattern is repeated across the corpus and allows the following rule, *Word-final /ain/ becomes /any/ and word-final /uin/ becomes /uny/.*

Based on this rule, the following applies:

101. kund**uin**g *forked lightning* is realised as kant**uny**

This lexeme could also be realised as karntuny. Naessan's (2013) CC rules do allow for an /rnt/ consonant cluster, but without audio records or speakers to confirm, there is no way to be certain. This is the reality of reconstructing languages from secondary research (Amery, 2016).

2.2.7.4 Assimilation of /ny/ in word-final position

Section 2.2.5.4 established that phones will assimilate to other phones in their immediate environment, both morphemically and sententially. This is particularly so with nasals. In conversational speech, the palatal nasal in word-final position will assimilate towards other phones that occur immediately after it. Von Brandenstein (n.d.) argues that a word-final nasal will assimilate towards a word-initial nasal where they occur sequentially, however in example (102), we can hear the palatal nasal assimilating towards the velar stop. In natural speech, that is ordinary conversational speech, individual words receive less stress, and seemingly run together (Yule, 2004). This results in the palatal nasal sounding a bit like the velar nasal /ng/.

102. Mirni**ny** karli pakurri? *Where is that man's spear?*

2.2.7.5 Palatal Nasal Consonant Cluster Restrictions

The palatal nasal may only occur in C1.

103. na**ny**tjin	*wide*
104. ali**ny**tjirra	*north*

2.2.8 Bilabial Stop /p/

Goldfields Aboriginal Languages use the voiceless bilabial stop grapheme /p/. The phoneme is on a continuum between voiceless /p/ and voice /b/. In Standard Australian English, these are two different phones, but in Goldfields languages, they are the same realised as more or less voiced. The bilabial stop in Mirniny, is realised 70% voiced /p/, and 30% /b/.

The bilabial stop sounds like /**p**/ in sto**p**, was**p** or **p**ill. It may occur word-initially or word-medially. It cannot take the word-final position.

2.2.8.1 Word-initial /p/

105. **p**irri	*nail*
106. **p**ankarta	*daytime*

2.2.8.2 Word-medial /p/

107. ku**p**i-ku**p**i	*whirlwind*
108. pa**p**arlu	*uncle, mother's side*

2.2.8.3 Bilabial Stop Consonant Cluster Restrictions

As with other stops, the bilabial stop may only occur in C2.

109. kam**p**u	*bone, bark, stick*
110. pin**p**i	*tree bark*
111. pirr**p**atu	*midday*

2.2.9 Retroflex Rhotic /r/

The retroflex rhotic sounds like /r/ in **r**eal, **r**ough and ve**r**y. It is the most restricted in terms of where it may occur, that being word-medial in an intervocalic position only (Naessan, 2013).

2.2.9.1 Word-initial /r/

Morpho-phonemic rules do not allow retroflex rhotic to be used word-initially (Naessan, 2013) however the GALCAC database has one example.

112. **r**a-	*throw, aim, project*

There are three sentential examples of this verb root, with two corresponding tenses.

113. **r**arnu	*threw*, PAST
114. **r**arra!	*throw!* IMP

This lexeme has been acquired from one source. Unfortunately I have been not been able to find any examples of use from other sources, nor is there an audio source. In most cases, linguists prefer to use only those lexemes that are supported by more than one source, however considering it appears in three sentences, the decision has been made to keep it in the database until further information is available.

2.2.9.2 Word-medial /r/

115. wipa**r**u	*snake*, generic
116. ku**r**ila	*south*

2.2.9.3 Word-final /r/

The retroflex rhotic may not take word-final position (Naessan, 2013). However, the GALCAC Mirniny toolbox contains several examples of the consonant in this position.

117. bilai**r**	*the sea* realised as pirliya
118. kongai**r**	*night* realised as kangkiya
119. thulai**r**	*penguin* realised as tjuliya

The GALCAC database contains entries from another source recording example (118) as kangkiya. Example (119) is entered both audio and written sources. The reliability of sources for both (118) and (119) allows us to apply the same word-final segment to (117).
The consistency of the above examples allows us to write the following rule:
Word-final /air/ is actually /iya/.

In example (118) the nasalisation rule discussed in section 2.1.1.3 can be applied. The complex vowel rule, explained in section 2.2.7.3 can be applied at (117), (118) and (119)**.**
The /th/ /tj/ distinction at (119) will be discussed further in section 2.2.15.

2.2.9.4 Retroflex Rhotic Consonant Cluster Restrictions

This phone does not appear in either C1 or C2.

2.2.10 Retroflex Lateral /rl/

The retroflex lateral sounds like Standard American English gi**rl** and whi**rl**. This consonant may appear in word-medial and word-final positions but not word-initial. However, there are many Australian languages which retroflex every initial lateral, there is not recorded evidence to prove or disprove this for Mirniny as of 2023.

2.2.10.1 Word-medial /rl/

120. wamu**rl**u	*bird down, feathers*
121. maku**rl**u	*big, heavy*
122. ka**rl**aya	*emu*
123. ku**rl**arri	*bird, Laughing Jackass*

2.2.10.2 Word-final /rl/

124. tjilka**rl**	*tree root*
125. kuku**rl**	*throat*

2.2.10.3 Retroflex Lateral Consonant Cluster Restrictions

The retroflex lateral may only appear in C1.

126. wa**rl**pi	*water*
127. ku**rl**pirra	*kangaroo*
128. ku**rl**tjirrka	*grass seed*

2.2.11 Retroflex Nasal /rn/

The retroflex nasal is produced retroflexed as the Standard American English /n/ phoneme in ba**rn**, or ya**rn**. The retroflex nasal may appear in word-medial or word-final positions. It does not occur word-initially.

2.2.11.1 Word-medial /rn/

129. panya**rn**i	*DEM*
130. pu**rn**i	*horse*
131. pu**rn**itjarrtjarr	*plover*
132. tji**rn**tu	*sun*

2.2.11.2 Word final /rn/

133. yurntarn	*nape of neck*
134. kularn	*horn (of an animal)*

2.2.11.3 Retroflex Nasal Consonant Cluster Restrictions

The retroflex nasal may only appear in C1.

135. pu**rn**tangu	*rock*
136. tja**rn**turiny	*lightning*

2.2.12 Alveolar Rhotic /rr/, trill or tap

The alveolar rhotic has two realisations, depending on whether it appears in the middle or at the end of a word. Medially, it is a tap as in the Standard Scottish English /r/ in bairn because the tip of the tongue **taps** the top of the mouth. In conversational speech, that is when it is produced quickly, it sounds like a **tap** and can easily be mistaken for the alveolar stop or retroflex stop.

When it occurs at the end of a word, the alveolar rhotic has a trill-like production. In this position it is called a **trill.** The alveolar rhotic may appear in word-medial or word-final position. It does not appear word-initially.

2.2.12.1 Word-medial /rr/

137. pi**rr**i	*nail*
138. la**rr**a	*really*?
139. ngu**rr**a	*circumcision*
140. kaka**rr**a	*east*

2.2.12.2 Word-final /rr/

The retroflex rhotic may not appear word-finally, but the alveolar rhotic can. This is an important distinction as the sounds produced by each phone are quite different.

141. tjarta**rr**	*this way*
142. tjaltji**rr**	*flint stone*
143. tjalyu**rr**	*plume of feathers*
144. pulyi**rr**	*blood*

Consider the following examples where the retroflex rhotic has been recorded in historical material as the alveolar rhotic.

145. kulbi**r** and kulbe**rh**	*kangaroo* realised as kurlpi**rr**
146. ngane**r**	*silly* realised as ngani**rr**

2.2.12.3 Alveolar Rhotic Consonant Cluster Restrictions

The alveolar rhotic may only appear in C1.

147. ku**rr**kun	*elbow*
148. nga**rr**ka	*cliff*
149. ngu**rr**ku	*face*
150. purnitja**rr**tjarr	*bird, plover*

2.2.12.4 Morpho-phonemic Rules concerning /r/ and /rr/

Within the GALCAC Mirniny toolbox, there are several examples of lexemes with both retroflex and alveolar rhotic occurring intervocalically. GALCAC linguists have studied the lexemes in which this occurs and have found that there is a particular order in which these phones appear. This has to do with the previously stated rules as to CCs and in conjunction with the production qualities of each consonant.

Consider the following examples;

151. pi**r**a**rr**	*mallee*, species of
152. ka**r**a**rr**a	*thin*
153. ngu**r**a**rr**a	*fly*
154. wilu**r**a**rr**a	*west*

As above, the retroflex rhotic occurs before the alveolar rhotic. We know this because of previously discussed phonemic environment rules: /r/ only occurs intervocalically; /r/ may not appear word-finally; /rr/ may appear word-finally. Unlike SAE, where word-final /er/, /ar/, /or/ and /re/ are commonly found at the end of words, none of these environments are permitted in Mirniny. At the end of a word, the alveolar rhotic is a continual trill. This phone

is much easier for the vocal apparatus to produce than a retroflex rhotic. In this way the manner of articulation affects the morphological rules of a language, and by extension, the way it is used by speakers. The examples above, (151), (152), (153) and (154), combined with this knowledge about production allow us to write the following rule; *Where they occur in contiguous syllables, the retroflex rhotic appears before the alveolar rhotic*.

Using this rule we can predict the following,

155. gooraara	*shrub, species of* realised as ku**r**a**rr**a
156. kooraradee	*tall* realised as ku**r**a**rr**arti

There is one exception to this formula,

157. ngu**rr**a**rr**a	*circumcise, to*

In example 157 the noun ngurra *circumcision* has been verbalised using the verb suffix, -rra-. This creates the verb stem, *to circumcise* to which verb tense can then be added.

2.2.13 Retroflex Stop /rt/

The retroflex stop sounds like the Standard American English /rt/ in ca**rt** and da**rt**. The retroflex stop is only permitted word-medially. It cannot appear word-initially or word-finally.

2.2.13.1 Word-medial /rt/

158. ngu**rt**a-	*to have*
159. naka**rt**u	*this*
160. nga**rt**a	*tree, species*
161. yalka**rt**a	*three*
162. pu**rt**i	*girl*
163. yapa**rt**i	*yesterday*

2.2.13.2 Retroflex Stop Consonant Cluster Restrictions

The retroflex stop appears in C2. Unfortunately there is no data available to discuss here.

2.2.14 Alveolar Stop /t/

Goldfields Aboriginal Languages use the voiceless alveolar stop grapheme. The phoneme is on a continuum between /t/ and /d/, more voiced initially and less voiced medially. In Standard Australian English, /t/ and /d/, are two different phones, but in Goldfields languages, they are a single phone. The alveolar stop in Mirniny is 70% a voiced /t/, and 30% a voiceless /d/.

The alveolar stop sounds like the /**t**/ in **t**in, ma**t** and **t**eapo**t**. It may only appear in word-medial position.

2.2.14.1 Word-initial /t/

Naessan (2013) claims the alveolar stop cannot appear word-initially, but the GALCAC Mirniny database contains two examples of this consonant in initial position.

164. **t**anpi	*lobster*
165. **t**arri-**t**arrilukin	*no gloss*

Unfortunately, there are no audio recordings with which to analyse these further. Despite the lack of available data, these lexemes will remain in the toolbox, until more information becomes available.

2.2.14.2 Word-medial /t/

166. i**t**alitja	*bustard, bush turkey*
167. irl**t**u	*blood*
168. kaarl**t**a	*west*
169. ku**t**iya-	*run, to*
170. maa**t**u	*on top of*

2.2.14.3 Alveolar Stop Consonant Cluster Restrictions

The alveolar stop only appears in C2.

171. kan**t**a	*thigh*
172. karn**t**a	*vomit*
173. ngurn**t**a-,	*to be, exist, stay*
174. nyun**t**u	*2sg*
175. parl**t**a-	*spear, to*

2.2.15 Lamino-dental Stop /tj/

This phoneme is not present in SAE. The tip of the tongue touches behind the teeth when pronouncing /j/ as in **j**udge and **j**am. It can appear in word-initial and word-medial, but not word-final position.

2.2.15.1 Word-initial /tj/

The historical word lists vary in their representation of the lamino-dental stop. This phone is sometimes presented as the dental fricative, /th/, as /tj/ and even voiced and voiceless alveolar stops /d/ and /t/. However analysis of audio samples of lexemes containing this phone show it is one phoneme produced as a variant according to the phonemic environment.

Pronunciation of the word-initial lamino-dental stop is dependent upon the vowel immediately following.

176. **tj**alyi	*foam*
177. **tj**artu	*toward*

Preceding the open, backed vowel /a/, the initial consonant sounds almost like the voiced dental stop. This is especially noticeable in example (177), where the mouth remains open after the /a/ as it produces the retroflex stop.

178. **tj**ilarra *full*
179. **tj**irra *calf of the leg*
180. **tj**irriny *sandhill*

In examples (178), (179) and (180) contiguous close, fronted vowel appearing immediately after the initial consonant causes the lamino-dental stop to be more pronounced, almost fricatised. This is because the position of the mouth, as it moves into the close front vowel, affects the manner in which /**tj**/ is produced.

181. **tj**utju *dog*
182. **tj**uwi *meat*

The close middle vowel /u/ results in a thicker dental stop-like sound, that is similar to (176) and (177).

As discussed at (39), example (181) is a reduplicated morpheme. A *reduplicated* morpheme is not hyphenated. It is a frozen form where each reduplicated element is not an identifiable lexeme. A reduplicated morpheme is different to a *reduplication* of a morpheme, which is hyphenated to illustrate each identifiable lexeme. For this reason, (181) is written without the hyphen.

2.2.15.2 Word-medial /tj/

As with word-initial position, the medial /**tj**/ is affected in its phonemic quality dependent upon the following vowel. Audio samples of this phone in word-medial position show the same effect as the CV combination in initial position.

183. pa**tj**aku *use mouth*
184. ku**tj**arra *two*
185. wirti**tj**a *fat, grease*
186. ka**tj**i *spear*
187. nga**tj**u *1sg*
188. tju**tj**u *dog*

2.2.15.3 Lamino-dental Stop Consonant Cluster Restrictions

The lamino-dental stop takes C2 position only.

189. warr**tj**a *wombat fur*
190. mirniny**tj**u *man+ERG*
191. many**tj**ali *food that is not meat*

Within a CC, this phone is affected by the environment, just as when it occurs on its own in initial or medial positions.
Concerning the lamino-palatal dental, this phone is cause of consternation amongst linguists for some time. This phone has been affected by three factors. First, given the production of this phone is affected by the phonemic environment, it is likely to exist as both /j/ and /tj/, used in free variation according to speaker preference, dependant on vocalic surrounds. The influence of (dominant) English cannot be discounted, as Australian language speakers came

into contact with English speakers, a phonemic shift has occurred towards /j/ in some (linguistic) environments. This is likely to have become more widely used among younger generations, that is, the grandchildren of the first contact people, who acted as language informants in the last century.

2.2.16 Bilabial Approximate, /w/

The bilabial approximate phoneme is like the SAE /**w**/ in **w**ater, **w**ide and a**w**ay. It may occur in word-initial and word-medial position. It does not take word-final position.
The bilabial approximate is sometimes referred to as a semi-vowel.

2.2.16.1 Word-initial /w/

192. **w**amurlu	*feathers*
193.**w**angarla	*crow, species of*

As discussed in (8), (9) and (10), initial /**w**/ affects the length of vowel /a/ where it immediately follows. At (193) the bilabial approximate before, and the velar nasal following /a/ results in a nasalised open backed vowel, sometimes written with /o/, as in 'wongala' (see (13) for a discussion about nasalisation).

194. **w**intu	*hair*
195. **w**ura-	*throw, to*

2.2.16.2 Word-medial /w/

196. pu**w**a,	*hit!*
197. nga**w**u	*egg*

At (196) and (197) the approximate glides between vowels /u/ and /a/, and /a/ and /u/ so softly it is almost inaudible. Both of these words are sometimes written in historical material with complex vowels, /ua/ and /au/ (or CVV) leaving out the glide altogether. In (197) short vowel /a/ is surrounded by a velar nasal and an approximate. Because of this phonemic environment it is held for longer [see (8), (9) and (10)]. As discussed in section 2.2.7.3 complex vowels, or diphthongs, are not present in the phonemic inventory of Mirniny. In this environment, the consonant approximates between vowels, as it assimilates to them (Yule, 1996; Crystal, 1998).

2.2.16.3 Bilabial Approximate Consonant Cluster Restrictions

The bilabial approximate does not appear in either C1 or C2. It is not permitted within a consonant cluster.

2.2.17 Lamino-palatal Glide /y/

The lamino-palatal glide sounds like the SAE /**y**/ in **y**ou, **y**ellow and **y**ard. It may occur word-initially and word-medially. It does not appear in word-final position. The lamino-palatal glide and the bilabial approximate are sometimes referred to as semi-vowels, because their pronunciation has a vowel-like quality; however, they are still consonants and abide by the rules assigned to consonants, not vowels. As established at section 2.1 Mirniny does not have

a vowel-final rule. In this Goldfields language vowels and consonants are able to appear word-initially and word-finally, but phonotactic rules prevent the glide and the approximate from appearing in word-final position.

2.2.17.1 Word-initial /y/

198. **y**akin	*moon*
199. **y**atu	*bird, eagle*

2.2.17.2 Word-medial /y/

In the medial position, the lamino-palatal glide assimilates to the vowels on either side of it, just as with the bilabial approximate in the preceding section.

200. ku**y**a	*NEG*
201. pirli**y**a	*the sea*
202. pu**y**a	*smoke*

Example 203 below, is sometimes written in historical material as **y**ai. The glide vowel glide vowel sequence of this lexeme results in a 'soft' sounding word, with /**y**/ gliding or assimilating to both vowels. The final syllable could be mistaken for a complex vowel, however audio samples reveal that the speaker is in fact producing a glide.

203. **y**a**y**i-	*now*

2.2.17.3 Lamino-palatal Glide Consonant Restrictions

The lamino-alveolar glide is not permitted within consonant constructions. This consonant is well represented as one of two sounds in CCs in other phones, palatals /ly/ and /ny/.

3.0 Conclusion

This paper discussed the phonemic qualities and associated morphological rules of the Goldfields Aboriginal Language, Mirniny. GALCAC has been unable to locate fluent speakers therefore this phonemic study relies on historical sources and secondary research to arrive at informed conclusions as to the distribution of phones and to identify the phonotactic rules. Previous research conducted at GALCAC focussed on word creation and morphological processes of Goldfields Languages including Mirniny, see Productive Morphological Processes for Language Rejuvenation of Goldfields Aboriginal Languages 2022.

This research paper compliments previous work by GALCAC and provides an orthological basis for language revitalisation for descendants of Mirniny elders, whose language was severely damaged upon the arrival of colonisers to the continent in 1788. Identification of the phonemic rules will assist with language rejuvenation.

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Appendices

Mirniny Distribution Patterns: Consonants

Table 1: Syllable Distribution.

Place of Articulation	Segment	Word Initial	Word Medial	Word Final
Bilabial	/p/	+	+	-
	/m/	+	+	-
	/w/	+	+	-
Alveolar	/t/	-	+	-
	/n/	+	+	+
	/rr/	-	+	+
	/l/	-	+	+
Retroflex	/rt/	-	+	-
	/rn/	-	+	+
	/r/	-	+ (intervocalic only)	-
	/rl/	-	+	+
Palatal	/tj/	+	+	-
	/ny/	+	+	+
	/y/	+	+	-
	/ly	-	+	-
Velar	/k/	+	+	-
	/ng/	+	+	-

Table 2: Consonant Cluster Distribution

Manner of Articulation	Consonant	C1	C2
Stops	/p/	-	+
	/t/	-	+
	/rt/	-	+
	/tj/	-	+
	/k/	-	+
Nasals	/m/	+	+
	/n/	+	-
	/rn/	+	-
	/ny/	+	-
	/ng/	+	+
Rhotics	/rr/	+	-
	/r/	-	-
Approximates	/w/	-	-
	/y/	-	-
Laterals	/l/	+	-
	/ly/	+	-
	/rl/	+	-