

PAMA-NYUNGAN REFLEXES IN THE ARANDIC LANGUAGES

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1. INTRODUCTION¹

1.1 THE PROBLEM OF ARANDIC COGNATES

Geoffrey O'Grady, in his major work on comparative Pama-Nyungan, made the following comments on the Arandic languages (1990a:xviii):²

It might be argued, as Ken Hale has done (p.c.), that the Arandic languages should have been included in such a comparative study as the present one. Although these languages clearly mesh intimately into the rest of Pama-Nyungan, we have omitted them on the present pass through the data because of the reduced chances of correctly identifying cognates shared by Arandic with other Pama-Nyungan languages. This is due to the virtually universal loss of initial consonants, as well as to the neutralisation of word-final vocalic contrasts, in Arandic languages. In the case of a highly marked starred form such as **nurrku egg, brain* (with rare initial apical nasal), it is quite literally a hundredfold more difficult to pinpoint an Arandic reflex than in the case of a language which preserves the **n-*. When the number of reconstructions comes to exceed the critical mass necessary for demonstrating Pama-Nyungan's status as a language family in the strictest sense, comparative work on Arandic should not be delayed.

¹ This report is based on research undertaken as part of a joint research project, "Comparative study of the languages of Central Australia", with Luise Hercus, David Nash and Jane Simpson, which was supported by the Australian Research Council (grant no. A58932251). An earlier version of §2 was presented as "Arandic historical phonology" at a workshop on comparative Australian linguistics held at Melbourne University's field research station at Strathfieldsaye, Victoria in April 1993. I am grateful to participants in that workshop for their comments, and to Ilia Peiros, Gavan Breen and Juliette Blevins. My research on the Kaytetye language was supported by the Australian Institute of Aboriginal Studies and the Australian National University.

² The Arandic languages are spoken in a large area in the south-eastern part of the Northern Territory. The fundamental division of the Arandic languages is between Kaytetye, spoken around Barrow Creek, and numerous varieties of Arrernte (Aranda); see Hale (1962). The following abbreviations are used for names of the Arandic languages and/or dialects cited in this paper:

A	Arrernte (Eastern and Central)	LA	Lower (Southern) Arrernte
Aly	Alyawarr	SA	Southern Arrernte = Pertame
Anm	Anmatyerre	WAnm	Western Anmatyerre
Ant	Antekerrephe	Yr	Ayerrereng
K	Kaytetye		

Other abbreviations used in this paper are:

ABL	ablative	ERG	ergative	KIN	kinterm	PL	plural
ACC	accusative	EXC	exclusive	LOC	locative	POSS	possessor
DAT	dative	GEN	generation	MOI	moiety	SG	singular
DU	dual	INC	inclusive	NOM	nominative	SM	same

O'Grady was wise to omit Arandic from his Pama-Nyungan cognates. He recognised the problems in correctly identifying cognates that arise from the drastic sound changes of Arandic. As he correctly stated, these changes affected both the beginning and the end of words. Initial consonants were lost and final vowels were neutralised. Other changes neutralised vowels in further contexts and transformed some consonants into typologically rare segments. These sound changes need to be understood before cognates can be correctly identified. In §2 I give a description of the historical phonology of Arandic. Once the phonological transformations are known, however, we are still left with a great number of possible etyma of each Arandic word, since so many phonological segments and contrasts have been lost. In §3 I give a demonstration of how the number of possible ancestors can be calculated for words of different phonological shapes.

Most of the problems of Arandic etymology stem from the severe phonological changes undergone by this subgroup of languages. The reduction in the length of words has had the effect that many words apparently became too short to be viable or distinctive and hence survive only in longer forms that incorporate a suffix—meaningful or otherwise—or continue earlier compound words. For example, **nguku* (possibly **kuku*) 'water' should have become by sound changes ***ikwe* or ***akwe* (I use double asterisk for unattested but not reconstructed forms). It survives in extended form in Arrernte *kw.atye*, of which only the *kw-* is inherited from **nguku*; the rest is some kind of extension. (I use a full stop to mark an erstwhile boundary, following the practice of O'Grady.) 'Water' if unextended would have become identical to 'egg', from **muka*; the latter survives with a different increment in *kw.arte*. **Nguku* is also found in former compounds, with the word for 'shade' (as pointed out by Breen pers. comm.), in the meaning 'cloud' *(a)k.ulye* in Arrernte and the further evolved meaning 'rain' in Kaytetye *akw.elye* ('shade' is *ulye* in Arrernte and *elye* in Kaytetye). Some Arandic words have come to incorporate a former inflectional suffix, derivational suffix, or enclitic. Thus the descendants of some Proto Pama-Nyungan (pPN) monosyllabic verb roots represent earlier disyllabic inflected tense forms; from pPN **nga-* 'eat' Kaytetye has as its root *ayne-*, which continues **nga-rni* ('eat-PAST' in Walmajarri, for example). The normal word for 'mouth' in Arrernte is *(a)rrakerte*, which represents the fusion of the 'having' suffix *-akerte* with the inherited term *arre* (from **Rirra* 'tooth'), which is still used without the suffix in Kaytetye. An example of the incorporation of an enclitic is found in the Kaytetye for 'what', *w.ante*. This is cognate with Arrernte *iwe.nhe* 'what', incorporating the definite suffix **nha*; both must reflect a Proto Arandic **ewe* of uncertain provenience. The Kaytetye for 'what', *w.ante*, and for 'who', *atn.ante*, incorporate a form *-ante* which probably was an interrogative-indefinite particle. (For a discussion of reanalyses that result in incorporation of extraneous material into a root, using some Arandic examples, see Koch (1995, 1996).

These etymological problems, which are ultimately caused by the phonological transformations of the original material, are supplemented by the usual problems of semantic change that are found when one does etymology. Thus if we go looking for the ancestor of 'hand', Arrernte *iltye* and Kaytetye *eltye*, we will not find it in the meaning 'hand' but rather in the term for 'fingernail', **miltyV* (as noted already in Dixon 1970:91, n.11). We must assume a semantic shift from 'nail' to 'finger/hand' in or before Proto Arandic. This is in accordance with the unidirectional semantic shifts expected in body parts according to the theory of Wilkins (1996).

It will be obvious that reliable etymologies depend on an adequate understanding of the historical phonology of the language in question. On the other hand it must also be

remembered that the historical phonology must be based on reliable etymologies. If the sound changes are worked out on the basis of false cognates, they will be wrong. Similarly if loan words are mistaken for cognates and sound changes are extracted from correspondences found in these sets of words, this also leads to an incorrect historical phonology. So where do we get the reliable etymologies that can form the basis for Arandic historical phonology?

1.2 THE GENETIC POSITION OF ARANDIC

Other problems in the identification of cognates of Arandic words stem from the uncertainties about the genetic position of Arandic. In the first place, there are no apparent languages of the same subgroup that have not undergone the same sound changes. This is unlike the situation in the Ngayarda languages (O'Grady 1966) and the Kanyara-Mantharta languages (Austin 1981b), or Paman languages (Hale 1976b), where closely related languages virtually retain the ancestral forms unaffected by phonological changes. Secondly, we do not know which languages are the closest genetic relatives of the subgroup; that is, we do not know whether Arandic is part of an intermediate subgroup of Pama-Nyungan. Hence we do not know beforehand where it is most profitable to look for cognates. On the assumption that the nearest relatives are likely to be (some of) the languages that are now adjacent, we might begin our search for cognates by looking first to neighbouring languages. If we do this, however, we risk mistaking loan words for cognates, since it is with its immediate neighbours that a language is most likely to exchange loan words. It is safer to look farther afield; but this may lead to diminishing returns if, as it is reasonable to expect, the number of cognates varies in inverse proportion to the geographic distance between the languages. The safest strategy is to begin with words that have reasonably secure reconstructions in the higher-level ancestor, Proto Pama-Nyungan. There are not a great number of these, but they do have the virtue of having relatively basic meanings and including some of the more 'grammatical' words such as personal pronouns (as well as some affixes). It is reasonably safe also to find cognates in languages of the wider region, Central Australia and even Western Australia, provided that no reliance is placed in the initial stages of research on immediate neighbours. (For principles of how to distinguish loan words from cognates in adjacent languages, after the historical phonology is worked out, see Koch *in press*.)

In practice I have also scoured lists of words reconstructed for other subgroups of Pama-Nyungan, such as Proto-Kanyara and Proto-Mantharta (Austin 1981b), Proto-Ngayarda (O'Grady 1966), Proto-Paman (Sommer 1969), Karnic (Austin 1990), Warluwarric (Carew 1993). I have also looked through comparative wordlists of languages in Central Australia in the broadest sense contained in works such as O'Grady and Klokaid (1969), Breen (1971, 1990a), Menning and Nash (1981), and dictionaries of languages in the area broadly defined.

It can probably not be said yet that pPN has been reconstructed in as much detail as O'Grady (above) suggested is necessary before Arandic cognates can be exploited. The number of reliably reconstructed words is still pretty meagre. Moreover, we lack a handy list of reconstructions: there is no etymological dictionary available (although O'Grady's comparative files surely contain the makings of such a work). We still lack a proper subgroup structure for the Pama-Nyungan family. While this situation prevails, we have no certainty as to what spread of languages permits a set of cognates to be reconstructed for

pPN, as opposed to a subgroup of Pama-Nyungan. If a word is found in the Centre and West but nowhere in the East it is doubtful that we should have any confidence in reconstructing it for pPN; the Centre plus West may constitute a subgroup or early dialect area that has undergone shared innovations. Likewise if a form is found only in the East, even if it attested from Cape York to Victoria, might it not also represent an innovation in an eastern subgroup or early dialect area? But what if a form is found in the West, Centre, North (i.e. Yolngu) and Cape York? Can we not reliably treat it as inherited from pPN? To answer yes presupposes that there could not have been a 'northern' or 'north-western' subgroup that excluded the South and East. This is not yet certain in view of the likelihood that Pama-Nyungan languages originally expanded from somewhere in the northern part of the continent. It seems to me that a word can most reliably be reconstructed for pPN if it has a considerable geographic attestation in both the east-to-west and north-to-south dimensions.

Is Arandic etymology still premature? I believe that it is not. Although there is not a great deal of reconstructed pPN material, there is now a great amount of lexical material available for many of the languages west of Queensland and New South Wales, that is, in the region in which the most cognates are to be expected. There is also now a vast quantity of lexical material available on Arandic languages, with the recent publication of dictionaries of Alyawarr (Green 1992) and Eastern-Central Arrernte (Henderson & Dobson 1994). My own research has yielded extensive amounts of Kaytetye vocabulary.

Another factor that hindered earlier use of Arandic lexical material for comparative purposes was the poor understanding of Arandic synchronic phonology and the resulting misleading orthographic representation of Arandic words (e.g. Strehlow 1944, and even to some extent Yallop 1977). Arandic synchronic phonology is now reasonably well understood (see Wilkins (1989) for a detailed description of Arrernte phonology).

2. ARANDIC HISTORICAL PHONOLOGY

2.1 SYNCHRONIC PHONOLOGY

Before investigating the diachronic phonology of the Arandic languages it is necessary to make some observations about their synchronic phonology. Table 1 gives the maximal inventory of Arandic consonants. Like other languages of Central Australia, the Arandic languages distinguish two sets of laminal consonants and two sets of apicals. Some varieties, notably Kaytetye, Alyawarr (Yallop 1977; Green 1992), and Antekerrepene (Breen 1977) have a further set of prepalatalised apical consonants; there is evidence that other dialects once had these as well but have largely merged them with the prepalatals. Another series of phonemes characteristic of Arandic is the prestopped nasals; these are nasal consonants with a delayed nasal onset; they occur at all places of articulation. Arandic languages also have an unusual unrounded velar-uvular glide which is represented orthographically by *h*. Most varieties can be analysed as containing a full set of rounded (R) and unrounded (U) consonants; this analysis doubles the consonant inventory. The vowel system, shown in Table 2, is uncharacteristic of Australian languages; the most common vowel is a schwa, spelled *e*. Kaytetye and Western Anmatyerre can be analysed as having only the vowels *a* and *e*; for other varieties one or both of *i* and *u* are recognised, although their role is somewhat more limited than might be expected (Breen 1990b).

TABLE 1: MAXIMAL CONSONANT INVENTORY OF ARANDIC LANGUAGES

Labial		Lamino -Dental		Apico -Alveolar		Apico- Postalveolar		Prepalatalised Apical		Prepalatal		Dorso-Velar	
U	R	U	R	U	R	U	R	U	R	U	R	U	R
<i>p</i>	<i>pw</i>	<i>th</i>	<i>thw</i>	<i>t</i>	<i>tw</i>	<i>rt</i>	<i>rtw</i>	<i>yt</i>	<i>ytw</i>	<i>ty</i>	<i>tyw</i>	<i>k</i>	<i>kw</i>
<i>pm</i>	<i>pmw</i>	<i>tnh</i>	<i>tnhw</i>	<i>tn</i>	<i>tnw</i>	<i>rtn</i>	<i>rtnw</i>	<i>ytn</i>	<i>ytnw</i>	<i>tny</i>	<i>tnyw</i>	<i>kng</i>	<i>kngw</i>
<i>m</i>	<i>mw</i>	<i>nh</i>	<i>nhw</i>	<i>n</i>	<i>nw</i>	<i>rn</i>	<i>rnw</i>	<i>yn</i>	<i>ynw</i>	<i>ny</i>	<i>nyw</i>	<i>ng</i>	<i>ngw</i>
		<i>lh</i>	<i>lhw</i>	<i>l</i>	<i>lw</i>	<i>rl</i>	<i>rlw</i>	<i>yl</i>	<i>ylw</i>	<i>ly</i>	<i>lyw</i>		
				<i>rr</i>	<i>rrw</i>	<i>r</i>	<i>rw</i>			<i>y</i>	<i>yw</i>	<i>h</i>	<i>w</i>

TABLE 2: VOWEL INVENTORY OF ARANDIC LANGUAGES

High	(i)	(u)
Mid	<i>e</i>	
Low	<i>a</i>	

Several facts about the phonotactics of Arandic languages need to be understood. All words and all morphemes end in the vowel *e*, in my analysis. (In Breen's analysis the final vowel *e* is not present in the underlying form but is added by a phonological rule (Breen 1977:375, 1990b; cf. Green 1992).) Words may begin with a consonant or a homorganic cluster of consonants; in most varieties most words begin with a vowel.

2.2 PRE-ARANDIC PHONOLOGY

For the Pama-Nyungan language ancestral to the Arandic languages I assume a 'normal' Australian phoneme inventory with six places of articulation, no prestopped, prepalatalised or rounded consonants, and no *h*. This system would be shared with languages to the east and south, but not with those to the west and north, where only one set of laminal consonants is found. I assume a system of three vowels, probably with a contrast of length. The length contrast, although not found in contemporary languages in the Centre (but occurring in the Thura-Yura languages of South Australia), is reconstructed for Proto Pama-Nyungan and lower-order protolanguages such as Proto Paman. Positing a length contrast in Pre-Arandic allows us to use vowel length as a conditioning environment that favoured a certain sound change, such as lenition of *k* to *h*, and inhibited others, such as nasal prestopping and possibly consonant rounding. Table 3 gives the assumed Pre-Arandic phoneme inventory.

TABLE 3: PRE-ARANDIC PHONEME INVENTORY

	Peripheral		Laminal		Apical	
	Labial	Velar	Dental	Prepalatal	Alveolar	Postalveolar
Obstruent	<i>p</i>	<i>k</i>	<i>th</i>	<i>ty</i>	<i>t</i>	<i>rt</i>
Nasal	<i>m</i>	<i>ng</i>	<i>nh</i>	<i>ny</i>	<i>n</i>	<i>rn</i>
Lateral			<i>lh</i>	<i>ly</i>	<i>l</i>	<i>rl</i>
Tap/Trill					<i>rr</i>	
Approximant	<i>w</i>			<i>y</i>		<i>r</i>
Vowel short	<i>u</i>		<i>i</i>		<i>a</i>	
Vowel long	<i>uu</i>		<i>ii</i>		<i>aa</i>	

For Pre-Arandic phonotactics, I assume that words necessarily began with consonants (but perhaps not all consonants were permitted in initial position) and ended with vowels and certain consonants. I posit stress on the initial syllable, as is normal for Australian languages.

2.3 EFFECTS OF ARANDIC SOUND CHANGES

A series of Arandic sound changes had the following effects:

- creation of schwa vowel (*e*);
- creation of prestopped nasal consonant phonemes: *pm*, *tn*, etc.;
- creation of prepalatalised apical consonant phonemes: *yt*, *yn*, etc.;
- creation of a velar-uvular approximant consonant phoneme (*h*);
- creation of rounded consonant phonemes: *pw*, *mw*, etc.;
- loss of initial consonants;
- shift of stress rightward by one syllable;
- addition of final vowel to consonant-final words.

2.4 ARANDIC SOUND CHANGES AND SUPPORTING ETYMOLOGIES

In this section I present, in their presumed historical order, the sound changes (SC) which characterised the Arandic subgroup, along with the etymologies which justify the changes. The sound changes are described both informally and in formal notation. The etymologies are repeated, in a different ordering and with references to the comparative literature, in §4.

(SC1) Nasal prestonning: $N > TN / \#C_{[-nas]}V_-$

A nasal consonant became prestopped (i.e. developed a non-nasal onset) when it followed a stressed vowel, provided that the initial consonant of the word was not also nasal. The stop phase would have been the result of a timing lag between the oral closure and the velic opening components of the nasal consonant. (Where there was an initial nasal consonant, the stressed vowel presumably was nasalised, and the velum was thus already open until the

following nasal was articulated.) A further condition may apply to this change: namely, that vowel was not long. This is suggested by 'dig' **paanga* -> *ange*- (not ***aknge*-). On the other hand, 'carry' *aknge*- (cf. Warlpiri *ka-ngu* (PAST)) has *kng* in Arrernte although it is supposed to have had a long vowel in Proto Pama-Nyungan, **kaa-ng*- (see Dixon 1980:132, 404). It is not yet clear whether prestopping affected nasals occurring as the first member of a consonant cluster; in Kaytetye, where prestopped nasals contrast with plain nasals in this environment as well, it does appear that the prestopping resulted when an initial non-nasal consonant was present. See 'smell' and 'stone' in Table 4. Prestopped nasals occur before stops only in Kaytetye and in Alyawarr, where they sometimes alternate with plain nasals. Hence it is possible that nasals in this environment generally became prestopped and then later lost the prestopping in such clusters in most dialects of Arrernte.

The allophonic prestopped nasals became contrastive with plain nasals when initial consonants were lost, or, if the vowel length condition applies, when vowel length ceased to be distinctive. (If the vowel length condition applies, our task of finding possible sources for Arandic words is made more difficult: we are not justified in positing initial non-nasal consonants for the Pre-Arandic forms of every word where TN is found in Arandic.)

Note that the basic conditions on the change of prestopping (following a stressed vowel, dependence on the nasality of the initial consonant) are the same as the conditions on a synchronic allophonic rule in Diyari (see Austin 1981a:18). Phonetic prestopping of nasals is an areal feature that includes, beside the Arandic languages, Wangkangurru, Arabana and Diyari in the Karnic group, and Adnyamathanha, Guyani and Nukunu in the Thura-Yura group (see Hercus 1972, 1992). Similar prestopping occurred in some Cape York languages. In Walangama and the Kunjen dialects prestopping occurred after a short vowel that was preceded by an initial non-nasal consonant (Black 1980:217, Sommer 1969:54-58). The same conditions appear to have applied in the Lamalamic languages, where in Lamalama and Parinmankutinma, but not in Umbuykamu, there has been a further development of *pm* to *mb*, etc. (data in Laycock 1969).

TABLE 4: ETYMOLOGIES THAT INDICATE N > TN / #TV_ (WHERE T = NON-NASAL)

Gloss	Etymology	Kaytetye	Arrernte
digging stick	* <i>kana</i> +	<i>atneme</i>	<i>atneme</i>
excrement	* <i>kuna</i>	<i>atne</i>	<i>atne</i>
to spear	* <i>Ra-ni</i>	<i>aytne-</i>	
deaf, mad	* <i>wanga</i>	<i>akngwe</i>	
name	* <i>yini</i>	<i>etne</i>	[<i>arr</i>]itne, [<i>arr</i>]itnye
snake	* <i>wama</i>	<i>apmwe</i>	<i>apmwe</i>
coolamon	* <i>purnu</i>	<i>rtnwe</i>	<i>urtne</i>
carry, take	* <i>ka-ngV</i>		<i>aknge-</i>
smell	* <i>parnti-</i>	<i>eytnte-</i>	<i>inte(rne)-</i> (Aly)
stone	* <i>parnta</i>	<i>artnte</i>	

TABLE 5: ETYMOLOGIES THAT INDICATE N > N / #NV_

Gloss	Etymology	Kaytetye	Arremte
night	* <i>munga</i>	<i>engwe</i>	<i>ingwe</i>
eat	* <i>nga-rni</i>	<i>ayne-</i>	
mother/breast	* <i>ngama</i>	<i>ame-nhenge</i>	<i>me-</i>
		'Mo-DYAD'	
lie	* <i>nguna-</i>	<i>enwe-</i>	
sit	* <i>nhi(i)na-</i>	<i>ane-</i>	<i>(a)ne-</i>

TABLE 6: ETYMOLOGY THAT INDICATES N > N / #TV:_

Gloss	Etymology	Kaytetye	Arremte
dig	* <i>pa(a)nga/i-</i>	<i>ange-</i>	<i>angerne-</i>

(SC2) Origin of *h*: *k* > *h* / #CV:_V

Arandic *h* is a voiced velar-uvular approximant, which tends to be weakly articulated and to disappear. It occurs in only about a score of words in each language, and is largely restricted in occurrence to the first consonant position in a word. Both the rarity of the phoneme and its restricted distribution would be nicely accounted for if it can be shown that *h* originated from a consonant that followed a long vowel. Proto Pama-Nyungan and some other languages have a contrast in vowel length and restrict long vowels to the first syllable of a word. I propose that *h* is in fact the reflex of *k* after long vowels in Pre-Arandic. In many languages obstruents occur short, optionally voiced and fricative after stressed long vowels while they are realised as long, voiceless and fully stopped after stressed short vowels; for example, Wik languages (Hale 1976c:50). In a number of languages distinctive voiced fricatives have arisen from obstruents following long vowels, concomitant with the loss of vowel length contrast (Urathi: Hale 1976a:43, Crowley 1983:332; Anguthimri: Crowley 1981:159; Kuku-Thaypan: Rigsby 1976:74; see also Dixon 1980:298f.). I posit that a similar change took place in the prehistory of Arandic, but that it led to a phonemic split only in the velars. The velar fricative, unsupported by fricatives at other places of articulation, later opened into an approximant. (Some instances of *h* occurring in suffixes have been reported for Alyawarr and Anmatyerre (Breen pers. comm.); the fact that some of these correspond to *k* in other varieties of Arandic seems to suggest a later change of the same kind we are positing for Pre-Arandic.)

An alternative origin of *h* from *w* (by derounding) has been suggested by Breen (1977:379)—following a suggestion of Hale, but disclaimed later (Breen 1990b)—and Alpher (1988:192). This idea is apparently based on correspondences between Arandic *h* and Warlpiri *w* in sets of words such as those given in Table 7. This correspondence is rather to be explained as an adaptation of Arandic *h* into the phoneme system of Warlpiri as part of the borrowing process; the variable initial consonants (*w*, *y*, *ng*) are indicative of borrowing from Arandic into Warlpiri (Koch in press).

TABLE 7: CORRESPONDENCE ARANDIC *h* : WARLPIRI *w*

Gloss	Kaytetye	Warlpiri
wife's father	<i>ahenterre</i>	<i>wantirri</i>
kangaroo	<i>aherre</i>	<i>wawirri, yawirri</i>
bush currant, <i>Canthium latifolium</i>	<i>ahakeye</i>	<i>yaakiyi, yawakiyi</i>
python sp.	<i>ahenenye</i>	<i>ngawininyi</i>
throat	<i>ahenytye</i>	<i>yiwinji</i>

Although the derivation of *h* from *k* is the most plausible origin, it is not yet possible to prove it conclusively by etymologies. The best etymology is the one that relates the initial part of 'earth', Kaytetye *ahē.me* and Arrernte *ahē.lhe* to a widespread Pama-Nyungan **Raaku* (see §4, List 5).

(SC3) Long vowel shortening: *V* : > *V*

At some time the contrast between long and short vowels in initial syllables was neutralised unconditionally. This was subsequent to the change *k* > *h*, if this was conditioned by a preceding long vowel. It must also have been subsequent to the pre-stopping of nasals if this took place only after a preceding short vowel (cf. 'dig' above).

(SC4) Nasal stop cluster reduction: *N_iT_i* > *N_i* / #CVCV_V

Homorganic clusters of nasal plus stop were reduced to just the nasal after unstressed syllables. The examples are all from the third consonant position of a word. It is assumed that the stress was still on the first syllable of the word when this change took place. This change can be seen as a kind of extreme lenition of the stop, and it is likely that the stop was pronounced as voiced before it was lost.

Certain evidence exists only for the clusters *mp* and *ngk*. The 'liver' cognates (a Barkly area regional term) supply the best etymological support, along with the Ergative/Locative allomorph *-nge*, which surely reflects Pama-Nyungan **-ngku* Ergative and **-ngka* Locative, and in certain languages, including Warlpiri, occur after disyllable stems ending in a vowel. This change further suggests likely sources for the *-me* morph of the Kaytetye 1 Dual Inclusive Nominative/Ergative Same-Moiety-Same-Section pronoun *ayleme*, since a Dative suffix **-mpa* is widely attested in non-singular pronouns, and there is a tendency for dative forms of personal pronouns to end up as nominatives and/or stems. The same *-me* recurs in the Kaytetye 3 Dual Nominative/Ergative Same-Moiety-Same-Section pronoun. Meanwhile the widespread word for 'galah' gives evidence that the non-homorganic cluster *nty* (≠ *nyty*) was not affected. The 'snake' word given in Table 8 is attested only in Alyawarr, and the presumed etymon occurs in Western Desert (WD) in the meaning of 'rainbow serpent'.

TABLE 8: ETYMOLOGIES SUPPORTING NASAL CLUSTER REDUCTION

Gloss	Etymology	Kaytetye	Arrernte
liver	* <i>malampa/i</i>	<i>aleme</i>	(a) <i>leme</i>
ERG	*- <i>ngku</i>	# <i>V(C)CV-nge</i>	
LOC	*- <i>ngka</i>	# <i>V(C)CV-nge</i>	
we.two-DAT	* <i>ngali-mpa</i>	<i>ayleme</i>	
they.two-DAT	* <i>pula-mpa</i>	<i>elweme</i>	
snake	* <i>warnampi</i> (WD)		<i>rtnweme</i> (Aly)
galah	* <i>kilan.tyi</i>	<i>elentye</i>	<i>ilentye</i>

(SC5) Prepalatalisation of apicals before *i*: C[apical] > yC / $\check{V}_-$ (C)i

This change affected obstruents, nasals, and laterals but not rhotics, at both alveolar and postalveolar (retroflex) places of articulation. That preceding stress was a necessary condition is clear from ‘father’s mother’ **kaparli* > *aperle*, where *rl*—occurring after the unstressed second syllable—was not affected by a following *i*. The change thus antedates the shift of stress to the second syllable. The change probably operated across consonant clusters; examples are ‘smell’, ‘lie’ and ‘ear’ (< ‘leaf’).

It is probable that this change was simultaneous with the reduction of unstressed vowels to *e*, and served to preserve something of the quality of the disappearing vowel. This motivation is obscured, however, by the formal ordering of this rule before vowel centralisation. It is possible that there were prepalatalised allophones of apicals before *i* in the language for a long time but that they became contrastive only when the following vowels merged to schwa.

Subsequent change within many dialects of Arrernte led to the merger of the prepalatalised apicals with the inherited prepalatal consonants. In some instances initial *yC* developed into *iC* or *irC*: the factors responsible for this differentiation have not yet been determined. Note too that ‘name’ in Kaytetye (*etne*) and possibly Alyawarr (*itne*) are unexplained exceptions to normal prepalatalisation; perhaps they continue an earlier variant **yina* or **yinū*.

TABLE 9: ETYMOLOGIES SUPPORTING PREPALATALISATION

	Gloss	Etymology	yC	Language	Cy, iC, irC	Language
<i>yl < li</i>	we.DU	*ngali	ayle-	K, Aly	ile-	A
	prickle	*tyilika	eyleke	K	lyeke	A
<i>yl < rli</i>	boomerang	*karli	aylayle	Aly	alye, ilye	A
<i>ylp < lpi</i>	leaf	*karlpi	eylpe	K	irlpe	A
<i>yn < rni</i>	eat	*nga-rni	ayne-	K		
<i>ynt < nti</i>	lie < fall	*wanti-	aynte-	Aly	inte-	A
<i>ynt < rnti</i>	smell	*parnti-	eynte-	K	ntyerne-	A
					interne-	Aly
<i>yt < rti</i>	grub	*parti	[k]ayte	K	-atyte	A
			-ayte	K, Aly		
		*yirtiya	eyteye	K	tyeye	WAnm
					irtaye	SA
<i>ytn < ni</i>	to spear	*Ra-ni	aytne-	K		
<i>ytn < ni</i>	name	*yini	(etne)	K	[arr]itnye	A
					[arr]irtne	A
					itne	Aly
<i>ytn < rni</i>	fall	*warni-	aytne-	Aly	atnye-	A

(SC6) Vowel centralisation: V > e / [-stressed]

Vowels were reduced to schwa in unstressed syllables. Several subtypes of this change need to be distinguished. In the first place: vowels in absolute final position of multisyllabic words. All the etymologies in this paper can be used to illustrate this final vowel neutralisation. Secondly, vowels in a final closed syllable: only disyllabic words are citable. Examples are given in Table 10, of which probably only ‘tongue’ is of pPN antiquity. Then there are more numerous examples of vowel reduction in the medial syllable of trisyllabic words. Examples are given in Table 11, which presents words containing medial *a*, *i* and *u*. Of words with medial *a* the one with the longest pedigree is ‘two’, which may be of pPN antiquity.

TABLE 10: CENTRALISATION OF VOWELS IN FINAL CLOSED SYLLABLE

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language
tongue	*thalany	*eleny.e	alenye	K, A
back of neck/head	*tyi(r)ta(r)n	*ertern.nge	rternnge	K, Aly
bone	*nungkarn	*ungkern.e	ngkwerne	K, A
tooth	*kurrtya(r)n	*urrtjern.e	errtywerne	K
mosquito	*kiwiny	*eweny.e	iwenye	A

TABLE 11: CENTRALISATION OF VOWELS IN MEDIAL SYLLABLES

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language
two	* <i>kutharra</i>	* <i>etherre</i>	- <i>therre</i> 'DU' (a) <i>therre</i>	K K, A
father's mother	* <i>kaparli</i>	* <i>eperle</i>	<i>aperle</i>	K, A
magpie	* <i>kurrparu</i>	* <i>urrpere</i>	<i>arppwere</i>	K, A
wife's brother	* <i>ngumparna</i>	* <i>umperne</i>	<i>mpwerne</i>	K, A
liver	* <i>malampa</i>	* <i>eleme</i>	<i>aleme</i>	K, A
galah	* <i>kilantyV</i>	* <i>elentye</i>	<i>elentye</i> <i>ilentye</i>	K A
dog	* <i>malakV</i>	* <i>eleke</i>	<i>aleke</i> <i>alekere</i>	K LA, Yr
emu	* <i>karlaya</i>	* <i>erleye</i>	<i>arleye</i>	A
road	* <i>yirtiya</i>	* <i>eyteye</i>	<i>eyteye</i> <i>tyeye</i>	K WANm
north	* <i>kayirra</i>	* <i>eyerre.re</i>	<i>ayerrere</i>	
prickle	* <i>tyilika</i>	* <i>eyleke</i>	<i>eyleke</i> <i>lyeke</i>	K A
fly	* <i>nhimu.ngu</i>	* <i>emenge</i>	<i>amenge</i>	K, A
smoke	* <i>tyukurtu</i>	* <i>ukerte</i>	<i>kwerte</i>	A

The final situation to be considered is words of four (or more) syllables, which in many Australian languages have a secondary stress on the penultimate syllable. Not many Arandic words of this structure have been found which have good etymologies as monomorphemic words. Nevertheless, Arrernte *antekeerre* 'south' ('west' in certain dialects), which is presumably from the *yantakarra* found in Karnic languages, and the pan-Arandic *atetherre* 'budgerigar', with cognates *ngatajarri* in Warumungu and *ngatijirri* in Warlpiri, support the suggestion that the vowels of third syllables of four-syllable words also turned into schwa.

It is possible that vowel centralisation took place in final open syllables before final closed syllables, and/or in final syllables before it affected medial syllables: rule SC6 then represents the telescoping of two or more historical changes. It is also possible that the words cited in Table 10 added a final vowel (or CV increment)—by SC7—before the vowel of the original final syllable was centralised. This would simply remove the second category of examples and make them rather examples of the third category.

(SC7) Final vowel addition: Ø > e / C_#

In accordance with other languages of a large Centralian block (including the Karnic, Thura-Yura and some Warluwarric languages) the Arandic languages do not tolerate word-final consonants. Where these did occur formerly, they were eliminated either by the incorporation of a vowel-final particle (especially Arandic *-nge* and *-tye*) or by the addition of a final vowel. It is impossible to tell whether the vowel was added before or after the neutralisation of final vowels to schwa. If the paragogic vowel addition predated final vowel reduction, it is impossible to tell what principles governed the selection of the extra vowel; it may have been a harmonising vowel, or it may have been consistently the same vowel, for instance *a*. If final vowel addition postdated final vowel reduction, the added vowel would have necessarily been schwa. I arbitrarily place vowel addition after centralisation in the

chronology of sound changes so that the formal expression of the change only needs the vowel *e* as its output. This change can be illustrated by the words already given in Table 10. (According to the analysis of Breen, modern Arandic languages lack a final vowel in the underlying form of words; any actually occurring vowels are predictable and generated by phonological rules (see Breen 1990b, Green 1992). In this analysis, SC7 would represent the addition to the grammar of the relevant phonological rules.)

(SC8) Rounding of *a* after initial *w*: *a* > *o* / #*w*_

The vowel *a* was rounded after an initial *w* (see Table 12). This was presumably a synchronic phonetic (allophonic) rule in an earlier stage of the language. It is impossible to tell how long this rule was in the language. But its output must have been present in the language before the loss of initial consonants. (That is why I have ordered it here.) This is a phonetically natural rule, found in many Australian languages; hence it is plausible that it occurred in Pre-Arandic as well. There may have been further conditions on this rule. The rounding may not have affected a long vowel, and it was apparently inhibited in certain environments, such as when the following consonant was lamino-dental or a prepalatalised apical; for examples see Table 13. (For details of the conditioning of rounding in Arabana-Wangkangurru, see Hercus 1994.) After the loss of the initial consonant *w* the vowel [o], originally an allophone of /*a*/, was presumably reinterpreted as an allophone of /*u*/. Its subsequent development was identical to that of original *u*. The telescoping of these two diachronic processes would yield a diachronic rule of the form *wa* > *u* / #_.

TABLE 12: ETYMOLOGIES SHOWING *wa* > *wo* (> *u*)

Gloss	Pre-Arandic	Proto Arandic, SA	Arandic	Language
crow	* <i>waka</i>	* <i>uk.aye</i>	<i>kwayekwaye</i>	K
arm	* <i>waku</i>	* <i>uke</i>	<i>akwe</i>	K, A
snake	* <i>wama</i>	<i>upme</i>	<i>apmwe</i>	K, A
deaf	* <i>wanga</i>	* <i>uknge</i>	<i>akngwe</i>	K
fire	* <i>waru</i>	<i>ure</i>	<i>ure</i>	A
			<i>ware</i>	K
snake	* <i>warnampi</i> (WD)	* <i>urtname</i>	<i>rtnweme</i>	Aly

TABLE 13: ETYMOLOGIES SHOWING *a* NOT UNDERGOING ROUNDING AFTER *w* WHEN PRECEDING LAMINODENTALS AND PREPALATALISED APICALS

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language
where	* <i>wantha</i>	* <i>enthe-</i>	<i>nthe-</i>	A
give < leave	* <i>wantha-</i>	* <i>enthe-</i>	(<i>a</i>) <i>nthe-</i>	A
lie < fall	* <i>wanti-</i>	* <i>eynte-</i>	<i>aynte-</i>	Aly
			<i>inte-</i>	A
fall	* <i>warni-</i>	* <i>eytne-</i>	<i>aytne-</i>	Aly

There are a few unexplained exceptions to rounding, where the Arandic terms lack any indication of rounding, although they presumably have numerous cognates beginning with *wa-*. These would be regular if we were to posit that the Pre-Arandic form began with another consonant, such as *k* (there are examples in Australian languages of *kangka* and a

few of *kapa-*), or that the vowel was long and inhibited rounding; examples are given in Table 14.

TABLE 14: ETYMOLOGIES THAT ARE EXCEPTIONS TO ROUNDING

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language
go	* <i>wapa-</i>	* <i>epe-</i> * <i>epe.tye-</i>	<i>ape-</i> (a) <i>petye-</i> 'come'	K A
speak	* <i>wangka-</i>	* <i>engke-</i>	<i>angke-</i>	K, A

(SC9) Loss of initial consonant: C > Ø / #_

All initial consonants disappeared. Initial dropping can be illustrated by all the examples cited in this paper as illustrations of other changes. It is impossible to know whether the loss of initial consonants happened all at once or in stages. It is plausible to suggest that at least some of the consonants were first lenited to voiced fricatives and/or glides before being lost. There are examples from elsewhere in Australia of laminal stops and nasals being lenited to *y* (Thura-Yura languages, according to J. Simpson pers. comm.), labial stops being lenited to *w* (Warlmanpa and Walmajarri *parntapi* 'bark' vs Warlpiri *warntapi* 'bark container') or *v* (Adynamathanha). There are also examples, however, of consonants disappearing directly; for example, *ng* in Arabana (Hercus 1994:32), *k* in Adynamathanha (Hercus 1972).

Perhaps the best example that may indicate an intermediate stage in the loss of initial consonants concerns a nasal consonant in a personal pronoun. The first person plural root in Arrernte is *anwe-*, which reflects an earlier *une-* (which is attested in Lower Arrernte). This should reflect a form **NunV*, where *N* is a nasal consonant, since prestoping has not taken place, and *V* is not *i*, since there is no prepalatalisation. The likely pPN etymon, however, has the form **ngana*, which does not have a rounded vowel. Bearing in mind that Arandic rounding may result from **wa-*, we might suggest that in this pronoun the initial *ng* lenited to *w* after prestoping ceased being operative and that *wa* then evolved into *u* by the regular processes of change. The progression of forms would then have been as follows:

**ngana* > **ngane* > **wane* > **une* > *anwe-*

There is no evidence that initial *ng* lenited to *w* generally. The assumption of special sound changes in personal pronouns is nevertheless justifiable in the light of their tendency to cliticise (in modern Kaytetye, for example). There is no trace of a similar lenition in first person singular and dual pronouns, which also began with **nga-*. (If it did take place there, however, it is possible that the *wa* did not develop into *u* because the following consonant was either a laminal or a prepalatalised apical, the Pre-Arandic forms being **ngathu* '1SG.ERG', **ngay* '1SG.NOM', **ngatyu* '1SG.DAT', **ngali* '1DU'.) Furthermore, there is no supporting evidence for this change in Kaytetye, since there the first person plural root is a different form *ayne-*, which either represents an analogical change of the expected form ***ane-* < **ngana*) under the influence of the first dual *ayle-* < **ngali*) or reflects a different Pre-Arandic form, probably **ngarni* (cf. Arabana-Wangkangurru *arni* < **ngarni*, Pitta-Pitta *ngarna*).

There are some other indications of intermediate stages in the loss of initial consonants in Arandic. The Kaytetye form of 'give', *etnye-*, suggests that the Pre-Arandic form was **yinya* by the time nasal prestoping took place. This form, with lenited initial *ny* and an assimilated *i* in place of original *u*, has parallels in other languages; for example Walmajarri

has *yinya* compared to the more conservative Mudburra *nyunya[rra]* as the past tense of **nyu-* 'give'. In second person singular pronouns, which also presumably reflect Pre-Arandic forms beginning with **nyu-*, Kaytetye likewise shows no trace of the rounded vowel. This may indicate an early development of **nyu* to **yi*, possibly via **yu* with lenition of *ny* to *y*. Of languages in the region, Pitta-Pitta and the Warluwarric languages (Carew 1993:53) have pronominal forms beginning with *yi-*. On the other hand, Arrernte bears witness to forms containing *u*, *unte* (directly attested) and **ungke* for the ergative and dative respectively. There are several possible interpretations of these differences. They may reflect an early common sound change *ny* > *y*, followed by a change *yu* > *yi* in Kaytetye only. These different developments are shown in Table 15. On the other hand, the Kaytetye pronouns may result from the (irregular) loss of rounding that affected alveolar consonants (see below), with perhaps the unroundedness of the ergative *nte* effecting an analogical derounding of the dative ***ngkwe-* to *ngke-*. (If Kaytetye and Arrernte underwent slightly different changes, with respect to derounding after *y*, before initial consonants were completely lost, then it follows that some of the loss of initial consonants took place after the stage that can be called Proto Arandic in the strict sense. One way out of this dilemma is to accept the notion of dialects in the protolanguage.)

TABLE 15: POSSIBLE CHRONOLOGY OF 2SG.ERG

Kaytetye	Arrernte
* <i>nyunte</i>	* <i>nyunte</i>
* <i>yunte</i>	* <i>yunte</i>
* <i>yinte</i>	
* <i>ente</i>	<i>unte</i> (A)
<i>nte</i>	<i>ntwe</i> (Aly)

Whatever the detail of the loss of initial consonants, this change had important consequences for the phonological system. The difference between plain nasals and prestopped nasals became contrastive (unless this took place earlier as a consequence of the loss of vowel length contrast). Another consequence of the loss of initial consonants, in particular of *w*, would have been the reanalysis of initial *o* (deriving from *a* after *w*) as belonging to the phoneme *u*.

(SC10) Stress shift to second syllable: #*'SS..* > #*'S'S..*

Stress in Arandic is on the first syllable beginning with a consonant (i.e. (V)'CV). This reflects the second syllable of Pre-Arandic. It is possible that the shift of stress is related to the earlier strong stress on the first syllable, which occasioned the reduction of vowels in unstressed syllables. The stress may in some way have spread over to the second syllable and been reinterpreted as belonging there. One might posit that the loss of initial consonants was somehow caused by the shift of stress. However, there are enough examples of lenition and even loss of initial consonants in other Australian languages where there is no shift of stress—for example Arabana-Wangkangurru (Hercus 1994:32)—to make it clear that initial consonant loss is not necessarily a result of destressing.

(SC11) Reinterpretation of initial rounding: #uCe > #eCwe

Only the south-western dialect of Arrernte (Southern Arrernte or Pertame) consistently preserves initial *u* which derives from Pre-Arandic *Cu-* or *wa-*. Elsewhere this *u* is reflected as rounding on the following consonant or consonant cluster, which is indicated in the orthography by *w* following the consonant (cluster). The earlier *u* disappears completely if the word still has two syllables without it (and the *u* is not followed by a heterorganic consonant cluster). Otherwise it is replaced presumably by schwa, which is reflected ultimately as *a*, *i* or nothing (see next paragraph). Presumably the rounding has spread rightwards sufficiently to be perceived at the plosion of the consonant. With this change we are in the realm of individual Arandic dialects; this is no longer a Proto Arandic sound change. Examples are given in Table 16.

TABLE 16: ETYMOLOGIES SHOWING ROUNDEDNESS SPREAD

Gloss	Pre-Arandic	Proto Arandic/SA	Other Arandic	Language
urine	* <i>kumpu</i>	* <i>umpe</i>	<i>mpwe</i>	K, A
cook	* <i>kupa-</i>	* <i>upe-</i>	<i>pwe-</i>	K
butcherbird, magpie	* <i>kurparu</i>	<i>urpere</i>	<i>arpwere</i>	K, A
egg	* <i>muka</i>	* <i>uke+</i>	<i>kwa[rte]</i>	K, A
night	* <i>munga</i>	<i>unge</i>	<i>ingwe</i>	K, A
night-LOC	* <i>munga-ngka</i>	* <i>unge-nge</i>	<i>ngwenge</i> 'tomorrow'	K
anthill, termite mound	* <i>mungka</i>	* <i>ungke+</i>	<i>ngkwe[peye]</i> <i>ingkwe[peye]</i>	K A
water	* <i>ng/kuku</i>	* <i>uke+</i>	<i>kw[atye]</i>	A
3SG.DAT	* <i>nguku</i>	* <i>uke</i>	<i>kwe-</i> <i>-ikwe</i>	K A
wife's brother	* <i>ngumparna</i>	<i>umperne</i>	<i>mpwerne</i>	K, A
lie	* <i>nguna-</i>	* <i>une-</i>	<i>enwe-</i>	K
forehead	* <i>ngurlu</i>	* <i>urle</i>	<i>erlwe</i> 'eye' <i>rlwe[tnperre]</i>	K K
bone	* <i>nungkarn</i>	<i>ungkerne</i>	<i>ngkwerne</i>	K, A
2DU	* <i>nyump</i> VIV	* <i>umpele</i>	<i>mpwele</i>	K, A
2SG.ERG	* <i>nyuntu</i>	* <i>unte</i>	<i>nt(w)e</i>	Aly
3DU	* <i>pula</i>	* <i>ule</i>	<i>elwe-</i>	K
big > old man	* <i>purlka</i>	* <i>urlke</i>	<i>erlkwe</i>	K
smoke	* <i>tyukurtu</i>	<i>ukerte</i>	<i>kwerte</i>	A
crow	* <i>waka</i>	* <i>uk.aye</i>	<i>kwayekwaye</i>	K
arm	* <i>waku</i>	* <i>uke</i>	<i>akwe</i>	K, A
snake	* <i>wama</i>	<i>upme</i>	<i>apmwe</i>	K, A

In a couple of Kaytetye words the rounded vowel, instead of spreading rightwards, has split into a consonant and a vowel. Both examples involve a following approximant (see Table 17).

TABLE 17: SPLIT OF ROUNDED VOWEL IN KAYTETYE

Gloss	Pre-Arandic	Proto Arandic/A	Kaytetye
meat	* <i>kuya</i>	* <i>uye</i>	<i>weye</i>
fire	* <i>waru</i>	<i>ure</i>	<i>ware</i>

There are some exceptions to rounding spread. In a number of words whose cognates clearly show a rounded vowel in the first syllable there is nonetheless no rounding in Arandic languages. Some examples are given in Table 18. Perhaps it is significant that the following consonant is (lamino)dental or (apico)alveolar. These articulations appear to be the least compatible with rounding. There is considerable variation in rounding between the different varieties of Arandic (see '2PL' and '3DU' for examples). It seems that rounding was least stable with alveolar and dental consonants and most stable with velars.

TABLE 18: EXCEPTIONS TO ROUNDING SPREAD

Gloss	Pre-Arandic	Expected Proto Arandic	Arandic	Language
two	* <i>kutharra</i>	* <i>utherre</i>	(<i>a</i>) <i>therre</i>	K, A
excrement	* <i>kuna</i>	* <i>utne</i>	<i>atne</i>	K, A
nose	* <i>mulha</i>	* <i>ulhe</i>	<i>elhe</i>	K
			<i>alhe</i>	A
raw > alive	* <i>kunka</i> /* <i>wanka</i>	* <i>utnke</i>	<i>atnke</i>	K
2PL	* <i>nhurra</i>	* <i>urre-</i>	<i>errwe-</i>	K
			<i>arre-</i>	A
3DU	* <i>pula</i>	* <i>ule</i>	<i>elwe-</i>	K
			<i>ale-</i>	A

(SC12) Neutralisation of initial *a* and *i*

Initial vowels in Arandic do not reflect the vowel of the Pre-Arandic first syllable. Where this was *u*, it is usually reflected as rounding on the following consonant. Otherwise in place of the original vowel is a very short *a* or *i* or no vowel at all. Precise rules predicting *a* or *i* have not yet been discovered. There are considerable differences between the varieties of Arandic in the treatment of these vowels.

3. THE CALCULATION OF COGNATE POSSIBILITIES

We are now in a position to demonstrate how, using our knowledge of Arandic historical phonology, we can start from an Arandic word and infer how many possible sources it might have in Pre-Arandic.

Let us consider the fate of originally disyllabic words of the structure $C_1V_1C_2V_2$ (where C_2 may be a consonant cluster). C_1 is lost, V_2 is neutralised to *e* (schwa), and V_1 is largely neutralised and/or lost. Only C_2 is preserved. Now Proto Pama-Nyungan probably allowed a contrast of three vowels *a*, *i*, *u* in both vowel positions (probably additionally a length contrast at V_1) and 13 consonants at C_1 —*k*, *ng*, *w*, *p*, *m*, *TY*, *NY*, *LY*, *y*, *T*, *N*, *L*, *r* (where *TY*, etc. represents a laminal and *T*, etc. represents an apical). I am assuming that there was no contrast of apical consonants—alveolar vs retroflex—in initial position, and that at least one of the apical consonants, perhaps *rr*, did not occur (cf. Dixon 1980:167f.). I also

accept as a working hypothesis that there was no contrast initially between dental and prepalatal laminal consonants, that is, *th* vs *ty*, *nh* vs *ny*, *lh* vs *ly* (cf. Dixon 1980:153f.) Thus a given Arandic disyllabic word may be the reflex of $13 \times 3 \times 1 \times 3 = 117$ different pre-forms (without considering a possible length contrast in the first syllable, which would require the figure to be doubled; see below).

Actually the situation is not quite so bad. In the first place, the nature of V_1 may be partly known. If V_1 was originally *u*, C_2 is usually reflected as a rounded consonant *Cw* in most dialects. Exceptions are likely to be with apico-alveolars (**kuna* > *atne* 'excrement') and lamino-dentals (**kutharra* > (*a*)*therre* 'two'). Thus an Arandic word of the shape (*V*)*Cwe*, with rounded C_2 , continuing a Proto Arandic form **uCe* (still reflected in some dialects), may be the reflex of only $13 \times 1 \times 1 \times 3 = 39$ pPN forms. If C_2 is unrounded, however, the pPN form (notated as **CEcV*, where *E* stands for a vowel that may have been *a* or *i* but not *u*) may reflect one of $13 \times 2 \times 1 \times 3 = 78$ forms. These calculations apply only where both C_1 and V_2 are unknown. Where the nasal or non-nasal nature of C_1 is known from the type of nasal at C_2 (see below) the possibilities are actually narrowed down to those indicated in Table 19, 4-7.

The nature of the initial consonant C_1 may likewise be partially inferable. In the case where C_2 is a nasal consonant, this descends as prestopped where C_1 was originally non-nasal (and V_1 short, but we are ignoring here the complications of long vs short V_1). Where C_2 is a plain nasal, the original C_1 was one of the four nasal consonants (or, rarely, C_2 was preceded by a long vowel preceded by any consonant). Hence the possible number of pre-forms is, for words with non-nasal C_2 , theoretically $13 \times 3 \times 1 \times 3 = 117$, but, given that V_1 is partly knowable, at worst $13 \times 2 \times 1 \times 3 = 78$ (where V_1 was not *u* and C_2 is not nasal) and at best $4 \times 1 \times 1 \times 3 = 12$ (where V_1 was *u* and C_2 is a plain nasal)—see Table 19, 2-7.

Similarly, the identity of V_2 may be (partly) known, since it may be reflected in the nature of C_2 . Where C_2 was an apical stop, nasal or lateral (*t*, *rt*, *l*, *rl*, *n*, *m*, but not *r* or *rr*) and V_2 was *i*, the apical descends as a prepalatalised apical (*yt*, *yl*, *yn*, or *ytn*)—for example, **ngali* > *ayle*, **karli* > *ayle*—the contrast between alveolar and retroflex place of articulation being neutralised. Thus an Arandic word of the structure *Vyte* (where *t* indicates an apical non-rhotic consonant) has $13 \times 3 \times 2 \times 1$ possible etyma (e.g. a word *ayte* may be the descendant of a set of pPN words summarised by the formula **CV(r)ti*). An Arandic word containing an apical stop, nasal or lateral that is not prepalatalised reflects forms that may be summarised as **CVtO*, where *O* indicates a vowel *a* or *u* but not *i*. There is not the ambiguity between an earlier alveolar and retroflex, say *t* and *rt*, that there is before an earlier *i*. The number of possible etyma of words with non-nasal apical C_2 is 52 or 26, as shown in Table 19, 8-11. For words containing an apical nasal at C_2 , the possibilities are even smaller, ranging from 36 down to 8, as shown in Table 19, 12-19.

The calculation of all these possible numbers of pre-forms are given in Table 19; the abbreviations used are as follows:

upper-case letter	=	unspecified phoneme
lower-case letter	=	specified phoneme
C	=	unspecified consonant
V	=	unspecified vowel
c	=	specified consonant
v	=	specified vowel
E	=	<i>i</i> or <i>a</i> (not <i>u</i>)

O	=	a or u (not i)
P	=	non-nasal unspecified for place of articulation
M	=	nasal unspecified for place of articulation
p	=	non-apical non-nasal
m	=	non-apical non-prestopped nasal
pm	=	non-apical prestopped nasal
l	=	apical (alveolar or retroflex) non-nasal consonant
n	=	apical (alveolar or retroflex) non-prestopped nasal
tn	=	apical (alveolar or retroflex) prestopped nasal

TABLE 19: NUMBER OF DISYLLABIC PRE-FORMS OF ARANDIC WORDS ACCORDING TO PHONOLOGICAL SHAPE

	Pre-Arandic	Proto Arandic	Arandic	Number of possible pre-forms
1	*CVcV	*VCe		13x3x1x3=117
2	*CEpV	*epe	(V)pe	13x2x1x3=78
3	*CupV	*upe	(V)pwe	13x1x1x3=39
CVmV				
4	*PEmV	*epme	(V)pme	9x2x1x3=54
5	*PumV	*upme	(V)pmwe	9x1x1x3=27
6	*MEMV	*eme	(V)me	4x2x1x3=24
7	*MumV	*ume	(V)mwe	4x1x1x3=12
CVIV				
8	*CEli	*eyle		13x2x2x1=52
9	*CEIO	*ele	(V)le	13x2x1x2=52
10	*Culi	*uyle		13x1x2x1=26
11	*CulO	*ule	(V)lwe	13x1x1x2=26
CVnV				
12	*PEni	*eytne		9x2x2x1=36
13	*PEnO	*etne		9x2x1x2=36
14	*Puni	*uytne		9x1x2x1=18
15	*PunO	*utne		9x1x1x2=18
16	*MEni	*eyne		4x2x2x1=16
17	*MENO	*ene		4x2x1x2=16
18	*Muni	*uyne		4x1x2x1=8
19	*MunO	*une		4x1x1x2=8

In making the above calculations, I have not taken into consideration the relative frequencies of particular phonemes in a given environment of pPN. In various Pama-Nyungan languages where such statistics have been given, there is typically a very low frequency of apical consonants at C₁, and some phonemes may be totally lacking (e.g. *ly-* in Nyangumarta (O'Grady 1957)). There are also particular consonant-vowel combinations that are infrequent to the point of absence, such as *ki* and *ngi* (O'Grady 1957, but note widespread *kila(n)* 'galah'). The frequency of V₂ may also vary according to the nature of V₁ (Dixon 1980:179). The effect of taking the relative frequency of pPN phonemes into account would not reduce the number of possible pre-forms, but only make certain ones much less likely than others.

Proto Pama-Nyungan probably had a contrast of long vs short vowel at V_1 position (Dixon 1980:132), which was generally neutralised in the Arandic languages. The effect of taking this variable into account would be to change the number of variables at V_1 from 3 to 6, or usually, where the vowel is known to have been round, from 1 (*u*) to 2 (*u* or *uu*), and, where the vowel is known to have been unrounded, from 2 (*i* or *a*) to 4 (*i*, *ii*, *a* or *aa*). In effect all scores need to be doubled. The one exception known at this time is where C_2 descends as the velar approximant represented orthographically by *h*. As described in §2, *h* probably continues an earlier *k* that followed a long vowel. It is possible that the conditioning of **k* was more complex; *k* might conceivably have developed into *w* after *uu*, perhaps only when it was followed by an unrounded vowel, if 'kangaroo' *aherre* reflects **tyuukuru* (cf. Diyari *tyukuru*). It is conceivable that consonants other than *k* underwent a different development after a long vowel; perhaps *ty* or *th* > *y* in this environment, or *t* > *rr*, or *rt* > *r*, even *p* > *w*. So far, however, no etymologies supporting such developments have been found.

It is quite likely that a long vowel prevented the prestopping of nasals. If this was the case, a word containing a plain nasal at C_2 position may not unequivocally be reconstructed as, say **PE(:)mV*, representing 108 ($9 \times 4 \times 1 \times 3$) possible forms with a non-nasal C_1 and a long or short unrounded V_1 , but reflects either **PEmV*, representing 54 ($9 \times 2 \times 1 \times 3$) possible forms with a non-nasal C_1 and a short V_1 , or **CE:mV*, representing 78 ($13 \times 2 \times 1 \times 3$) possible forms with any C_1 and a long V_1 , which makes a total of 132 possible sources.

The calculations given above would need to be altered if we posit that pPN had only a single apical consonant at C_1 , as implied by the argument of Evans (1988) and by my pPN reconstructions using **R* in List 5. Instead of 13, there would be only 10 consonant possibilities at C_1 . Even if this is true for pPN, it may not have held anymore for the Pama-Nyungan form of language that immediately preceded Arandic. On the other hand, if we assume that the Pre-Arandic form of Pama-Nyungan had an initial contrast of laminodentals with prepalatals, we need to add three more consonants to the C_1 possibilities. We are thus back to a figure of 13 if we at the same time posit a single apical, but 16 if we accept four initial apicals. Then the worst case structure— $13 \times 2 \times 1 \times 3 = 78$ for row 2 of Table 19 (or $13 \times 4 \times 1 \times 3 = 156$ if we allow for vowel length at V_1)—changes to $16 \times 2 \times 1 \times 3 = 96$, and, with consideration of vowel length, $16 \times 4 \times 1 \times 3 = 192$.

4. LISTS OF ARANDIC REFLEXES OF PAMA-NYUNGAN

The Pama-Nyungan forms are cited in an orthography that consistently uses voiceless stop symbols, *rC* for retroflex consonants, *Cy* for lamino-prepalatals and *Ch* for laminodentals. For the phonology of Proto Pama-Nyungan (pPN) I have assumed two sets of apicals, as per O'Grady (1990b:136), but without interpreting the retroflex consonants as clusters (O'Grady 1979:134). For initial apicals, whose phonetic nature is unclear, I use the symbol **R* (cf. Evans 1988:103f.). I represent pPN as having both dental and prepalatal laminals, according to the evidence of double laminal languages.

Lists 1-4 give Arandic forms which have a relatively certain Pama-Nyungan etymology. The first list gives affixes. The subsequent lists divide the etymologies into pronouns, verbs and nominals. Forms are ordered alphabetically by the gloss of the pPN form, which is given in the first column. The protoforms are given in the second column. The next column to the right gives the presumed Proto Arandic form; that is, the form that resulted from the

common Arandic sound changes before the form was diversified in the various Arandic languages and dialects. The next column gives the attested forms, followed by an indication of which language or dialect it occurs in if it does not occur generally in Arandic. Then the gloss in Arandic is given if it is different from that of the corresponding pPN word. The final column lists references to other scholars who have previously recognised the etymology. List 1 omits the Proto Arandic column but includes a column where the conditioning environment of the affix may be given. Hyphens in the pPN forms are used to mark morpheme boundaries. A full stop is used in Proto Arandic forms to separate increments that were presumably not part of the pPN form, following the practice of O'Grady. Square brackets are used to separate parts of Arandic forms which are not inherited from the protoform.

List 5 combines and lists in alphabetical order all the Pama-Nyungan forms that have been cited in the tables of §2, with glosses, and provides bibliographical references to the reconstruction of the pPN forms. These sources include Capell's Common Australian, O'Grady's Proto Nuclear Pama-Nyungan, Dixon's Proto Australian, as well as the (merely) Proto Pama-Nyungan of Blake, Evans and Alpher. Not all forms cited as pPN may prove to go as far back as Proto Pama-Nyungan. Inclusion of a form only means that I consider it to be a candidate for Proto Pama-Nyungan. Some forms have been included because some scholar has reconstructed it as such. I have included some forms not mentioned by others that I nevertheless consider to be eligible on the basis of the geographical distribution of cognates.

List 6 presents a further set of Arandic words that have good cognates in other Pama-Nyungan subgroups. Here the reconstruction gives the Pre-Arandic form that is suggested by the most closely related cognates. These etymologies will be justified elsewhere by the citation of the actual cognates. (For language/dialect names see fn.2. Where no language name is given, the form occurs in the two main branches of Arandic, Kaytetye and Arrernte in the broadest sense.)

LIST 1: AFFIXES

Gloss	pPN	Arandic	Language	Environment	Reference
Ablative	*-ngu	-nge	A		
Accusative	*-nha	-nhe	A		Capell 1956:65
Dative	*-ku	-ke	A		Capell 1956:64, 100
		-we	K		
Ergative	*-lu	-le			Capell 1956:64
Ergative	*-ngku	-nge	K	#VCV_	
Locative	*-la	-le			
Locative	*-ngka	-nge	K	#VCV_	
Nominaliser	*-ntha	-(ny)tye	A		Evans 1988:94
Past	*-nha	-nhe	K		
Purposive	*-ku	-we[the]	K		

LIST 2: PRONOUNS

pPN gloss	pPN form	Proto Arandic form	Arandic form	Language	Arandic gloss	Reference
1DU.DAT	*ngali-mpa	*eyleme	ayleme	K	1DU.INC.NOM SM.MOI.SM.GEN	
1DU.EXC	*ngali-rna		ayerne ilerne	K, Aly A		Capell 1956:100
1DU.INC	*ngali	*eyle	ayle- ile- alye-	K, Aly A Ant		Breen 1977:374
1PL.EXC	*ngana-rna	*unerne	(a)nwerne	A		Capell 1956:100
1PL.INC	*ngana	*wana > *une	(a)nwe-	A		
1SG.DAT	*ngatyu *etye.nge	*etye (a)tyenge	-atye		1SG.KIN.POSS 1SG.DAT	
1SG.ERG	*ngathu	*ethe	(a)the	A		Capell 1956:100 O'Grady 1959:95 Dixon 1970:87
1SG.NOM	*ngay	*eye.nge	(a)yenge			
2DU	*nhumpVIV	*umpele	mpwele			Capell 1956:100 Breen 1977:374
2PL	*nhurra	*urre-	errwe- arre-	K A		Capell 1956:100 Breen 1977:374
2SG.ACC	*nyuna	*ene	[aty]ene	K	I:thee	
2SG.DAT	*nyunku	*ungke *engke *ungke.nge *engke.nge	-ingkwe ngke- ngkwenge ngkenge	A K A K	2SG.KIN.POSS 2SG.KIN.POSS 2SG.DAT 2SG.DAT	
2SG.ERG	*nyuntu	*unte *ente	unte nte	A K		Capell 1956:100 O'Grady 1959:75, 95
2SG.NOM	*nyun	*un.nge	nge			
3DU	*pula	*ule	elwe- ale-	K A		Breen 1977:374
3DU	*pula-mpa	*ule.me	elweme	K	3DU.NOM SM.MOI.SM.GEN	
3SG.DAT	*nguku	*uke *uke.re	kwe- -ikwe kwere ikwere	K A K A	3SG.KIN.POSS 3SG.KIN.POSS 3SG.DAT 3SG.DAT	
where	*wanh-tha	*enthe	nthe-			O'Grady 1959:99

LIST 3: VERBS

pPN gloss	pPN form	Proto Arandic form	Arandic form	Language	Arandic gloss	Reference
bite	*patha-	*ethe-	[kw]athe-	K	drink < water eat (see *nguku)	
burn	*kampa-	*epmpe-	a(p)mpe- (a)mpe-	Aly A		O'Grady 1959:21
carry	*ka-ngV	*eknge-	(a)knge-	A		
cook	*kupa-	*upe-	pwe-	K		
cut	*paki-	*eke-	ake-	A	cut, break off	
dig	*paangi/a-	*enge-	ange-	K		
		*engerne-	ange.rne-	A		
eat	*nga-rni	*eyne-	ayne-	K		
fall	*wanti- (< *panti- ?)	*eyntne-	aynte- inte-	Aly A	lie	
get	*ma-ni		ine- -eyne-	A K	CAUSATIVE	
give	*nhu-nya > *yinya	*etnye-	etnye-	K		
go	*wapa-	*epe-	(a)pe-	K		
		*epe.tye-	(a)petye-	A	come	
leave	*wantha-	*enthe-	(a)nthe-	A	give	O'Grady 1959:99 (‘put’)
lie	*nguna-	*une-	enwe-	K		
shoot	*Ruwa-	*uwe-	we-			
sit	*nyiina-	*ene-	(a)ne-			Capell 1956:92 Breen 1977:374
smell	*parnti-	*eynterne-	eyntne- inter(ne)- ntyer(ne)-	K Aly A		
speak	*wangka-	*engke-	angke-			Capell 1956: 93, 100 O'Grady 1959:95
spear	*Ra-ni	*eytne-	aytne-	K		
stand	*thana-	*etne-	(a)tne-			Breen 1977:374
stand >						
become	*tyarrV	*erre-	-arre- -irre-	K A		
watch	*miira-	*ere-	are-		see	

LIST 4: NOMINALS

pPN gloss	pPN form	Proto Arandic form	Arandic form	Language	Arandic gloss	Reference
anthill, termite mound	* <i>munḡka</i>	* <i>unḡke+</i>	<i>ngkwe[peye]</i> <i>ingkwe[peye]</i>	K A		
arm	* <i>waku</i>	* <i>uke</i>	<i>akwe</i>			
beard	* <i>nganka</i>	* <i>enke</i>	[<i>arr</i>]an <i>ke</i>	Aly		
big	* <i>purika</i>	* <i>urike</i>	<i>erikwe</i> <i>irikwe</i>	K Aly	old man grey-haired	
breast	* <i>ngama</i>	* <i>eme+</i>	<i>am[arle]</i>		female	O'Grady 1959:99
crow	* <i>waka</i>	* <i>uk.aye</i>	<i>kwaye[kwaye]</i>	K		
dark, night	* <i>munga</i>	* <i>unge</i>	<i>ingwe</i>			O'Grady 1959:72,78,95
digging stick	* <i>kana</i>	* <i>etne.me</i>	<i>atne[me]</i>			
earth	* <i>Raaku</i>	* <i>ahe+</i>	<i>ahe[rne]</i> <i>ahe[lhe]</i>	K, A A		
egg	* <i>muka</i>	* <i>uke+</i>	<i>kwarte</i>			O'Grady 1990d:14, 1990c: 86, 102
excrement	* <i>kuna</i>	* <i>utne</i>	<i>atne</i>			Schmidt 1919:188 Capell 1956:87, 100 O'Grady 1959:72, 94 Breen 1977:374
eye	* <i>miil.ngV</i>	* <i>elknge</i>	<i>alknge</i>	A		
fingernail	* <i>miltyV</i>		<i>eltye</i>		hand	Dixon 1970:91
fish	* <i>kuya</i>	* <i>uye</i>	<i>weye</i>	K	meat	
forehead	* <i>ngurlu</i>	* <i>urle</i>	<i>erlwe</i> <i>rlwe[tnperre]</i>	K K	eye forehead	
MoFa	* <i>ngatyi</i>	* <i>etye</i>	<i>atye[waleye]</i>	K		
MoMo	* <i>kami</i>	* <i>epme[nhe]</i>	<i>ipmenhe</i>	A		
mother/breast	* <i>ngama</i>	* <i>eme</i>	<i>me-</i> <i>ame[-nhenge]</i>	A K	mother mother-DYAD	O'Grady 1959:99
nose	* <i>mulha</i> (> * <i>milha</i> ?)	* <i>ulhe</i> (* <i>elhe</i> ?)	<i>elhe</i> <i>alhe</i>	K A		Schmidt 1919:188 Capell 1956:88, 100 O'Grady 1959:68, 72 Breen 1977:374
raw, alive	* <i>kunka</i>	* <i>etnke</i>	<i>atnke</i>	K	alive	Capell 1956:100 O'Grady 1959:94
stone	* <i>parnta</i>	* <i>ertnte</i>	<i>artnte</i>	K		O'Grady 1990b:133
tongue	* <i>thalany</i>		(<i>a</i>)lenye			Schmidt 1919:188 Capell 1956:89, 100 O'Grady 1959:99 Dixon 1970:91 Breen 1977:374
tooth	* <i>Rirra</i>	* <i>erre</i>	<i>arre</i> (<i>a</i>)rr[akerte]	K A	mouth	O'Grady 1959:99
two	* <i>kutharra</i>	* <i>etherre</i>	-therre (<i>a</i>)therre	K	DUAL two	Capell 1956:62 Capell 1956:93, 100 O'Grady 1959:72,94,99 Dixon 1970:90

pPN gloss	pPN form	Proto Arandic form	Arandic form	Language	Arandic gloss	Reference
urine	<i>*kumpu</i>	<i>*umpe</i>	<i>mpwe</i>			Breen 1977:374
water	<i>*ngapa</i>	<i>*epe.lhe</i>	<i>pelhe</i>	A	saliva	
water	<i>*nguku</i>	<i>*uke</i>	<i>kw[atye]</i>	A		Capell 1956:89 O'Grady 1959:51, 1990d:14
		<i>*uke+*ethe-</i>	<i>kwathe-</i>	K	drink < water eat	
		<i>*uke+*ulye</i>	<i>akulye</i>	A	cloud	
		<i>*uke+*elye</i>	<i>akwelye</i>	K	rain	

LIST 5: PROTO PAMA-NYUNGAN FORMS

Form	Gloss	Reference
<i>*-ku</i>	Dative	Capell 1956:65, 77ff. Dixon 1980:311, 314 Blake 1988:27
<i>*-ku</i>	Purposive	Capell 1956:63, 77 Dixon 1980:381, 410 Alpher 1990:165
<i>*-la</i>	Locative	Dixon 1980:311 Blake 1988:27
<i>*-lu</i>	Ergative	Capell 1956:64 Dixon 1980:311 Blake 1988:27f.
<i>*-ngka</i>	Locative	Capell 1956:65 Dixon 1980:311 Blake 1988:27f.
<i>*-ngku</i>	Ergative	Dixon 1980:311 Blake 1988:27f.
<i>*-ngu</i>	Ablative	Dixon 1980:312 (<i>*-ngu(ru) ?</i>) Blake 1988:27 (<i>*-ngu ABL?</i>) Alpher 1991 (<i>*-nguru</i>)
<i>*-nha</i>	Accusative	Capell 1956:28, 65, 77 (<i>*-na</i>) O'Grady 1979:127 (<i>*-nya</i>) Dixon 1970:89, 1980:315, 338 (<i>*-NHu</i>) Blake 1988:27 (<i>*-nya</i>) Evans 1988:99 (<i>*-NHu</i>)
<i>*-nhV</i>	Past	O'Grady 1979:122 (<i>*nha (< *y-na)</i>) Dixon 1980:381f., 410 (<i>*-NHu</i>) Alpher 1990:164f. (<i>*-nya</i>)
<i>*-nthu</i>	Nominaliser	Evans 1988:94
<i>*ka-ngV</i>	carry	Capell 1956:92 (<i>*ka-</i>) Dixon 1980:132, 404 (<i>*kaa-ng</i>) Hale 1982:373 (<i>*ka-</i>) Alpher 1990:165 (<i>*ka-</i>)

Form	Gloss	Reference
<i>*kami</i>	mother's mother	O'Grady 1979:107, 1990c:101 Hale 1982:373
<i>*kampa-</i>	burn	Alpher 1991 (<i>*kaampa-</i> , see <i>kaw</i>)
<i>*kana</i>	digging stick	Koch in press
<i>*kumpu</i>	urine	Capell 1956:89 Dixon 1980:100
<i>*kuna</i>	excrement	Capell 1956:81, 87 (<i>*kuna</i>) Capell 1956:84, 87 (<i>*kunang</i>) Hale 1982:374 Dixon 1980:99f., 152, 172
<i>*kunka</i>	raw > alive	Dixon 1980:155 (<i>*kurnka</i>) O'Grady 1990c:87 (<i>*ku(u)nka</i> (> Nyungic <i>*wanka</i>)) Alpher 1991 (<i>*kunka</i> , see <i>kunq</i>)
<i>*kupa-</i>	cook	
<i>*kutharra</i>	two	Capell 1956:93 (<i>*kutyarra</i>) Dixon 1970:90, 1980:153, 323, 367 (<i>*kuTHarra</i>)
<i>*kuya</i>	fish	O'Grady 1979:118, 1990c:103 O'Grady 1990c:103 (<i>*kuyang</i>)
<i>*ma-ni</i>	get	Capell 1956:81, 92 (<i>*ma-</i>) Dixon 1980:405 (<i>*maa-n</i> 'hold in hand') Hale 1982:374 (<i>*ma-</i> 'take/get') O'Grady 1990c:79 (<i>*maaN</i> 'grasp, hold in hand') Alpher 1990:160 (<i>*ma(a)n V Past</i> , <i>*ma(a)ni nPast</i>)
<i>*miil</i>	eye	Capell 1956:81, cf. 87 (<i>*mi:l</i>) O'Grady 1979:120 (<i>*miilpa</i>) Dixon 1980:99f., 172
<i>*miira-</i>	watch	O'Grady 1990c:85
<i>*miltyV</i>	fingernail	Dixon 1970:91 O'Grady 1990c:84 (<i>*milytyu</i> 'point, end')
<i>*muka</i>	egg	O'Grady 1990d:14, 1990c:86
<i>*mulha</i>	nose	Capell 1956:81 (<i>*mula</i>) Capell 1956:84 (<i>*mulang</i>) O'Grady 1990c:84 (<i>*milya</i> 'nose, end')
<i>*munga</i>	night, dark	O'Grady 1990c:86 ('dark')
<i>*mungka</i>	anthill, termite mound	O'Grady 1990c:86
<i>*ng/kuku</i>	water	Dixon 1980:100, 172 (<i>*kuku</i>) O'Grady 1979:109 (<i>*nguku</i> pPam)
<i>*ng/nyu-ku</i>	3SG.DAT	Dixon 1980:361 (<i>*NHu</i> 3SG) Blake 1988:6 (<i>*nyu</i> (East) / <i>*ngu</i> (West) 3SG)
<i>*nga-rni</i>	eat	Capell 1956:91 (<i>*nga-</i>) O'Grady 1979:125 (<i>*nga-</i>) Dixon 1980:405 (<i>*nga-l</i>) Alpher 1990:161 (<i>*ngarni</i> Past)
<i>*ngali</i>	1DU.INC	O'Grady 1979:130 Dixon 1980:334, 353 (<i>*ngaLi</i>) Blake 1988:6 (<i>*ngali</i>)

Form	Gloss	Reference
*ngali-mpa	1DU.INC.DAT	
*ngali-rna	1DU.EXC	
*ngama	breast, mother	Capell 1956:85, 87 (*ngamang 'breast') O'Grady 1979:114 ('breast, milk') Dixon 1980:100, 152 (*ngama/u(n) 'breast, woman') Hale 1982:374 ('female, mother') Alpher 1991 ('mother')
*ngana	1PL.INC	O'Grady 1979:130 Dixon 1980:155, 334, 353 (*ngana 1PL.EXC) Hale 1982:372 (*ngana 1PL.EXC) Blake 1988:6 (*ngana 1PL)
*ngana-rna	1PL.EXC	
*nganka	beard	Capell 1956:81, 87 (*nganka(rr)) O'Grady 1979:120 (*ngarnka) Dixon 1980:100 (*nganka(r))
*ngapa	water	Capell 1956:90 (*ngapang)
*ngathu	1SG.ERG	Dixon 1970:87, 1980:341 (*ngaTHu)
*ngatyi	mother's father	Hale 1982:374
*ngatyu	1SG.DAT	O'Grady 1990c:88 (< *ngay-ku)
*ngay	1SG.NOM	Dixon 1980:339, 172 Blake 1988:6
*nguna-	lie	Dixon 1980:407, 156 (*ngu-n (w-) >ng/wuna-) Alpher 1990:165 (*nguna-/wuna-)
*ngurlu	forehead	Dixon 1980:157 Alpher 1991 (*ngulu?, see ngol)
*nhu-nya	give	Capell 1956:81, 91 (*yu-/ngu-/wu-) Dixon 1980:404 (*NHu-ng) Alpher 1990:165 (*wu-)
*nhumpVIV	2DU	Dixon 1970:86f., 1980:334 (*NHu(m)paLV) Hale 1982:374 (*nyupala) Blake 1988:6 (*nyuNpaIV) Evans 1988:103 (*NHunpaIV)
*nhurra	2PL	Dixon 1970:88, 1980:334, 153 (*NHurra) Hale 1982:374 (*nyurra) Blake 1988:6 (*nyurra)
*nyiina-	sit	Capell 1956:81 (*ni(n)-) Dixon 1980:407, 153 (*NYii-n (> nyina-)) Hale 1982:374 (*nyina-) Alpher 1990:164 (*nyiina-)
*nyun	2SG.NOM	Dixon 1980:340, 344, 172 (*ngin (/nyin/nyun?)) Blake 1988:6 (*ngin)
*nyunku	2SG.DAT	
*nyuntu	2SG.ERG	Dixon 1980:340, 344 (*ngintu) Hale 1982:374 (*nyuntu)
*paangV-	dig	O'Grady 1990c:237(*pangu-)

Form	Gloss	Reference
<i>*paka-</i>	cut	Dixon 1980:408 (<i>*paka-l</i> ? 'dig/strike'?) Alpher 1990:158 (<i>*paka-</i> 'dig/hit') Alpher 1990:158 (<i>*paka</i> 'hit') Alpher 1991 (<i>*paka-</i> 'cut/hit', see <i>pe</i>) O'Grady 1990e:224 (<i>*paka</i> -spear') O'Grady 1990e:225 (<i>*paki-</i> 'cut')
<i>*parnta</i>	stone	O'Grady 1990b:133, 1990e:251 (<i>*pArnta</i>)
<i>*parnti-</i>	smell	O'Grady 1990b:126f., 1990e:251 (<i>*parntiL</i>)
<i>*patha-</i>	bite	O'Grady 1979:118 (<i>*patya-l</i>) Dixon 1980: 403, 408 (<i>*patya-</i>) Hale 1982:374 (<i>*patya-</i> 'bite/eat/taste')
<i>*pula</i>	3DU	Alpher 1990:156 (<i>*patya-</i>) O'Grady 1990e:220 (<i>*patya-</i> 'bite')
<i>*pula-mpa</i>	3DU.DAT	O'Grady 1990e: 222 (<i>*paatya-</i> 'taste')
<i>*purlka</i>	big	Capell 1956:61 ('DU') Capell 1956:93 (<i>*pula(ty)</i> 'two') O'Grady 1979:130 ('two') Dixon 1980:100, 172, 356 ('3DU, two') Hale 1982:374 ('two, DU') Blake 1988:6 ('3DU')
<i>*Ra-ni</i>	spear	Capell 1956:93 (<i>*pulka</i> 'big/old')
<i>*Raaku</i>	earth	Dixon 1980:100, 157 Hale 1982:373 Alpher 1991 (see <i>pulqa</i>) Evans 1988: 104 (<i>*RLDa-</i> 'throw spear')
<i>*Rirra</i>	tooth	Hendrie 1990:32 (<i>*taakun</i>) Alpher 1991 (<i>*taaku</i> , see <i>larr</i>) Evans 1988:104 (<i>*RLDag-</i> 'fire/hearth/camp/place')
<i>*Ruwa-</i>	shoot	Capell 1956:83, 89 (<i>*lirrang</i>) Dixon 1980:100 (<i>*tirra (/l-/r-)</i> 'teeth') Hale 1982:374 (<i>*rirra</i> 'mouth')
<i>*thaarrV</i>	stand, become	Evans 1988:104 (<i>*RLDirra</i> 'tooth')
<i>*thalany</i>	tongue	Hendrie 1990:71 (<i>*rirrang</i>) Evans 1988:104 (<i>*RLDuwa</i> 'hit with a missile')
<i>*thana-</i>	stand	Hendrie 1990:73 (<i>*ruwa-</i>) O'Grady 1979:121f. (<i>*tyaarra-y</i>)
<i>*waka</i>	crow	Capell 1956:89 (<i>*talang</i>) Capell 1956:81 (<i>*tali:nj</i>) O'Grady 1979:129 (<i>*tyalany</i>) Dixon 1970:89, 1980:99f. (<i>*THalaNY</i>) O'Grady 1979:120, 129 (<i>*tyalany</i>) Evans 1988:99 (<i>*DHalaNH</i>) Dixon 1980:407 (<i>*THa-n</i> (> <i>tyana-</i>)) Alpher 1990:165 Capell 1956:81 (<i>*wa:kan</i>) Capell 1956:90 (<i>*wakang</i>)

Form	Gloss	Reference
*waku	arm	Hale 1982:374
*wangka-	talk	Capell 1956:93
*wanh-tha	where	Dixon 1980:374f. (*waNH-THa) Hale 1982:374 (*wanytya/u/i)
*wantha-	leave > give	Hale 1982:374 (*wanta- 'put, leave')
*wanti-	fall	Dixon 1980:179 (*wanti-) Alpher 1990:165 (*wantV-) Alpher 1991 (*wanti/a-, see war)
*wapa-	go	Hale 1982:374 (*wapa- 'go, walk') O'Grady 1990b:121, 131 (*wapaY)

LIST 6: WIDESPREAD PAMA-NYUNGAN FORMS

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language	Gloss	Reference
cry	*kaka-	*eke-	ake-	K		
east	*kakarra	*ekngerre	akngerr[ake]	K		
	> *kangarra		ikngerre	A		O'Grady 1959:25
FaMo	*kparli	*eperle	aperle			
emu	*karlaya	*erleye	arleye	A		O'Grady 1959:72, 89, 94
boomerang	*karli	*eyle	[k]ayle	K		
			aylayle	Aly		
			alye, ilye	A		
leaf	*karlpi	*eylpe	eylpe	K	ear	
			irlpe	A	ear	
north	*kayirra	*eyerre.re	ayerrere			
galah	*kilan	*elen.tye	elentye	K		
			ilentye	A		
mosquito	*kiwiny	*ewenye	iwenye	A		
humpy	*kuntiyi	*untye	anytywe	A	nest	
father	*kurla	*urle-ye	arlweye	K		Koch 1995:53
magpie	*kurmparu	*urpere	armpwere	K	butcherbird	
tooth	*kurrtiya(r)n	*urrtiyern.e	errtywerne	K		
heart	*kurtu	*urte	urt[akerte]	A		
			urt[apwerte]	Ant		Breen 1977:374
head	*maka	*eke	ake	K, Ant		O'Grady 1959:63
			ak[aperte]	A		
dog	*mala.k V	*eleke	aleke	K		
			alekere	LA, Yr		Koch in press
liver	*malampa	*eleme	aleme			
bone	*nungkarn	*ungkerne	ngkwerne			
swallow	*nguka-	*uke-	kwe-	K		
			kwe.rne-	A		
WiBr	*ngumparna	*umperne	mpwerne			
fly	*nhimu.ngu	*emenge	amenge			
lick, suck	*p/kunytia-	*untye-	untye-	LA	drink	
			anytywe-	A		

Gloss	Pre-Arandic	Proto Arandic	Arandic	Language	Gloss	Reference
rib	*pangkV	*engke+	ngkerralye ngkarralye	A K		
body, flesh	*parlku	*erlke	arlke			
grub	*parti	*eyte	[k]ayte -ayte -atye	K K A		
hair, fur	*punytyu	*unytye	etnytye	K		
tree, wood	*purnu		urtne	A	wooden dish, coolamon	
sand	*thulpu	*ulpe+ *elpe+	elpw[aye] elp[aye]	Anm K	creek	
bird	*thuthV	*uthe	(u)th[ipe] th[angkenhe]	A K		
back of neck	*tyi(r)ta(r)n	*ertern.nge	rternnge	K, Aly	back of head	
prickle	*tyili.ka	*eyleke	eyleke lyeke	K A		
smoke	*tyukurtu	*ukerte	kwerte	A		O'Grady 1959:56, 75, 99
snake	*wama	*upme	apmwe			O'Grady 1959:95 Breen 1977:374
deaf	*wanga	*uknge	akngwe	K		
fall	*warni-	*eytne-	aytne- atnye, itnye	Aly A		Dixon 1980:405 (<*pa-n?)
fire	*waru	*ure	ure ware	A K		Capell 1956:90
name	*yini	*eytne *etne	itne, [arr]itnye etne	A K, Ant		Breen 1977:374
road	*yirtiya	*eyteye	eyteye tyeye	K WAnm		

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