

CHAPTER 1

Introduction

This thesis describes and analyses a number of issues in the interface between prosody and morphology in the Australian language Ngalakgan.

Ngalakgan, like many languages of northern Australia, allows a high degree of complexity in word structure. The structure of phrases and sentences, by contrast, is quite 'loose'. There are no privileged positions for logical subject, object or verb in the sentence. All of this information is encoded in the morphology of argument and predicate expressions. Hence, the proper interpretation of words in Ngalakgan is crucial to an understanding of what speakers want to say.

Given that words in Ngalakgan share many features in common with sentences in English, the focus of this thesis is on the 'sentential' aspects of morphology: the internal prosodic and referential structure of words. The following issues are addressed:

- The location of stress in simple and complex words
- The metrical and tonal organisation of words
- The nature of segmental contrasts and syllable structure in the language, and the relationship of these to morphological and prosodic structure
- The semantic interpretations of compounds

The data in this thesis comes from my fieldwork in the Northern Territory. In the following sections I describe the sociolinguistic and fieldwork situation. §1.3 outlines previous work on Ngalakgan, and how the thesis fits into the current situation in Australian linguistics. The analysis is framed in terms of Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1993a). §1.4 provides a brief introduction to this theory. An outline of the chapters is provided at §1.5. §1.6 provides tables of the phonological inventory and standard orthography used for writing Ngalakgan.

1.1 The Ngalakgan people and their language

Ngalakgan is an Australian language, spoken in the Roper River region of the Northern Territory (see the map preceding page 1).¹ Ngalakgan is classified by Alpher, Evans and Harvey (to appear), as a member of the large 'Gunwinyguan' (GN) family of languages. GN is one of the better-established genetic groupings within the residual category of Non-Pama-Nyungan Australian languages (originally due to unpublished claims by Hale: cited in e.g. Dixon 1980:21).

The following sections place Ngalakgan in its social and linguistic context. I will outline the descriptive contribution of the thesis - how it differs from the descriptive grammar of Merlan (1983), and from previously described patterns in other languages.

1.1.1 Features of the language

The principal typological features of Ngalakgan are:

- Prefixation to predicates for two core arguments, and to nominals for Noun Class
- Suffixation for argument (ergative, genitive/dative) and local-semantic roles (locative/allative, ablative, perlative), number, and possession
- A wide range of prefixes performing broadly derivational functions, including specification of the 'grouping' of arguments (e.g. *man-* 'group', *welenj-* 'together', *kore?* 'alone'), manner (e.g. *ṇamulu-* 'really'), and applicatives such as *pak-* which 'raise' a non-subcategorised argument
- Productive compounding derivations in both nominal and verbal classes, including incorporation of nominals and adverbials
- Syntactically-free, pragmatically-determined word order

¹This map represents an estimate of the positions of languages in relation to each other and major land forms. Names of languages in the Gunwinyguan family are written using the standard orthography for Ngalakgan, presented in 1.6.1 (except 'Jawoyn', which uses the conventional spelling of [jawoɹŋ]). It should be noted that many of these languages have their own, distinct orthographic systems. The spelling of the Yolngu language Ritharrngu is given in the standard Yolngu orthography, except that the digraph 'ng' is used rather than the Yolngu orthographic symbol 'ŋ' (which was not available when producing the map). The map should not be treated as a definitive description.

Similar or identical patterns are found in Ngalakgan's closest relatives: Rembarrnga, Mayali, Dalabon, and Ngandi.

1.2 The speakers, their social environment, and the fieldwork

There are only a few fluent speakers of Ngalakgan. I have worked with the Roper communities (those serviced by the Roper Highway), and among these communities there are only three people whom I would regard as fluent first language speakers. All three are elderly, in their late seventies or early eighties. There are several secondary speakers (some very fluent) among the Roper communities speaking various other languages, and a number of (at least) partial speakers at Bulman, on the Central Arnhem Highway; I am unsure of their level of command of the language. Children have not acquired Ngalakgan since the 1930's.

1.2.1 Informants

There were three primary consultants for this thesis: *Golokgurndu* (Roy James), *Gerrepbere* (Splinter James), and *Nyulpbu* (Doreen Duncan). †*Garlbarr* (Dicky Darwin) also provided valuable data, though his primary linguistic affiliation was to Rembarrnga.²

My primary consultant throughout my period in the field has been Roy. He is perhaps in his early eighties. Roy grew up and worked in the area of Roper Bar as a police tracker. In his early days he droved cattle to Queensland through the Barkly Tablelands. Roy lives at Bardawarrnga outstation, on land granted back to his clan under the Aboriginal Land Rights Act (NT 1976), together with some of his family, including his brother Splinter.

Doreen lives in the community of Urapunga 30 kms to the east of Bardawarrnga. Doreen spent some of her childhood at Bulman, but as a young woman worked at Roper Bar.

²The symbol '†' signals the name of a deceased person. These names should not be used in the presence of the deceased's relatives or fellow community members.

In 1994 and 1995, the linguistic consultancy 'team' consisted of myself, Roy and †Dicky. Dicky was a noted raconteur and also spent many hours teaching language to children. He sadly passed away in 1998, shortly after my trip to Urapunga to take part in the school language program.

1.2.2 Linguistic situation

All three speakers are in regular contact with each other and with speakers of various other languages in the region. Apart from Ngalakgan, the most important languages in this area (the Roper River drainage basin) are presented in the list at (1), together with a primary reference for each.

(1)	Alawa	(Sharpe 1972)
	Dalabon/Ngalkbon	(Capell 1962)
	Jawoyn	(Merlan MS)
	Kriol	(Harris 1986)
	Mangarrayi	(Merlan 1982)
	Marra	(Heath 1981)
	Ngandi	(Heath 1978a)
	Rembarrnga	(McKay 1975)

Kriol is an English lexifier creole which is the lingua franca of the majority of the Top End and the Kimberley regions. Rembarrnga is the language which appears to be most closely related to Ngalakgan (Baker MSSa, b). Ngandi is a neighbouring GN language with many phonological and typological similarities to Ngalakgan, but these similarities are on the whole superficial: the verb paradigms of Ngandi are quite different to Ngalakgan and demonstrably related to neighbouring Nunggubuyu (Heath 1984). Marra and Alawa are two neighbouring Non-Pama-Nyungan languages which are not closely related to any other languages. There is no strong evidence for a relationship between these languages (Baker MSb). Mangarrayi is possibly another GN language (Alpher, Evans, Harvey: to appear), but quite divergent from them in many respects (Merlan 1989). It is probable that Ngalakgan speakers traditionally had some contact with Jawoyn and Dalabon also, both are GN languages. Dalabon is somewhat closer to

Mayali than other GN languages (Baker MSA), and Jawoyn probably related most closely to Warray (Harvey p.c.).

1.2.3 Fieldwork

The languages of elicitation were English, Kriol and Ngalakgan. Fieldwork was carried out at various locations - Katherine town, Bardawarrkga, Urapunga, Ngukurr - with Urapunga and Ngukurr being the most frequent bases. Total time spent in the field was 16 months. Periods spent in the field, together with dated recordings, were as follows:

1994	July-October	(Tapes 6/9/94-27/9/94)
1995	March-May	(Tapes 3/3/-16/5/95)
1996	January, March-August	(Tapes 4-10/1/96; 13/5-4/7/96)
1997	September	(Tapes 1/9/-12/9/97)
1998	October	(Tapes 13/10-15/10/98)

Data taken from elicitation sessions are referred to by the date, tape number and side. For example: [1/6/96:1A] refers to the session recorded on this date, tape number 1, side A. The majority of these sessions are transcribed and the transcriptions are lodged at the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) together with the recordings.

Data taken from texts are referred to by the text. These are as follows:

KD	'Kangaroo Dreaming': dreaming myth narrative relating to travels of the Plains Kangaroo ancestor (<i>jardugal/garndalpburru</i>)
DP	A processual text: how to collect pandanus and sugarbag
DD	A processual text: how to make damper
Txt 1/6/96	A hunting narrative
QS	'Quiet Snake Dreaming': dreaming myth narrative relating to the travels of the Quiet Snake (Olive Python) ancestor (<i>gurrujardu/gurrijartbonggo</i>)

1.2.4 Data and methodology

Ngalakgan data I collected are primarily of two types: elicited words and phrases, and texts. Texts were often freely offered by speakers, particularly Roy. Roy provided many texts, some sacred ('Kangaroo Dreaming', 'Two Quiet Snakes') many secular - his favourite theme being hunting.

Doreen also provided some fine, succinct texts, which were all recorded as part of the ongoing language revival program at Urapunga school. They cover such themes as the traditional way to collect and prepare pandanus for weaving, preparing lilyseed bread, and making medicine from indigenous plants.

The tapes record a copious amount of elicitation, though elicitation, as any fieldworker will attest, is a tricky business with Aboriginal consultants.³ Luckily, both Splinter and Doreen are adept at objectifying linguistic data, and elicitation with Splinter in particular was very productive. Some interactive material was also recorded.

I have also had the privilege of working with many other people in these communities, who provided me with an insight into the range of linguistic variation in the area. I would particularly like to mention *Dhitdenbuy* Thompson, *Ginburr* Hall, *Alice Mirninggirri* and especially Cherry Daniels, who acted as consultants for Ngandi.

1.3 Previous work on Ngalakgan

The only reference work on Ngalakgan is Merlan (1983): *Ngalakan Grammar, Texts and Vocabulary*. The lexical and grammatical analysis in this grammar form the basis for the discussion in this thesis. Merlan based her initial fieldwork on unpublished fieldnotes by Jeffrey Heath, who worked on the neighbouring, related language Ngandi (Heath 1978a). Fieldtapes recorded by Merlan and Heath, and earlier researchers such as McKay, are lodged at AIATSIS. (I did not make use of these tapes.) To my knowledge Merlan has carried out no subsequent work on Ngalakgan since the

³The reasons for this are sociolinguistic (Walsh MS).

publication of her grammar. Examples taken from Merlan (1983) are annotated as [M-*n*], where *n* is the number given to the example in that work.

The earliest substantial documentation of Ngalakgan is in Tindale (1928), a wordlist of 400 words in a number of languages of the Roper region, including Ngalakgan. Capell (1942:387-389) included three pages on Ngalakgan grammar and vocabulary in his survey of North Australian languages. Frances and Howard Morphy worked with speakers of the language for a land claim under the auspices of the Northern Land Council, as anthropological consultants. Their unpublished land claim book *Yuṯpundji-Djindiwirritj* (1981) contains much valuable anthropological, historical, and social data and discussion, and some language material in the form of toponyms, kinship, subsection, personal and ancestor names.

1.3.1 Differences from previous work

This thesis extends the description and analysis of Ngalakgan in a number of areas.

Chs 2, 3 and 5 provide extensive description of stress in Ngalakgan. Merlan (1983) contains only a brief description of stress. What is included there does not diverge in most respects from the description given here.

Geminate alternation is described in Merlan (1983:25-26). In Ch 4, I provide additional material leading to a different description of the process.

There are points at which Merlan and I differ. Merlan found a vowel length contrast in just one word *ma:ʔ*, the predicate form of attributive *maʔ* 'good'. I did not find these two to be in contrast. I did find a contrast in length between open monosyllabic roots such as *po* 'river' [bo:], and corresponding vowels in all other environments: *pok* 'creek' [bɔk]. This distinction is described and analysed in §2.1.2; instrumental evidence for the claim is provided in Ch 5.⁴ Heath (1978a:7) recognises a contrastive vowel length distinction in Ngandi in a handful of stems. McKay (1975:26)

⁴ This is not the only difference between Merlan (1983) and the present work, but it is one of the most important differences.

notes that vowel lengthening is a predictable feature of monosyllabic roots in Rembarrnga, regardless of affixation.

1.3.2 The thesis in the current Australian linguistic context

There has been comparatively little study of the prosody of Australian languages. To date, the only other extended treatments of prosody in Australian languages are King (1994b[1999]), and Berry (1999). King (1994b[1999]) is an instrumental study of Dyirbal intonation. Berry (1999) is a treatment of stress and other phonological phenomena in mainly Central Australian languages - Warlpiri and Arrernte - couched in an Optimality Theory framework. Henderson (1998) discusses phonology and prosody in Arrernte. Nash 1980[1986] is a study of morphology in Warlpiri, and contains large sections on prosody and phonology. McDonald (1977) is a study of the phonetics and phonology of Yarlalde, which includes a detailed treatment of stress and syllabification.

There are a few discussions devoted exclusively to the phonology of Australian languages. Dixon (1980:§6) is a typological survey of phonological and phonotactic patterns. Hamilton (1996) is a survey and analysis of phonotactic patterns in Australian languages. Evans (1995) is a survey of phonological patterns such as syllable structure, the range of segmental contrasts, dissimilation processes, and stress. Butcher has produced papers and several unpublished manuscripts on the phonetics of Australian languages, mainly of the Northern Territory (1993, 1995, 1997, to appear). There are numerous shorter works on Australian phonology and prosody, for example Hale (1976), Wood (1978), Harvey (1991), Breen (1992), Blevins (1994).

1.4 Optimality Theory

The phonological analysis in this thesis is couched in terms of 'Optimality Theory' (OT) as set out in Prince and Smolensky (1993), McCarthy and Prince (1993a, 1993b, 1995b) (herein 'P&S', 'M&P' respectively), and subsequent works. This section offers a brief overview of the mechanics of the theory.

1.4.1 The basic apparatus

OT differs from previous work in phonological theory in two respects:

- (2) a. There are no phonological rules, rather, the grammar consists of well-formedness conditions ('constraints') which are of a very general sort, available to all languages.
- b. Output forms are evaluated simultaneously, rather than serially, for satisfaction of all of the constraints in the grammar.⁵
- c. Constraints are ranked and violable.

I take each of these points in turn. Rule formalism in Chomsky and Halle (1968, hereafter 'SPE') was of the following kind:

- (3) $A \rightarrow B / (X) ___ (Y)$

The interpretation of (3) is that 'A becomes B in the environment of X (preceding) and/or Y (following)'.

In OT by contrast, it is hypothesised that all languages have access to a common store of phonologically natural conditions on well-formedness.⁶ Instead of the rule in (3), there is a constraint stating that the configuration XAY is ill-formed (*XAY). Outputs are evaluated with respect to a large number of well-formedness conditions simultaneously: there is no rule ordering, and no 'constraint-and-repair' strategy.

One such condition is that syllables should have onsets. This is formalised as a *constraint* - called 'Onset' - which has the following definition (M&P 1993a:30, P&S 1993:16):

- (4) ONSET *_σV 'Syllables must have an onset.'

⁵ While simultaneous evaluation is a desideratum of OT, serial derivation is not ruled out, and is in fact a feature of the analysis in M&P (1993a). Cf. also Blevins (1997), McCarthy (forthcoming).

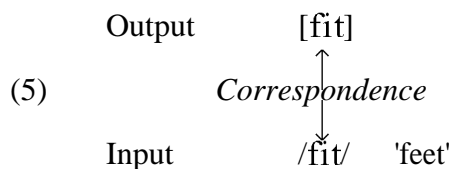
⁶The use of well-formedness conditions is of course not restricted to OT; M&P (1993a) cite *inter alia* Kisseberth (1970), Haiman (1972), Stampe (1972), Sommerstein (1974), and Goldsmith (1990).

It may not be observably the case that every syllable in a given language has an onset, and the word-initial position in languages may often be onsetless. This occurs because any constraint may in principle be violated. The fact that Onset may be violated does not change the observable fact that in most languages, in most environments, syllables have onsets: the constraint 'Onset' is obeyed. Where Onset is *not* obeyed in a given environment, OT claims that there is some other constraint which over-rides Onset (in that environment), and therefore, permits violation of Onset.

Much of the variation between languages resides in the ranking between conditions such as 'Onset' - a 'Markedness' constraint - and another set of constraints given the general term 'Faithfulness'.

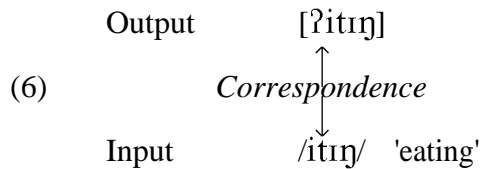
Faithfulness is the term given to constraints on the relation between two strings: input and output. *Underlying* and *surface* representations (UR, SR respectively) constitute one pair of input and output strings, respectively. Other pairs proposed by M&P (1995b) are *Base* (B) and *Reduplicant* (R), where 'Base' is the surface form of the stem which is copied by the reduplicant.

Faithfulness can be considered as a constraint on a Correspondence relation between the input and output, shown schematically as (5) (following M&P 1995b:252). In this example, the input and output are in perfect correspondence: at the surface, every segment finds some *correspondent* segment in the input.



Now consider (6), in this form, perfect correspondence is not observed. The output form has a segment [ʔ] which is not part of the input form. In this case, Onset demands that the syllable [it] have an onset, and in the output, this onset is supplied by an 'epenthetic' segment: one which finds no input correspondent. In this example, Onset

is satisfied, but perfect correspondence is violated; we say that Onset 'outranks' correspondence in this language.



Faithfulness, in M&P (1995b), is now the term given to a 'family' of constraints which regulate any operations on a phonological string which cause it to differ from its correspondent. The three Faithfulness constraints which concern us here are given in (7):

- (7)
- | | |
|-----------------|--|
| DEP[endency] | 'No epenthesis' |
| MAX[imality] | 'No deletion' |
| IDENT[ity]([x]) | 'Segments in correspondence have identical features (optionally parametrised to some feature [x])' |

The three Faithfulness constraints may be relativised to pairs of correspondents: Input-Output (IO-) Faith regulates the realisation of output representations based on some input, Base-Reduplicant (BR-) Faith of reduplicants on some base, and Output-Output (OO-) Faith of some output form on another (morphologically related) output form.

The second divergence of OT from SPE-based frameworks is simultaneity of evaluation. An Optimality Theoretic grammar evaluates candidate output forms with respect to their satisfaction of a large number of constraints simultaneously, relative to other candidates. The candidate which best satisfies the given constraint ranking is optimal for that grammar.

The set of candidate outputs is produced by a function called GEN (suggestive of 'Generator') in P&S (1993:4), and candidates are *analyses* of the input 'admitted by very

general considerations of structural well-formedness' (M&P 1993a:1). These 'general considerations' amount to providing the underlying form with prosodic structure: stress and syllabification.

In (8), below, a *tableau* arrays an input, in slashes in the top left hand corner; a partial constraint ranking (left to right); and a selection of candidate outputs, below the double line. The input in (8) consists of the word presented previously in (6), which is onsetless in the underlying (input) form. In English, onsetless words are dispreferred: epenthetic glottal stop insertion is observed, as in candidate (a). This is the attested output corresponding to the input in (8).

Based on the input, we have two serious candidates for consideration apart from the attested form (a). Candidate (b) represents the 'Faithful' analysis, and candidate (c) satisfies Onset by deleting the initial vowel of /itɪŋ/. These candidates are 'evaluated' with respect to the three constraints given in (8): MAX, ONSET and DEP.

(8)


/itɪŋ/ 'eating'	MAX	ONSET	DEP
a. [ʔ]itɪŋ			*
b. itɪŋ		*!	
c. tɪŋ	*!		

Candidate (b) faithfully realises the underlying form, so it satisfies both MAX and DEP. This candidate violates the constraint against onsetless syllables - ONSET - since the initial syllable of the second word lacks an onset. Violation is signalled by asterisks (*). Candidate (a), with an initial epenthetic segment, satisfies ONSET: the word has an onset at the surface. Epenthesis violates DEP. Since in this language epenthesis, rather than onsetlessness, is observed in this environment, we conclude that ONSET is ranked higher than DEP: it is more important that syllables have onsets than that they respect underlying forms.⁷

⁷ I have abstracted away from other issues, particularly the choice between potential onset segments.

We can draw no conclusion about the ranking of MAX and ONSET based on this tableau. Both of the candidates which violate these forms are unattested, and the attested candidate violates neither: there is no 'ranking argument' for MAX and ONSET.⁸ But since candidate (c) is unattested, MAX must be ranked above DEP, since onsetlessness is resolved in English by epenthesis, rather than deletion.

In the text, constraint domination is notationally represented with '>>'; as in 'ONSET >> DEP'. Unranked constraints are separated by commas: MAX, ONSET. In tableaux, ranking is signalled with solid boundaries between constraints (ONSET and DEP); a dotted boundary signals a lack of a ranking argument.

Note that constraint violation does not automatically exclude a candidate output from the running (exclusion is signalled by an exclamation mark (!) accompanying a violation mark). What is important is that a given candidate should violate constraints *minimally*. The attested candidate, which is signalled by the pointing hand () is the candidate which is *optimal* with respect to the constraint ranking in this language. The other candidates, (b) and (c) are *less harmonic* than (a) because they violate constraints which are higher-ranked than the highest (given) violation incurred by (a).⁹

The foregoing has described the basic mechanics of the theory. Other aspects of OT will be introduced in the following chapters where they are appropriate to the discussion.

1.5 Outline of the chapters

In Ch 2 I introduce the basic features of the language. The location of stress in roots is described. I show that stress provides evidence for two types or 'levels' of morphology: the 'root'-level and the 'word'-level. When two words are compounded - are complex at the word-level - each word retains the stress pattern and the meaning that it has when independent. Words which are complex at the root-level have the same stress

⁸Additional information, such as the behaviour of /itr/ following a consonant-final word, will allow us to make further ranking arguments.

⁹Following Prince and Smolensky (1993) I avoid use of the phrases 'less optimal', 'more optimal', and use 'less harmonic', 'more harmonic' instead, reserving 'optimal' for the best output.

characteristics as simple words. This reflects their semantic characteristics: the constituents of root-complex words do not necessarily make a compositional contribution to the semantics of the whole word. Ch 2 justifies the distinction between stress and pitch accent in Ngalakgan: not every strong beat in a word is associated with distinctive pitch.

Ch 3 describes the prosody of bound affixal morphemes in the language. I show that affixes and clitics constitute independent domains for prosodic structure, a characteristic which Ngalakgan shares with other Australian languages such as Warlpiri (Nash 1980[1986]) and Diyari (Austin 1981). This means that every suffix and clitic which is two syllables long or more receives its own stress. Monosyllabic suffixes and clitics can only be stressed if they precede another monosyllabic suffix or clitic.

Pitch accents in Ngalakgan are associated with two positions in words: their primary affiliation is to roots. They have a secondary affiliation with the last strong beat in a word. They cannot be associated with any other positions. As a result, suffixes and clitics can be associated with distinctive pitch, but prefixes cannot be. This characteristic distinguishes Ngalakgan from other languages of its genetic group (Gunwinyguan), in which prefixes can be stressed just if the root is monosyllabic. Ngalakgan provides further evidence that meaningful parts of words (morphemes) which are not themselves words, can nevertheless have the prosodic characteristics associated with words (cf. Aronoff and Sridhar 1983, Rubach and Booij 1990).

Ch 4 discusses the nature and distribution of geminates in the language, and the process of geminate alternation. I show that Ngalakgan has a single series of stops, like the majority of Australian languages. These stops also occur as geminates, which in all respects behave like geminates in other languages. This analysis is contrary to that of Merlan (1983), who proposes two series of stops in Ngalakgan: fortis and lenis.

Geminates, and glottal stops, are commonly found at morpheme boundaries. I regard both as 'boundary signals' in Trubetzkoy's (1939[1969]) sense: elements that

help a hearer to segment a word or phrase into its constituents.¹⁰ In this way, geminates and glottal stops perform a similar function to the stress patterns described in Chs 2 and 3. Each morpheme is distinguished not only by prosodic patterns, but also by characteristic syllabic structures and segments. Geminate alternation is a process which reinforces this relationship, by preventing incorrect parses.

Ch 5 discusses the basis of syllable quantity effects on stress in roots. I show that heavy syllables are those which are acoustically the most difficult to perceive. Stress on these syllables is a means of retaining distinctions which might otherwise be lost. Again, quantity-sensitivity is a hearer-oriented process: one which enables the hearer to properly perceive and interpret the word.

Ch 6 is a summary of the main claims of the thesis.

1.6 Phonological inventory and orthography

Table (1) presents the underlying consonant inventory. §2.4 discusses the neutralisation of apical contrasts morpheme-initially. Discussion of the nature of the opposition between singleton and geminate stops can be found in Ch 4.

Table (1) Consonant phonemes

	Labial	Apico-alveolar	Apico-postalveolar (retroflex)	Lamino-alveo-palatal	Dorso-velar	Glottal
Obstruent	p	t	ʈ	c	k	ʔ
Nasal	m	n	ɳ	ɲ	ŋ	
Lateral		l	ɭ			
Tap/flap		r				
Approximant			ɻ	y	w	

For the simple stops, the voiceless symbol is used here though the voicing of simple stops varies according to syllable position and place of articulation (and varies

¹⁰This Prague school notion was taken up by Firth (e.g. 1966[1948]), and more recently Cléirigh (1998) has extended the idea to a systemic-functional analysis of Irish.

accordingly in the phonetic representations of examples in the chapters) - see Ch 4 for discussion.

Note that the glottal stop has a highly variable realisation. It is always realised on preceding sonorants, so words such as /kuŋmaŋʔ/ 'maybe' are phonetically [guŋmaŋ] ~ [guŋmaŋʔ], where the diacritic underneath the final nasal represents 'creaky voice' associated with glottal constriction (Pullum and Ladusaw 1986[1996]). The final glottal closure is optional, depending on the position of glottal stop in the word and utterance (see Ch 5 for discussion).¹¹

The vowel inventory is presented in table (2).

Table (2) Vowel phonemes

	Front/unrounded Centralised ~ Peripheral		Back/rounded Centralised ~ Peripheral
High	ɪ ~ i	a	ʊ ~ u
Mid			ɔ ~ o
Low			

The most usual allophones of each vowel are given. Each non-low vowel has two allophones: 'centralised' and 'peripheral'. These sound roughly like the English 'lax' or 'open' and 'tense' or 'close' vowels respectively. The distribution of centralised and peripheral allophones is described in Ch 4. Phonologically long vowels are always peripheral.¹²

¹¹This was noted also by Merlan (1983:6): 'in spectrographic analysis of ordinarily-paced speech, the Ngalakan glottal shows up mainly as stretches of 'creaky voice', not characterised by any abrupt glottal closure'.

¹²That is, as opposed to vowels which are lengthened for stylistic reasons. For example, a common discourse device in this area is to lengthen the last vowel of a verb, to indicate temporal or spatial extension or duration: [yɪrbðippuiyné::ŋ] /yɪr-puyppuy+ŋe+ŋ/ (1aS-singe+[burn+])PP 'we singed it (for a long time)' (see e.g. Heath 1984 for discussion of this phenomenon in Nunggubuyu). Here the vowel is not phonologically long, and is accordingly realised not in the peripheral, but in the central allophone [ɛ].

1.6.1 Orthography

The following tables present the orthography currently in use in schools for teaching Ngalakgan. Orthographic representations are used in the thesis where phonological form is not at issue. The orthography follows that developed by Batchelor College for the Katherine region languages (e.g. Merlan for use by Jawoyn speakers) in most respects, and is similar to orthographies used by Diwurruwurru-jaru (the Katherine Language Centre) for teaching traditional languages in schools.

Table (3) Orthographic consonants

	Labial	Apico- alveolar	Apico- postalveolar	Lamino- alveo-palatal	Velar	Glottal
Simple stops	b...p	d...t	rd...rt	j...tj	g...k	h
Geminate stops	...pb...	...td...	...rtd...	...tjj...	...kg...	
Nasal	m	n	rn	ny	ng	
Lateral		l	rl			
Tap		rr				
Approximant			r	y	w	

Table (4) Orthographic vowels

	Front/unrounded		Back/rounded
High	i	e	u
Mid			
Low			
		a	

The main features to note are the following.

- Single stops are written *b, d, rd, j, g* syllable-initially, and *p, t, rt, tj, k* syllable-finally. This accords with the usual phonetic realisations in these environments.
- Geminate stops are represented by digraphs combining the syllable-final and syllable-initial symbols: *pb, td, rtd, tjj, kg*.

- Apicals in non-contrastive positions are written as alveolars. Non-contrastive positions are morpheme-initially (following a word-level '-' or '#' boundary), and in the second position of clusters. Accordingly, clusters of postalveolar segments are written with a single preceding *r*; hence *rnd*, *rtd* represent [ɳɖ], [ɳt] respectively. Non-homorganic clusters of apical segments do not occur; such clusters arising at morpheme boundaries are obligatorily assimilated at the surface (see §2.4).
- *h* is a glottal stop [ʔ], realised as laryngealisation (creaky voice) [◌̰] on a preceding sonorant as described in the previous section.
- *nk*, *rnk* represent heterorganic alveolar nasal + velar stop and postalveolar nasal + velar stop, i.e. [ŋɡ], [ɳɡ] respectively, whereas the homorganic cluster [ɳɡ] is written *ngg*. Similarly *nj* and *ntj* are homorganic [ɲj] and heterorganic [ɳj] respectively (the latter cluster is quite rare).¹³

¹³The reasons for adopting this convention are as follows. To be consistent, the homorganic alveo-palatal cluster should be represented as *nyj*. However, our experience at Diwurrurru-jaru has shown that learners find it difficult to control the symbol 'y' as an indicator of palatal place of articulation, rather than as a segment (i.e. the glide). Accordingly, use of *y* for this function is to be avoided, and the homorganic cluster is simply represented as *nj* in Ngalakgan and in other languages of the Roper serviced by the Language Centre. I do not suggest that either of the orthographic distinctions between *ngg* and *nk*, or between *nj* and *ntj* are easy for learners to grasp: they are not. But the fact that the homorganic cluster [ɲj] is so much more frequent than the heterorganic one [ɳj] allows us to get away with simply using *nj* most of the time.