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TESTING EPENTHETIC VOWELS IN ANINDILYAKWA

Velma J. Leeding

0. INTRODUCTION

A short transitional vowel occurs in Anindilyakwa following flap /ř/, retroflex /ř̄/ and alveolar /l/. It can be so short in the unstressed position that it has not been recorded as a phonetic variant or, with a change of stress/rhythm, can have the same [morə] of length as a full vowel.

[akář̄ŋa ~ akař̄íŋa] 'teeth'

[yimúř̄ŋ^{wa} ~ yimuř̄úŋ^{wa}] 'fruit (sp.)'

Difficulties have been experienced in determining whether all such

vowels have full phonemic status or are simply a phonetic transition between two consonants. Some of the Aborigines only accept one of the variants as the correct precise form but may use both, but not all speakers agree as to the precise form of specific words.

When the epenthetic vowel has not been written, some Aboriginal literates have had problems in reading the resultant series of consonants, especially when a series occurred more than once in a word. Miss Judith Stokes, C.M.S. linguist at Angurugu, noted that, in testing reading, the Aborigines there did not accept the inclusion of the vowel in a group of words with a possible epenthetic vowel. I have noted at Umbakumba that, when writing, if an Aboriginal failed to write the consonant grapheme which closes a syllable, the missing consonant plus a vowel was inserted when self-correcting.

Individual literate Aborigines at Umbakumba have been using different spellings of their own choice since 1977 but were taught the Angurugu spelling from 1975 to 1977. The Angurugu spelling of some words has been altered since 1975.

The purpose of this paper is to outline the methods of testing Aboriginal reactions to the epenthetic vowel and the interpretation of the results in relation to the phonological and morphological factors so that guidelines can be established for consistency in spelling. The orthography used throughout the paper is the current choice of the Umbakumba Aborigines and does not represent a one-to-one correspondence between phoneme and grapheme.

1. TESTING METHODS

Testing took place at Umbakumba over a period of 18 months. Four different tests were given, using either auditory discrimination or writing skills.

Method 1:

This test was administered in 1979. Sets of three or four "control" words were made to suit each word with a problem. Each problem word was added to two sets, viz. with the minimum number of syllables or the maximum number. The Aborigines were asked to listen to the set and state whether the last word "fitted" the set, i.e. had the same number of syllables. The test was based on auditory discrimination and patterning.

Method 2:

In the first half of 1980, 24 tests (377 words) were set up to cover the

whole orthographical system. Eleven "control" words where a full vowel occurred in the same position as an epenthetic vowel were included throughout and 53 words with an epenthetic-type vowel were tested in the last 15 tests.

The tests utilised writing skills. The testees were given the word, asked to pronounce it for themselves, and to fill in the missing part (see Appendix). The tests were designed so that the "part" to be written was either one or two syllables, or a part of a syllable. (A weakness in the test materials showed up later, viz. there should have been more "control" words where only a single grapheme was needed to complete the word.)

The tests were given over a period of 12 weeks. They were titled "Revision Lessons," and the Aborigines were told by the linguist that the aim was to check their spelling to see where more help was needed. The testees were not told which specific graphemes were being checked in each test but it was often deduced.

Method 3:

As Method 2 did not produce a consistent pattern, further testing was done as a separate exercise. In late 1980, an initial list of 47 words was compiled. Examples of "control" words and problem words were taken randomly from the dictionary and listed in alphabetical order. Each Aboriginal was tested individually.

The lists were typed out with the following caption: "How many syllables are in the following words? We can read the words in both spellings but there is a problem because we are not all spelling them the same way. Tick the way you would like to spell the word." This was followed by words listed with the two alternatives in spelling, together with the English meaning. (See Appendix, Table 1.) The original aim was to use the written form so that there would be no interference because of the pronunciation by the linguist. The method of administering the test did not prove to be satisfactory because the first testee did not use the skill of breaking words into syllables but examined the appearance of the two forms. The method was then changed to one of only auditory discrimination where the Aboriginal repeated the word, broke it aloud into syllables and counted them. (This technique was familiar because it is used in adult literacy classes.) The linguist then ticked the corresponding form.

In January 1981, Miss Judith Stokes supplied a list of a further 30 words of her choice. One word was deleted because it was not known/used at Umbakumba. Unfortunately, some of the flora and fauna words were not known by all testees and could not be included in the scores.

The number of syllables counted was accepted for scoring purposes, whether or not they accurately pronounced the closure each time. This was felt to be the more accurate way of evaluating their concept of the emic vowels.

Method 4:

The testing of epenthetic vowels was incorporated into the testing of the whole orthographical system in April and May 1981. Tests were developed along similar lines to those for diagnostic testing of English reading. In one section of the test, literates were required to write a list of 100 words which had been read onto cassette tape by a mature speaker of Anindilyakwa. "Control" words and "problem" words were scattered throughout the list.

2. **THOSE TESTED**

In Method 1, two literate Aborigines were tested before it was decided to disband this type of testing.

In Method 2, six literates were tested with ages ranging from 22 to 44 years of age.

In Method 3, there were eleven Aborigines selected to do the original test but only nine of these were available for the supplementary test. Some were fully literate in the vernacular but others were only in the process of becoming literate. All had done sufficient in auditory discrimination of syllables to be able to cope with the test. Ages ranged from 22 to 44 years of age.

In Method 4, five literates were tested with ages ranging from 24 to 37 years of age.

3. **RESULTS OF THE TESTING**

Method 1:

Anindilyakwa has a strong pattern of rhythm/stress/timing. It was found that, once this pattern was set up through the "control" words, the problem words were made to fit the pattern. Thus problem words were accepted in the two alternative sets. The testing method was considered to be unsatisfactory and was discontinued.

Method 2:

The scores for this method of writing the missing syllables are given on Table 2 (Appendix). The Table is divided into two major sections for

"control" versus "problem" words. The words are then grouped under the consonants contiguous to the possible epenthetic vowel. These groups are then classified as to whether the linguists recorded a full vowel, an epenthetic or zero. The scores for each word vary because some words were repeated and others were not known by all Aborigines.

A comparison of the scores in relation to the phonetic values assigned by the linguists is as follows:

- (a) where both linguists have recorded a full vowel the Aborigines included the vowel and were fully in agreement except in one word.
Score: 58/63 94%
- (b) where both linguists have not recorded a vowel the Aborigines tend to agree to its omission.
Score: 190/245 78%
- (c) where the linguists have recorded both or zero the Aborigines have a slight preference for its omission.
Score: 66/100 66%
- (d) where the linguists differ as to a vowel or an epenthetic
No examples

Method 3:

The scores are shown in Table 3 (Appendix) following the same format as previously.

As there is always a possibility that the order of the words could have influenced the choices, the scores are listed on Table 1. These indicate that the words were considered separately, with the possible exception that a pattern was set up for words beginning with 'y'. Looking at the individual tests, two literates had a strong tendency towards inclusion of the vowel, two towards its omission, but the other seven varied.

A comparison of the scores is as follows:

- (a) where both linguists have recorded a full vowel the Aborigines prefer to insert the vowel.
Score: 99/109 91%
- (b) where the linguists have not recorded a vowel the Aborigines prefer to omit one.
Score: 176/231 76%

- (c) where the linguists have recorded both or zero the Aborigines have a slight preference to insert a vowel.
 Score: 199/324 61%
- (d) where one linguist has recorded a full vowel but the other hasn't the Aborigines prefer to insert the vowel.
 Score: 53/66 80%

Method 4:

The scores for the method where the whole word was written are shown on Table 4 (Appendix) in the same format. Those Aborigines who had a strong tendency for or against the insertion of a vowel showed the same tendency here as in Method 3.

A comparison of the scores is as follows:

- (a) where both linguists record a vowel the Aborigines tend to insert the vowel.
 Score 54/64 84%
- (b) where the linguists have not recorded a vowel the Aborigines have a strong tendency to omit it.
 Score: 75/82 92%
- (c) where the linguists have recorded both or zero the Aborigines have shown no obvious preference for either its inclusion or omission. There is a slight preference for its insertion.
 Score: 18/32 56%
- (d) No examples

4. COMPARISON OF METHODS

A comparison of the scores for the various methods is shown in the chart below. Methods 2 and 4 required writing skills but Method 3 only auditory discrimination skills. Note that the percentages in (a) and (d) refer to the insertion of a vowel but in (b) and (c) to the omission.

	CONTROL WORDS		PROBLEM WORDS	
	(a)	(b)	(c)	(d)
Method 2	94%	78%	66%	-
Method 3	91%	76%	39%	80%
Method 4	84%	92%	44%	-

In the Control words, there is little difference between Methods 2 and 3 but Method 4 yielded a significantly higher percentage of omissions of the epenthetic vowels. In the Problem words, Method 2 shows a higher percentage for the omission of epenthetic vowels. It would seem, therefore, that the methods using writing skills show greater omission of the vowel than the method using only auditory discrimination skills. It must be remembered, however, that those taking the written tests were fully literate and more experienced in handling the orthography than some of those taking the auditory test.

A more concise way of making a comparison between the methods is to limit it to only those words which appear on more than one list. The details are shown on Table 5 (Appendix) where the words are listed according to the groups for scoring.

	CONTROL WORDS		PROBLEM WORDS	
	(a)	(b)	(c)	(d)
Method 2	100%	90%	65%	-
Method 3	100%	81%	42%	91%
Method 4	90%	95%	58%	100%

In both the Control and Problem words, Methods 2 and 4 have shown higher percentages of omission of the epenthetic vowel than Method 3. This correlates generally with the previous chart but the differences in percentages are more marked.

5. ANALYSIS OF RESULTS.

It is obvious from the scores that, where the linguists are most confused, so are the Aborigines. While it would be easy to say that the problem lies in the teachers' insecurity being transferred to the students, it is also possible that the structure of the language is a source of the problem. The possible factors have been investigated as applied to the larger test using Method 3. Methods 2 and 4 show a stronger tendency for the Aborigines to omit the epenthetic vowels. Remarks cover only those words where an epenthetic is involved, unless otherwise stated.

(i) The Factor of Stress

The epenthetic vowel is sometimes optionally stressed and lengthened to a full vowel. Were vowels inserted in this position? The general rule

for word stress is that primary stress falls on the penultimate syllable. It was anticipated that this would be a likely place for the insertion of the vowel.

In the three words where an optional vowel occurs in the stressed syllable, a vowel was inserted in only 38% of the occurrences.

Where an epenthetic vowel was recorded in thirteen words but was unstressed, testees inserted the vowel 76% of the time.

As the vowels were inserted only half as many times for the optional full, stressed vowel as for the unstressed epenthetic, it seems unlikely that stress and its resultant lengthening of the vowel are criteria for decision-making.

(ii) The Factor of Rhythm/timing

The rhythm and timing of utterances is always maintained and syllables seem to be inserted or deleted in order to maintain that rhythm. While the system is not fully analysed, pairs of words with similar rhythm patterns have been compared. These were selected randomly and are listed below.

	Vowel Inserted	Vowel Omitted
<i>awarr*walya</i>	6	5
<i>ayarr*murra</i>	6	5
<i>ngarrabuwarr*kina</i>	4	8
<i>ayangkidirr*bura</i>	2	8
<i>mar*mba</i>	8	1
<i>mar*nja</i>	4	5
<i>yarr*kaliwa</i>	9	2
<i>yarr*kwumarnda</i>	7	2
<i>yarr*buwa</i>	10	1
<i>yarr*milya</i>	10	1
<i>yilarr*banda</i>	2	8
<i>dimirr*mala</i>	8	3
<i>yingarr*banla</i>	1	4
<i>yirarr*nganja</i>	4	5

In four pairs out of the seven, the two words show a similar ratio but in three they do not. The differences are great enough to indicate that this factor is not a strong criterion in making decisions.

(iii) Number of Syllables

This criterion is closely linked to that of rhythm/timing. Have the testees made their decisions because of a preference for an even or odd number of syllables in the word?

The following statistics show the scores for each set of words in terms of their preference for the maximum number of syllables.

2 → 3	(98/129)	76%
4 → 5	(78/155)	50%
6 → 7	(31/110)	28%
3 → 4	(66/165)	33%
5 → 6	(29/67)	43%

These results do not actually show a preference for either odd or even number of syllables but they do show that the Aborigines are most likely to add a vowel in short words. The average length of a word is three to six syllables.

(iv) Consonant Clusters

The structure of the language permits a syllable to be closed by one or two consonants, thus making a possible sequence of three consonants. Has a potential sequence of three consonants influenced their decision?

In 11 words where the omission of a vowel creates a tri-cluster, the vowel was omitted in 47% (60/127). This suggests that the complexity of a string of consonants is not in focus.

(v) Preceding Consonant

Have the literates been influenced by the phonetic quality of the consonant preceding the epenthetic?

Scores for the omission of the vowel are as follows:

Following	rr	(249/510)	49%
	r	(55/91)	60%
	l	(22/42)	52%

As the results are fairly consistent, the preceding consonant does not appear to be influencing decisions.

(vi) Following Consonant

Has the phonetic nature of the following consonant influenced decisions? Were more vowels inserted if the following consonant was a continuant rather than a stop?

Scores for the omission of the vowels are as follow:

		<u>pre-stop</u>		<u>pre-continuant</u>	
Following	rr	(147/259)	67%	(101/248)	41%
	r	(8/9)	90%	(48/97)	50%
	l	(21/31)	68%	(1/11)	9%

More vowels were omitted preceding stops than continuants. Decisions do seem to have been based to some extent on a preference for the vowel before continuants.

(vii) Morpheme Boundaries

Was a vowel always inserted at a morpheme boundary? There are two types of morphemes involved in the tests for which the rules for syllable deletion vary, viz. a juncture formed by a root/stem and its affixation, versus two morphemes which form a compound stem. In the first type a full vowel can be reduced to an epenthetic but in the second the syllable /ki/ is deleted under certain rules creating the sort of consonant sequence where an epenthetic is likely to occur.

In the list of Control words, all those where the linguists recorded a vowel were of the first type. The Aborigines included the vowel 90% of the time. In the list of Control words where a vowel was not recorded by linguists, the Aborigines omitted the vowel 83% (5/6) of the time—these were of the second category. Problem words are only available for the second category for which Aborigines omitted the vowel 61% (19/31) of the time.

The results show that where the linguists have written a vowel between a root and its affixation, the Aborigines agree. The problem area is in the situation where a syllable is deleted in a compound stem. It would appear that some of the Aborigines react to the syllable which has been deleted by writing a vowel but it should be noted that no Aboriginal inserted the full syllable. (In some compound stems the rule to delete /ki/ is obligatory but in others it is optional.)

(viii) Phonetic Realisation of a Full Vowel or Epenthetic

The results show that, when a full vowel is heard, the Aborigines mostly hear it and write it (average score 90%). When an epenthetic is not heard by the linguists, the Aborigines usually omit it (average 82%).

When the linguists record an epenthetic and zero, the Aborigines are in a state of indecision. The linguists mostly write \emptyset in this situation but there is a significant lack of consistency. The Aborigines have omitted the vowel on an average of 50%.

When one linguist has recorded a full vowel and the other has not, there is an average of 80% for the Aborigines in inserting a vowel. Looking at the specific words, however, shows that the Aborigines agree with each linguist about half of the time.

It does seem that the phonetic nature of the vowel is influencing the decisions in that full vowels are usually identified as such.

6. CONCLUSION

There are apparently three factors which have tended to influence the Aborigines in making their decisions.

(i) Following Consonant

The phonetic nature of the continuant, rather than the stop, has influenced some Aborigines to insert a vowel, but the scores are not high enough for this to be used as a criterion for spelling.

(ii) Morpheme Boundaries

Where the morpheme boundary occurs between a root/stem and an affix, the scores of the Aborigines are high enough to indicate that this vowel should always be written. Most of these words were included in the Control Group because the linguists have always heard and written the vowel, e.g. *yirri-nga* 'we'. The tests corroborate the present orthography.

The more difficult problem is where there is a morpheme juncture within a stem. Most stems have long and short forms when the root is an adjective or a verb, e.g. *a-jalki-ngburingka* ~ *a-jalk-buringka* 'dry (of a place)'. In some nouns, only a short form appears to be used, e.g. *a-larr-mur.da* 'dusk' where the first morpheme of the stem is *-larrki-*. Anindilyakwa has long and short forms of quite a lot of words with some

Aborigines only using the short forms. Where a syllable is optionally deleted, the normal practice is to allow the literate to spell according to both long and short forms. If this practice is extended to cover the deletion of a syllable which results in a possible epenthetic, the vowel would not be written. Such a decision, however, is based on the structure of the language because the test scores do not give a definite conclusion.

(iii) Phonetic Realisation

The Aborigines, like the linguists, have leaned heavily on the pronunciation to determine the emic nature of the vowel. While there is confusion and indecision shown in the scores, it is also apparent that where a full vowel occurs there is much less indecision. It would appear that the best system would be to write only the full vowels and to omit the vowel wherever an epenthetic occurs without variation with a full vowel.

It should also be noted that there has been very little inconsistency in the linguists' writing of the full vowel. The problem with the epenthetic has arisen because of a lack of consistency in pairs of words which are phonetically the same but have been spelt differently, e.g.

[yaɻ ^ə ŋa]	<i>yarrnga</i>	'leech'
[maɻ ^ə ŋa]	<i>marringa</i>	'sleep'
[dimiɻ ^ə marə]	<i>dimirrmara</i>	'sandfly'
[diɻ ^ə malə]	<i>dirrimala</i>	'wind'

This has led to conflict and insecurity. Some Aborigines seem to have chosen one as the norm while others chose the other, but most have been generally confused. This confusion seems to have been extended into other words where the epenthetic follows /r/ and where spelling has been consistent.

Because there is confusion, it would seem wisest to make a decision on both the structure of the language (linguistic) and on the contrast in scores between a full vowel and a problem vowel (tests). It is concluded that:

(a) Control words in Group (a) should be written with a vowel but some words from Group (d) should also be included, e.g. *yarrimilya* 'coral'.

(b) Control words in Group (b) should continue to be written without a vowel, e.g. *arrkwara* 'worm'.

(c) Problem words where the linguist hears either zero or an epenthetic are in contrast with the full vowels and should be written without a vowel, e.g. *marrnga* 'sleep', *awarrwalya* 'shade'.

Having made such decisions, language data was again checked. Minimal contrasts were found to be maintained:

<i>darrba</i>	'trepang'
<i>darriba</i>	'stingray'
<i>amarangka</i>	'edible roots'
<i>amarngka</i>	'laugh'

It was also found that, with the writing of *marrnga* 'sleep' without a medial vowel, the optional form of the root correlated with other words where the consonant cluster /rrng/ is reduced to /n/ preceding a stop, e.g. *la-marrng-bujina* ~ *la-man-bujina* 'to sleep well'.

Where a vowel is inserted or deleted to maintain the rhythm of the sentence, rules are tentatively stated as:

(i) an emic vowel can be reduced to an epenthetic when it occurs in an unstressed position, usually antepenultimate.

(ii) an epenthetic vowel (non-phonemic) can be lengthened to a full vowel when it falls in the penultimate syllable. This is rare and the resultant vowel is not phonemic. If the maintenance of the rhythm requires the addition of a syllable, it seems to occur at the places where there is usually an epenthetic.

The above rules must be applied systematically to all data so that the Aborigines can begin to be systematic also. It is highly likely that some will react to a change in a common word which they have learned to spell in a certain way. It has been found, however, that if these words are not focused on, the change comes automatically once a strong pattern has been established in phonics. Both linguists have a few words which will need to be altered.

After the above system was set up, the words were grouped and shown to the Aborigines. For words where the linguists disagreed between the presence or absence of a full vowel, the Aborigines were asked individually to place them into one of the existing groups. (This did not duplicate the problems of Method 1 because no rhythm pattern was set up.) There was agreement. Table 6 lists the words in the suggested orthography.

APPENDIX

REVISION LESSON 10

ngarra _____ ngina

arung _____ kwa

naning _____ ka

ma _____ milya

a _____ ma

yini _____ ka

mang _____ kwa

ami _____ ngwa

_____ nga

yi _____ ngwa

nu _____ ka

nga _____ kinama

na _____ ka

_____ ma

_____ nga

ngarriki _____ ka

TABLE 1: DESIGN OF THE AUDITORY DISCRIMINATION TESTING

Original List

akarringa	akarrnga	teeth	3:8
alarrikbulala	alarrkbulala	thin	4:7
alyarrimur.da	alyarrmur.da	dark	2:9
alarringkawarriya	alarrngkawarriya	tatty	2:9
alyikarribilyirra	alyikarrbilyirra	slippery	1:10
ambarringarna	ambarrngarna	how many	4:7
amurrikbalya	amurrkbalya	soft	7:4
aringkiringkawura	arngkirngkawura	sometimes	5:15
awarriwalya	awarrwalya	shade	6:5
ayangkidirribura	ayangkidirrbura	level	2:8
ayarrimurra	ayarrmurra	arm	6:5
ayilibiyiliba	ayilbiyilba	scrub	0:10
ayirribiyirra	ayirrbiyirra	continuous	1:10
angkibarringwarringwa	angkibarrngwarrngwa	heavy	2:8
balimarna	balmarna	hat	10:1
darriyiba	darriba	slug	5:5
darriba	darrba	stingray	8:3
dimarringa	dimarrnga	cricket	7:4
dimirrimara	dimirrmara	sandfly	8:3
dimirrimala	dimirrmala	wind	8:1
mamirrikwura	mamirrkwura	rib	7:4
marribura	marrbura	scorpion	11:0
marringa	marrnga	night	9:2
mijirrikwudarrba	mijirrkwudarrba	pool	3:8
milarringkwa	milarrngkwa	berry	5:6
milyirrikwa	milyirrkwa	hibiscus	1:10
mulikwa	mulkwa	stomach	6:5
ngarrabuwarrikina	ngarrabuwarrkina	hide	4:8
ngarribarrikwudina	ngarribarrkwudina	go a little way	4:6
nidirriburakina	nidirrburakina	straighten	3:8
nijarridina	nijarrdina	finish	10:1
ngarrimurmuringkina	ngarrimurmurngkina	understand	8:3
niyirrimana	niyirrmana	swim	5:6
nanakarringina	nanakarrngina	get water	9:2
yambirrikwa	yambirrkwa	fish	3:8
yarrida	yarrda	rash	10:1
yarribuwa	yarrbuwa	cuttlefish	10:2
yarrikaliwa	yarrkaliwa	shell	9:2
yarrima	yarrma	fish	9:1
yarrimilya	yarrmilya	coral	10:1
yarringa	yarrnga	leech	10:1
yilarribanda	yilarrbanda	snake	2:8
yiliba	yilba	root	4:6

yimurringwa	yimurringwa	prune	6:5
yinikarrika	yinikarrka	hawk	3:8
yirringa	yirrnga	we	10:1
yirrima	yirrima	gum	9:0

Supplementary List

adarriba	adarrba	short	0:9
amaringka	amarngka	laugh	1:8
aringkawa	arngkawa	wise	9:0
arrida	arrda	rash	7:2
arrikwara	arrkwara	worm	6:3
dirrikba	dirrkba	plover	8:1
arribilya	arrbilya	sickness	5:1
karriba	karrba	turtleshell	6:0
mangkarrikba	mangkarrkba	plum	2:6
marimba	marmba	palm	8:1
marinja	marnja	bees' eggs	4:5
marringmur.da	marrngmur.da	currant	8:1
marrikwurra	marrkwurra	fish	9:0
munginjarrikwa	munginjarrkwa	shell	6:3
murikwarringa	murikwarrnga	spear	5:2
yarrikwumarnda	yarrkwumarnda	shell	7:2
yikariba	yikarba	woomera	1:8
yilarriba	yilarrba	palm	0:9
yilikarinja	yilikarnja	shell	5:1
yilyikarrimur.da	yilyikarrmur.da	flyingfox	4:5
yimalyarribirra	yimalyarrbirra	shell	3:2
yimurribunga	yimurrbunga	shark	1:1
yimurriminya	yimurrminya	mussel	1:2
yingarribanja	yingarrbanja	limpet	1:4
yingkarima	yingkarma	skink	1:5
yinibarringinja	yinibarrnginja	gum tree	5:4
yirarringanja	yirarrnganja	paperbark	4:5
yirinjirra	yirnjirra	fish	2:7
yirimba	yirrimba	seagull	4:3

N.B. The numbers shown in the final column were added after the tests were completed. These are the scores for the Aborigines, e.g. akarrVnga 'teeth' where 3 included the vowel and 8 omitted it.

NOTATIONS USED IN TABLES 2-5:

- * the position of the vowel under discussion
- ∅ zero, where no vowel was written or inserted phonetically
- () optional
- both where the linguists recorded an absence of a vowel or an epenthetic
- MP the vowel under discussion is at the boundary of morphemes
- V a full vowel has been recorded, identified or written
- Where the total number of responses recorded for a word exceeds the number of test participants, this indicates the word was used more than once in the tests.

TABLE 2: SCORES BASED ON METHOD 2

1. Control Words

	<u>Aborigines</u>		<u>Linguists</u>	
	V	∅		
<u>rr + stop</u>				
wumarr*bina	1	5	V	V
narr*karrina	5	0	V	V
<u>rr + nasal</u>				
naniyarr*ngka	6	0	V	V
ngarrirr*ngkina	6	0	V	V
<u>r + stop</u>				
kwur*ba	8	0	V	V
<u>r + nasal</u>				
ar*ngka	6	0	V	V
ar*ngmarra	6	0	V	V
<u>l + stop</u>				
al*ka	6	0	V	V
angal*ba	8	0	V	V
<u>l + nasal</u>				
kwul*nga	6	0	V	V

rr + stop

ayirr*biyirr*ba	1	11	Ø	Ø
murirr*ba	2	4	Ø	Ø
alarr*kbulala	1	5	Ø	Ø
amaburr*kwakbala	1	4	Ø	Ø
aringkwarr*kwa	2	4	Ø	Ø
dikwurirr*kwa	3	3	Ø	Ø
mangkarr*kba	1	5	Ø	Ø
mangkwurr*kwa	1	5	Ø	Ø
naningkangkwarra*ka	2	4	Ø	Ø
nawarr*ka	1	5	Ø	Ø
ningwarr*ka	1	5	Ø	Ø
niribarr*ka	2	4	Ø	Ø
ngarrarr*kinama	3	3	Ø	Ø
ngarrikilarr*ka	2	4	Ø	Ø
ngarrilarr*kbalkina	0	6	Ø	Ø
yinikarr*ka	1	5	Ø	Ø

rr + nasal

akwularr*mbarrina	1	5	Ø	Ø
alirr*ma	2	4	Ø	Ø
malyirr*milya	2	4	Ø	Ø
nimularr*mbarrina	0	6	Ø	Ø
akiwabarr*ngwarr*ngwa	5	5	Ø	Ø
alarr*ngkwularrngkwala	3	9	Ø	Ø
amulirr*ngwa	2	4	Ø	Ø
arr*ngka	5	0	Ø	-

r + stop

abiyar*buwa	0	6	Ø	Ø
abiya (r) karbiya	0	6	Ø	Ø
naningkar*ba	0	8	Ø	Ø
yikar*ba	2	5	Ø	Ø

r + nasal

angar*mungkwa (MP)	0	8	Ø	Ø
ar*mbulirra	0	6	Ø	Ø
awar*mbuwar*mba	0	12	Ø	Ø
yilikar*mba	0	6	Ø	Ø
yir*njirra	0	6	Ø	Ø
amar*ngilyarra	2	6	Ø	Ø
ar*ngkawura	3	3	Ø	Ø
ar*ngkayiwaya	1	5	Ø	Ø
ar*ngkirra	3	3	Ø	Ø
marngkir*ngkiwilyarra	0	6	Ø	Ø

2. Problem Words

<u>rr + stop</u>			
nikwuyarr*baja	0	6	both both
wurriburr*ba	2	4	both both
dirr*kba	4	2	both \emptyset
yambirr*kwa	3	7	both \emptyset
<u>rr + nasal</u>			
alarr*mur.da (MP)	1	5	both \emptyset
yirr*ma	2	3	both \emptyset
akarr*nga	2	4	both \emptyset
marr*nga	3	3	both both
ngarrakarr*ngina	4	2	both \emptyset
yarr*nga	7	5	both \emptyset
yimurr*ngwa	2	4	both \emptyset
<u>r + nasal</u>			
mar*mba	0	6	both \emptyset
yir*mba	2	4	both both
mir*ngkirra	2	3	\emptyset both
yibur*ngkibur*ngkirra	0	8	\emptyset both

TABLE 3: SCORES BASED ON METHOD 3

1. Control Words

	<u>Aborigines</u>		<u>Linguists</u>	
	V	\emptyset		
<u>rr + stop</u>				
arr*bilya (MP)	5	1	V	V
darr*ba	10	0	V	V
karr*ba	6	0	V	V
marr*bura	11	0	V	V
marr*kwurra	9	0	V	V
munginjarr*kwa	6	3	V	V
nijarr*dina (MP)	10	1	V	V
yarr*buwa	10	2	V	V
<u>rr + nasal</u>				
yirr*nga (MP)	10	1	V	V
marr*ngmur.da	8	1	V	V

<u>r + nasal</u>				
ar*ngkawa	9	0	V	V
yilikar*nja	5	1	V	V

<u>rr + stop</u>				
adarr*ba	0	9	∅	∅
alyikarr*bilyirra (MP)	1	10	∅	∅
ayirr*biyirr*ba	1	10	∅	∅
yilarr*ba	0	9	∅	∅
yingarr*banja	1	4	∅	∅
alarr*kbulala	4	7	∅	∅
arr*kwara	6	3	∅	∅
mangkarr*kba	2	6	∅	∅
mijirr*kwudarrba	3	8	∅	∅
milyirr*kwa	1	10	∅	∅
ngarrabuwarr*kina	4	8	∅	∅
ngarribarr*kwudina	4	6	∅	∅
yinikarr*ka	3	8	∅	∅

<u>rr + nasal</u>				
niyirr*mana	5	6	∅	∅
alarr*ngkawarriya	2	8	∅	∅

<u>r + stop</u>				
yikar*ba	1	8	∅	∅

<u>r + nasal</u>				
yingkar*ma	1	5	∅	∅
mar*nja	4	5	∅	∅
yir*njirra	2	7	∅	∅
amar*ngka	1	8	∅	∅
ar*ngkir*ngkawura	5	15	∅	∅

<u>l + stop</u>				
ayil*biyil*ba	0	10	∅	∅
yil*ba	4	6	∅	∅

2. Problem Words

<u>rr + stop</u>				
ayangkidirr*bura	2	8	both	∅
darr*ba	8	3	both	∅
nidirr*burakina	8	3	both	∅
yilarr*banda	2	8	both	∅
yimurr*bunga	1	1	both	both
yarr*da	10	1	both	both

arr*da	7	2	both	both
amurr*kbalya	7	4	both	∅
dirr*kba	8	1	both	∅
mamirr*kwura	7	4	both	∅
yambirr*kwa	3	8	both	∅
yarr*kaliwa	9	2	both	both
yarr*kwumarnda	7	2	both	∅

rr + nasal

alyarr*mur.da (MP)	2	9	both	∅
ayarr*murra (MP)	6	5	both	∅
dimirr*mara	8	3	both	∅
yilyikarr*mur.da (MP)	4	5	both	∅
yimurr*minya	1	2	both	∅
yirr*ma	9	0	both	∅
akarr*nga	3	8	both	∅
ambarr*ngarna	4	7	both	∅
angkibarr*ngwarr*ngwa	2	8	both	∅
dimarr*nga	7	4	both	both
marr*nga	9	2	both	both
milarr*ngkwa	5	6	both	∅
murikwarr*nga	5	2	both	∅
nanakarr*ngina	9	2	both	∅
yarr*nga	10	1	both	∅
yimurr*ngwa	6	5	both	∅
yirarr*nganja	4	5	both	∅

rr + w

awarr*walya	6	5	both	both
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r + nasal

mar*mba	8	1	both	∅
yir*mba	6	3	both	both

l + stop

mul*kwa	6	5	both	∅
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rr + stop

yima(l)yarr*birra	3	2	v	∅
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rr + nasal

dirr*mala	8	1	both	v
yarr*ma	9	1	both	v
yarr*milya	10	1	v	both
yinibarr*nginja	5	4	∅	v

<u>r + nasal</u>				
ngarrimu(r)mur*ngkina	8	3	∅	V
<u>l + nasal</u>				
bal*marna	10	1	V	both

TABLE 4: SCORES BASED ON METHOD 4

1. Control Words

	<u>Aborigines</u>		<u>Linguists</u>	
	<u>V</u>	<u>∅</u>		
<u>rr + stop</u>				
arr*baja (MP)	5	0	V	V
naniwarr*bikina	4	1	V	V
nara ayakiwarr*bikima	4	0	V	V
warningwarr*birra (MP)	3	2	V	V
dakwarr*kwarra (MP)	3	2	V	V
marr*kwurra	4	1	V	V
nakbilyarr*kayina	4	1	V	
yingarr*kwulina	3	2	V	
<u>rr + nasal</u>				
naniyarr*ngka	5	0	V	V
yirr*ngakburrangina (MP)	5	0	V	V
yirr*(ng)wanja	5	0	V	V
mamurr*(nyi)nya	4	1	V	V
<u>rr + w</u>				
nikadirr*warnima	5	0	V	V
<u>rr + stop</u>				
akilyarr*ba	1	3	∅	∅
niwamburr*bijanga	0	5	∅	∅
yilarr*ba	0	5	∅	∅
dilarr*kbulala	0	5	∅	∅
nanirndirr*ka	0	3	∅	∅
<u>rr + nasal</u>				
nilarr*mburrana	0	5	∅	∅
yilarr*ngkwuwarra	0	5	∅	∅

<u>r + nasal</u>				
awar*mbuwar*mba	1	9	∅	∅
dimar*ngkambilyima	1	4	∅	∅
namar*ngkinama	1	4	∅	∅

<u>l + stop</u>				
maburambal*ba	1	4	∅	∅
wal*balbarrija	1	4	∅	∅
mal*dabirra	0	5	∅	∅
nara al*dadangima	1	2	∅	∅

2. Problem Words

<u>rr + stop</u>				
mamalarr*birra	3	2	both	∅
ngarrikwuyarr*ba	1	4	∅	both

<u>rr + nasal</u>				
dimirr*mara	3	2	both	∅
nara akbikbarr*ngwuma	3	2	both	∅
yimurr*ngwa	1	1	both	∅
yimudirr*ngwa	2	3	both	

<u>l + nasal</u>				
bal*marna	5	0	V	both

TABLE 5: COMPARISON OF SCORES FOR THE SAME WORDS TESTED BY DIFFERENT METHODS

1. Control Words

	Method 2		Method 3		Method 4	
	V	∅	V	∅	V	∅
<u>V recorded</u>						
ar*ngkawa	6	0	9	0	-	-
marr*kwurra	9	0	-	-	4	1
naniyarr*ngka	6	0	-	-	5	0
<u>V omitted</u>						
alarr*kbulala	1	5	4	7	0	5
awar*mbuwar*mba	0	12	-	-	1	9
ayirr*biyirr*ba	1	11	1	10	-	-

mangkarr*kba	1	5	2	6	-	-
yikar*ba	2	5	1	8	-	-
yilarr*ba	-	-	0	9	0	5
yinikarr*ka	1	5	3	8	-	-
yir*njirra	0	6	2	7	-	-

2. Problem Words

<u>Both or ∅</u>						
akarr*nga	2	4	3	8	-	-
alarr*mur.da	1	5	2	9	-	-
dimirr*mara	-	-	8	3	3	2
dirr*kba	4	2	8	1	-	-
mar*mba	0	6	2	7	-	-
marr*nga	3	3	9	2	-	-
ngarrikwuyarr*ba	0	6	-	-	1	4
yambirr*kwa	3	7	3	8	-	-
yarr*nga	7	5	10	1	-	-
yimurr*ngwa	2	4	6	5	1	1
yirr*ma	2	3	9	0	-	-
yir*mba	2	4	6	3	-	-
<u>V or ∅</u>						
bal*marna	-	-	10	1	5	0

TABLE 6: SUGGESTED SPELLING

1. Words With Phonemic Vowels

Most of these words are from the Control group (a) but some problem words have been added. Group (d) words are marked ***.

rr + stop

arribilya

darriba

karriba

marribura

marrikwurra

marringmur.da

munginjarrikwa

nijarridina

yarribuwa

wumarribina***

rr + nasal

yarrimilya***

r + nasal

aringka-wa

aringmarra

yilikarinja

l + nasal

balimarna***

2. Words Where The Epenthetic is not Emic and is Omitted

Some of these words are from the Control Group (b) but many others are added. Group (c) words are marked ** and Group (d) as ***.

rr + stop

adarrba
alarrkbulala
alyikarrbilyirra
amaburrkwakbala
amurrkbalya**
arrda**
arrkwara
a(wu)ringkwarrkwa
ayangkidirrbura**
ayirribiyirra
darrba**
dikwurirrkwa
dirrkba**
mamirrkwura**
mangkarrkba
mangkwurkwa
mijirrkwudarrrba
milyirrkwa
murirra
nankingangkwarrrka
nawarrka
nidirrburakina**
nikwuyarrbaja**
ningwarrrka
niribarrka
ngarrabuwarrrkina
ngarrarrkinama
ngarribarrkwudina
ngarrikilarrka
ngarrilarrkbalkina
wurriburra
yambirrkwa**
yarrda**
yarrkaliwa**
yarrkwumarnda**
yilarrba
yilarrbanda**
yima(l)yarrbirra**
yingarrbanja
yirikarrka

rr + nasal

akarrnga**
akiwabarrngwarrrnga
akwularrmbarrina
alarrngkwawarriya
alarrngkwularrrngkwala
alirrrma
ambarrngarna**
amilyirrrnga
arrngka
ayarrmurra**
al(y)arrmur.da**
angkibarrngwarrrnga**
dimarrnga**
dirrmala***
dimirrmara**
malyirrmilya
marrnga***
milarrngkwa**
murikwarrrnga**
nanakarrrngina**
nimularrmbarrina
niyirrrmana
ngarrakarrrngina**
yarrma**
yarrnga**
yilyikarrmur.da**
yimurrbunga**
yimurrrminya**
yimurrrngwa**
yinibarrnginja***
yirarrnganja**
yirrrma**

rr + semi-consonant
awarrwalya**

r + stop
abiya(r)karbiya
abiyarbuwa
naningkwarba
yikarba

r + nasal
amarngka
amarngilyarra
angarmungkwa
arbulirra
arngkawura
arngkayiwaya
arngkirngkawura
arngkirra
awarmbuwarmba
marmba**
marnja
marngkirngkiwilyarra
mirngkirra**
ngarrimu(r)murngkina***
yiburngkiburngkirra**
yilikarmba
yingkarma
yirmba**
yirnjirra

l + stop
ayilbiyilba
mulkwa**
yilba