Prosody and Grammar in Dalabon and Kayardild

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Abstract

This dissertation presents a qualitative and quantitative analysis of the interaction between grammatical structure and prosodic structure in two Australian languages, Dalabon and Kayardild. The typological profiles of these languages contrast dramatically: Dalabon is an extreme head-marking polysynthetic language, in which a single verb can carry all of the information typically associated with a clause in a language like English (e.g. M. Baker, 1996; Evans & Sasse, 2002). Kayardild is an extreme dependent-marking language, with syntactic relationships encoded on nominal dependents through sequences of case morphology (Dench & Evans, 1988; Evans, 1995a; Nordlinger, 1998).

One of the main motivations for studying the interaction between grammatical structure and prosodic constituency in two grammatically distinct languages is that a comparison will potentially test the effects that grammatical structure may have on prosody. By examining two structurally different languages it then becomes possible to test certain hypotheses regarding the grammatical influence on prosodic structure. Whether an extreme dependent-marking language and an extreme head-marking language show similar or different prosodic structural patterns may either support or disprove statements regarding the universality of the interaction between prosodic and grammatical structure.

This dissertation presents both quantitative and qualitative findings, based on approximately 75 minutes of recorded Dalabon and Kayardild narratives. The hypotheses examined in this dissertation concern whether factors such as grammatical complexity, the location of clause boundaries, discourse effects such as the introduction of new information, as well as prosodic length, affect prosodic constituency boundary location and strength, irrespective of the language type in question. Although the two languages differ dramatically in their grammatical structures, the overall interaction between prosody and the various grammatical
factors may be expected to show similar patterns. In order to test these hypotheses, the relationships between grammatical complexity and prosodic constituency, between the clause and prosodic constituency, and between prosodic length and prosodic constituency are examined. The results presented here show that there is a large amount of consistency across both languages in terms of the prosodic phrasing of clauses overall, supporting the view that prosodic structure is independent of grammatical structure. However, the results also show there is interesting variation in the prosodic phrasing of constituents within the clause as well as overall pausing patterns, suggesting that typological structure does have a role to play in prosodic structure.

The chapters are structured as follows: Chapter 1 provides the introduction and context for the research, with definitions of prosody and intonation, a review of the literature on the interaction between prosody and grammar, and the aims and hypotheses. Chapter 2 provides language overviews of Dalabon and Kayardild. Chapter 3 provides a description of the methods and materials, including an overview of the corpus, and the statistical methods and annotation conventions used. Chapter 4 provides descriptions of the intonation phrases found in Dalabon and Kayardild, including a description of the contour types found, the makeup and boundary tones of these phrases. Chapter 5 provides an examination of the relationship between the clause and prosodic phrasing including analyses of pause, IP boundaries, clause types, constituents and word order. In Chapter 6 some of the interesting findings to emerge from the preceding analyses are investigated. This includes the prosodic behaviour of nominals and examples of IPs which comprise multiple verbs. Chapter 7 concludes the dissertation, providing an overview of the main findings and their implications, as well as a discussion of directions for future research.
Declaration

The following declaration, signed by the student:

This is to certify that:

(i) the thesis comprises only my original work towards the PhD except where indicated in the Preface;

(ii) due acknowledgement has been made in the text to all other material used;

(iii) the thesis is fewer than 100,000 words in length, exclusive of tables, maps, bibliographies and appendices.
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## Abbreviations

> (Subject) acting upon (object)

~ Intonational fragment

... pause (>200ms)

(implies the presence of an intonation phrase boundary)

/ Intonation phrase boundary

(without adjacent pause – otherwise ‘...’ is used)

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<td>Intonation unit</td>
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<tr>
<td>LOC</td>
<td>Locative</td>
</tr>
<tr>
<td>LOT</td>
<td>A lot/large group</td>
</tr>
<tr>
<td>M</td>
<td>Middle (voice)</td>
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<th>Abbreviation</th>
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<td>Privative</td>
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<td>PROP</td>
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<td>PRS</td>
<td>Present (in Dalabon also used with apprehensives, and imperatives)</td>
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<td>PST</td>
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<td>PURP</td>
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<td>REDUP</td>
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<td>rms</td>
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<td>ToBI</td>
<td>Tones and break indices</td>
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<td>Verbal donative</td>
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<td>VPURP</td>
<td>Verbal purposive</td>
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**Bold type** Subordinate clauses
Language map

The geographic locations of Dalabon and Kayardild
Chapter 1. Introduction

This dissertation investigates the interaction of prosody and grammar in two Australian languages whose typological profiles contrast dramatically: one (Dalabon) is a head-marking polysynthetic language and the other (Kayardild) is a dependent-marking language. A polysynthetic language is a highly synthetic language where words comprise many morphemes (e.g. Comrie, 1989: 45), as the more synthetic the language the higher the morpheme to word ratio is. A head-marking language is a language where the relations between the constituents of a phrase are shown through morphological marking on the heads of the phrase. Polysynthetic languages are necessarily head-marking as the verb carries the morphological specification for arguments and possibly adjuncts (see e.g. M. Baker, 1996; Evans & Sasse, 2002; Mahieu & Tersis, 2009; Mithun, 1999). A single word in a polysynthetic language may therefore correspond to an entire sentence of English. An example of an extreme polysynthetic head-marking language, Yup’ik Inuit, is given in 1-1) where a single word consists of seven morphemes and equals an entire sentence in English.

1-1) tuntu-ssur-qatar-ni-ksaite-ngqiggte-uq
   reindeer-hunt-FUT-say-NEG-again-3SG:IND
   ’He had not yet said again that he was going to hunt reindeer.’ (Payne, 1997)

In Dalabon verbal words carry the morphological specification for all arguments as well as some adjuncts, meaning that a verbal word can equal an entire sentence, as shown in 1-2).

1-2) ka-h-njerrh-ngorr-ngorrka-ninj ...
   3/3lo-R-body-REDUP-carry.on.shoulder-PI
   ’He was carrying the animals on his shoulder.’ (JC 1:18)

In contrast, in a dependent-marking language the relations between the constituents of a phrase are shown through morphological marking on the dependents or modifiers of the phrase. In Kayardild, the syntactic relationships between constituents are
demonstrated through case marking on nouns, which span the entire range of a clause. The case marking of nouns may convey several different types of syntactic relationships, where the different cases may be sorted according to the syntactic level at which they occur. A noun may collect up to four different levels of case marking, where each signals different levels of syntactic relationships from the noun level to the main clause level (Dench & Evans, 1988; Evans, 1995a; Nordlinger, 1998). In the example given in 1-3) the nominative case marking -ya on the noun ni ‘he’ shows that it is the subject of the clause, while the modal proprietive case -u/-ku, found on the locational adjuncts dathin ‘there’ and dulk ‘country’ is generally used for all other relational phrases in a clause, including objects.

1-3) dathin-ku dulk-u ni-ya yulkaa-ju dii-ju
there-MPROP place-MPROP 3SG-NOM for.ever-POT sit-POT
‘... he would sit down forever at that place.’ (AD 20:46)

Whereas Dalabon encodes morphological information on the verb producing the equivalent of a clause, Kayardild encodes syntactic relationships between constituents on nouns. It might be assumed that it is a more complex matter to mark each constituent in relation to its head (as in a dependent-marking language such as Kayardild), rather than to mark just the constituent head (as in a head-marking language such as Dalabon), and this dissertation aims to investigate whether the study of prosody and its interaction with grammar can shed light on this matter.

The implication of studying the interaction between grammatical structure and prosodic constituency in two grammatically distinct languages is that a comparison will potentially test the effects that grammatical structure may have on prosody. By examining two structurally different languages it then becomes possible to test certain hypotheses regarding the grammatical influence on prosodic structure. Whether a dependent-marking language and a head-marking language show similar or different prosodic structural patterns, may therefore either support or disprove statements regarding the universality of the interaction between prosodic and grammatical structure.
The link between prosodically defined constituents (where prosody includes factors such as pitch, pause, duration, loudness and voice quality, which are responsible for the production and perception of intonation, tone, stress, rhythm, pausing and duration in speech, as defined in Chapter 1.1.1 below) and linguistic segmentation into basic units of information (e.g. Chafe, 1994; Croft, 1995; Halliday, 1967), as well as syntactic units (e.g. Gussenhoven, 2004; O'Connor & Arnold, 1973; Selkirk, 1984; Steedman, 2000) has been documented in a range of languages as typologically diverse as English, the Australian language Wardaman, and Mandarin. These prosodic units are marked phonetically by a range of different aspects including pause, pitch resets and/or discontinuity, voice quality, intensity, durational changes as well as sandhi phenomena (Himmelmann & Ladd, 2008: 252). Prosodic aspects may further be used in spoken language for pragmatic purposes, such as to signal focus, topic and contrast (e.g. Smith, 2004). The pause aspect of prosody demarcates various aspects of spoken language, and provides both speaker and listener with time to plan and process spoken material (F. Ferreira, 1993; Krivokapić, 2010). Cross-linguistically, pausing has been widely found to occur at prosodic (e.g. Butcher, 1981), syntactic (e.g. Grosjean, 1980b; Grosjean, Grosjean, & Lane, 1979) and discourse boundaries (e.g. Smith, 2004), where the strength of these boundaries as well as the length and speech rate of the unit may affect the duration of pause (Butcher, 1981). In addition, it has been widely documented that larger prosodic units such as the intonation phrase are utilised in the processing of higher-level linguistic units for both speaker and hearer.

This dissertation presents both quantitative and qualitative findings, based on approximately 75 minutes each of recorded Dalabon and Kayardild spontaneous oral narratives. The study of spontaneous narrative discourse contrasts with the experimental laboratory speech of previous studies, instead providing insight into how natural speech is produced. Furthermore, while an extensive grammar of Kayardild exists (Evans, 1995a), the same does not apply to Dalabon (although see Section 2.1.2 for a survey of publications relating to Dalabon) and this dissertation contributes to our knowledge of Dalabon grammar by exploring aspects of the grammatical structure, such as clausal constituency and word order. This dissertation further contributes to
our knowledge of intonation in Australian languages as well as polysynthetic languages more generally.

The main hypothesis of this dissertation is that factors such as grammatical complexity, the location of clause boundaries, discourse effects of topic shifts and the introduction of new information, as well as the size of prosodic constituents (measured in number of syllables, duration in ms, or number of prosodic constituents) affect prosodic constituency boundary location and strength, irrespective of the language type in question. That is, although the two languages differ dramatically in their grammatical structures, it is hypothesised that the overall interaction between prosody and the various grammatical factors will show similar patterns, due to the independence of prosodic and grammatical structure (e.g. Nespor & Vogel, 1986; Selkirk, 1978). In order to test this hypothesis, the relationships between grammatical complexity and prosodic constituency, between clausal and prosodic constituency, and between prosodic length and prosodic constituency will be examined, with the Intonation Phrase (henceforth the IP) the prosodic unit of focus. Using the IP as the main basis of prosodic analyses allows for cross-linguistic comparisons, as much of the research in the field of prosody and syntax interaction likewise makes reference to the IP.

The structure of this Chapter is as follows: Section 1.1 provides an overview of the definitions and study of prosody and intonation. Section 1.2 provides a thorough overview of the literature of the interaction between prosody and grammar. Section 1.3 concludes with a review of the main aims of the dissertation.

1.1 Prosody and intonation

In this chapter definitions of some of the fundamental terms, such as prosody and intonation, which are used throughout the current dissertation, will be given. Furthermore an overview will be provided of some of the main theories and research findings pertaining to the study of prosody and intonation which are relevant to the current dissertation.
1.1.1 Prosody

The term prosody is used to refer to the range of suprasegmental parameters which include fundamental frequency\(^1\) (f0), segmental duration, pause, loudness, and voice quality. These prosodic features are responsible for the perception and production of rhythm, pausing, stress, duration, tone and intonation in speech. The term prosodic structure will be used to refer to the abstract structures of hierarchically organised prosodic units made use of in theories of prosodic phonology (see Section 1.1.1.1 below).

1.1.1.1 Prosodic phonology

Prosodic phonology and the theory of prosodic domains was first developed by Selkirk (1984) and Nespor and Vogel (1986), and has since been employed by a number of researchers on a range of typologically diverse languages such as Greek, Bininj Gun-Wok, Dutch, Korean, Japanese, and Beaver (Arvaniti & Baltazani, 2005; Bishop, 2003; Gussenhoven, 2005; Jun, 2005; Pierrehumbert & Beckman, 1988; Schwiertz, 2009). Prosodic phonology explores how speech is divided into phonological units (such as the foot, the phonological phrase and the intonational phrase) which are organised hierarchically with the largest phonological units at the top and the smallest at the bottom, as shown in Figure 1-1.

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\(^1\) Fundamental frequency (f0) is the acoustic correlate, while pitch is the auditory correlate of tone.
Each prosodic constituent represents a domain where specific rules apply and which thereby determine the phonetic realisation of speech. An example of this is given by Nespor and Vogel (1986: 165) where the domain of the phonological phrase in the variety of Italian spoken by educated speakers in Florence is the domain where the process known as raddoppiamento sintattico, or syntactic gemination, occurs. Other phonological processes which contribute to the demarcation of domains include flapping in American English, where an alveolar stop becomes an alveolar tap in the domain of the phonological utterance.

Prosodic domains which have been proposed include the utterance, the intonational phrase, the phonological or intermediate phrase, the phonological word and the syllable, though the domains proposed differ slightly between researchers (Shattuck-Hufnagel & Turk, 1996: 206), as shown in Figure 1-1. It is generally agreed that prosodic domains cannot be recursive. This is known as the Strict Layer Hypothesis (SLH) as developed by Selkirk (1984: 26) and Nespor and Vogel (1986). Ladd, however,
(1996) provides a compelling argument to relax the SLH and instead introduces the Compound Prosodic Domain (CPD). Ladd argues that it is necessary to relax the SLH in order to allow for fine differences between boundary strengths, without having to expand the range of prosodic domains to accommodate the different levels. According to Nespor and Vogel, prosodic domains are somewhat independent from syntax, though generally prosodic constituents are isomorphic with morphosyntactic constituents across languages. Selkirk stresses that prosodic structure and syntactic structure are distinctly separate, though syntactic structure is reflected in prosodic structure in certain ways (1978). Similarly, Ladd states that there is some essential difference between syntactic and prosodic structure in that prosodic structure is flatter than syntactic structure (2008: 297). Each prosodic domain is associated with a set of mapping rules of certain prosodic features, which may mark either the head (culminative) or the edge (delimitative) of that particular domain. The basic delimitative function of intonation has been found universally across all languages (e.g. Beckman & Venditti, in press; Ladd, 2008) with certain boundary marking patterns found at the right and left edges of phrases.

1.1.1.2 Speaking tempo

Variations in speaking tempo have been found to affect pause and segment durations, and closely interact with prosodic phrasing. The study of speaking tempo has been analysed through two different approaches; speech rate, which measures syllables per second in speech including the pause time, and articulation rate, which is the number of syllables per second of speech excluding pause time. Researchers have claimed that any observable variation in speech rate is due to the differences in pause time, and that articulation rate is a more constant measure (Goldman-Eisler, 1968). Traditionally articulation rates have been investigated in the domain of an inter-pausal unit (henceforth IPU), where an IPU is defined as a stretch of speech between two pauses, and may comprise one or more IPs.

Studies show that articulation rates often slow down within the IP, and that final lengthening is often found on the final syllables of an IP. Articulation rates in Finnish
(Hakokari et al., 2007) for example reveal that final lengthening occurs on the final word of an utterance, shortening is found on the initial word in an utterance, and a stable articulation rate is found in the middle of an utterance, regardless of utterance length. Similarly, a study of Czech spontaneous speech (Dankovičová, 1997) shows that articulation rates overall show a weak trend of progressively slowing down towards the end of an IP, with final lengthening found on the final syllables of the IP. Articulation rates vary considerably across other domains (the clause and the IPU), revealing that articulation rates are bound to the domain of the IP, rather than the clause or the IPU.

1.1.2 Intonation

Intonation has been defined as the ‘pitch variations in the course of an utterance’ (t'Hart, Collier, & Cohen, 1990: 10), or the ‘patterned variation in voiced source pitch that serves to contrast and to organise words and larger utterances’ (Beckman & Venditti, in press). In the current dissertation the term intonation is used to refer to the use of suprasegmental postlexical tonal events produced in a linguistically structured manner. These intonational events may serve delimitative (boundary-marking) and culminative (head-marking) functions in relation to prosodic structure.

1.1.2.1 Intonational universals

The study of intonation reveals clear trends regarding the kinds of intonational patterns found in certain languages. Cross-linguistically, the typical ‘hat pattern’ is a commonly occurring tune found in languages as typologically diverse as Dutch (Ladd, 1996) and Bininj Gun-wok\(^2\) (Bishop, 2003). Languages such as English and Swedish

\(^2\) Bininj Gun-wok, meaning ‘people’s language’, is the term used to refer to the six mutually intelligible dialects Kuninjku, Manyallaluk Mayali, Kunwinjku, Kune, Gun-Djeihmi and Kundedjnjenghmi (Bishop, 2003).
show a range of right-edge tonal events (such as rising or falling contours) in addition to other possible marking at the rightmost edge (such as pausing or lengthening), as well as possible marked pitch resets at the leftmost edge (Bishop & Fletcher, 2005). In contrast, languages such as Korean (Jun, 1996) and French (Jun & Fougeron, 1995) display both right and left edge boundary tones which have an intonational grouping function. Previously, intonational studies largely focused on European languages such as English, Dutch and Swedish (e.g. Ladd, 1996, 2008), while Australian and polysynthetic languages received very little attention prior to recent years.

This study will therefore contribute to the study of the intonation of Australian languages which has been a growing field over the past decade in particular. Previous intonational studies of Australian languages have examined Alawa (Sharpe, 1972), Bininj Gun-wok (Bishop, 2003; Bishop & Fletcher, 2005; Fletcher & Evans, 2000, 2002), Dyirbal (King, 1992, 1994, 1999), Pitjantjatjara (Bowe, 1990) Iwaidja (Birch, 1999, 2002; Pym & Larrimore, 1979; Sayers & Pym, 1977), Jaminjung (Simard, 2010), Mawng (Hellmuth, Kügler, & Singer, 2007a, 2007b; Singer, 2005), Nunggubuyu (Heath, 1984), Warlpiri (King, 1999), Wik-Mungkan (Sayers, 1976), Dalabon (Fletcher, 2007, in revision; Fletcher, Evans, & Ross, 2004; Ross, 2003) and Kayardild (Fletcher, Evans, & Round, 2002; Round, 2009). The first in-depth study of the connected monologue speech of an Australian language was Heath’s study of Nunggubuyu (1984) which used the IP as the basic unit of study. This work has formed the basis of much of the later work in the field of Australian languages, including the present study. Bishop’s dissertation (2003) which also looks at monologue speech is currently the most comprehensive intonational analysis of an Australian language.

Furthermore, as Dalabon is a polysynthetic language, this study will contribute to the study of intonation in polysynthetic languages, which, until recently, has received little attention. Polysynthetic languages that have been studied to date include Beaver (Schwiertz, 2009), Chickasaw (Gordon, 2005), Cayuga (Dyck, 2001), Lushootseed (Beck, 1999; Beck & Bennett, 2007), Unangan (Taff et al., 2001; Taff & Wegelin, 1997, 1998), West Greenlandic Eskimo (Nagano-Madsen, 1993; Nagano-Madsen & Bredvad-Jensen,
1995), Navajo (McDonough, 1999), and see Mithun (1995) for a study of various prosodic aspects of some Siouan, Caddoan and Iroquoian languages, and Hargus and Rice (2005) for a collection of articles on various prosodic aspects of Athabaskan languages such as Chiricahua Apache, Dene Soun’liné, Jicarilla Apache, Sekani, Slave, Tahltan, Tanacross, Western Apache, and Witsuwit’en.

1.1.2.2 The study of intonation

The approach to intonation used in the current dissertation is located within the autosegmental metrical framework. The autosegmental metrical (AM) approach to intonation, developed in the late 1970s by Bruce (1977), Liberman (1975/79) Liberman and Pierrehumbert (1984), and coined by Ladd (see e.g. 1996), is an explicitly phonological approach to intonation, where tones are classified as merely high, low or nothing. While the British School of intonation employs a contour analysis of tones using terms such as rising and falling, the American School, in contrast, describes intonation in terms of levels (see e.g. Ladd, 2008). Where once four pitch levels were used (1-4) (e.g. Trager & Smith, 1951), proponents of the AM analysis make use of just two level tones: high (H) and low (L). The approach of using just two pitch levels as opposed to four allows the analysis to avoid using relative notions of where a tone exists. See Ladd (2008) for a full discussion of various approaches to the study of intonation. Within the AM framework, the tones and break indices (ToBI) system of transcribing intonation was developed (for a thorough description of the history and principles of ToBI see Beckman, Hirschberg, & Shattuck-Hufnagel, 2005). The ToBI framework will be used in the present dissertation, where separate ToBI-style labelling conventions developed to accommodate Dalabon and Kayardild will be discussed in detail in Chapter 3.

Spoken language naturally lends itself to some sort of segmentation for the purposes of its study, and this segmentation has typically involved intonationally or prosodically defined units. The notion of the IP (also known as the breath group, the tone unit, the tone group, the intonation group, and the intonation unit) is widely used, yet its defining criteria have varied across the literature.
In the British tradition the terms tone unit or tone group are used (e.g. Crystal, 1969; Halliday, 1967, 1970a, 1970b; O’Connor & Arnold, 1973). Halliday employs the term tone group (1967) though he makes no reference to the phonetic cues, such as juncture or pitch variation, found at a tone group boundary, instead stating that the boundary is a theoretical one. Later Halliday states that within the same utterance, tone group boundaries should not display a break or pause (1970a: 51). Crystal employs the term tone unit in his studies of prosody and intonation in English (1969), where the boundaries of the tone unit are indicated by two phonetic factors: 1) a perceivable pitch change, and 2) the presence of junctural features such as pause and length variations (1969: 205-6). In addition, the tone unit is identified as having a nuclear pitch movement (1969: 205). O’Connor et al.’s tone group is not explicitly defined using phonetic criteria and instead described as a grouping of tunes (1973: 39), where the boundaries of these tone groups may be separated by pause, but are often not (1973: 4).

The term intonation(al) phrase (IP) is used within the AM account of intonation, to refer to the prosodic domain (e.g. Beckman & Pierrehumbert, 1986; Gussenhoven, 2004; Ladd, 2008; Nespor & Vogel, 1986; Pierrehumbert & Hirschberg, 1990) where the edges of the IP are associated with boundary tones. According to Pierrehumbert and Hirschberg ‘Each intonational phrase provides an opportunity for a new choice of tune, and ... some parts of the tune serve to mark the phrase boundaries... Phrase boundaries are also indicated by the duration pattern and by pausing’ (1990: 272). Selkirk’s IP (1978) is the unit associated with pitch reset, pre-pausal lengthening, primitive intonational contours, while the edges of the IP are associated with boundary tones. Furthermore, the IP is found to be the domain of declination effects. Pitch declination, which is found cross-linguistically, is the gradual lowering of pitch peaks and troughs throughout an intonational contour, as illustrated in Figure 1-2. Declination is typically found on intonational units which correspond to clauses or clause complexes (Clark, Yallop, & Fletcher, 2007).
In their discourse transcription methods, Du Bois et al. describe the intonation unit\(^3\) (IU) as ‘a stretch of speech uttered under a single coherent intonation contour’ (Du Bois et al., 1992: 17). Du Bois et al. (1992) identify IUs using five prosodic cues: a coherent intonational contour\(^4\), pauses, pitch reset at IU boundaries, anacrusis (an acceleration of the initial unstressed syllables found at the beginning of an intonation unit) at the beginning, and lengthening of final segments towards the end of an intonation unit. Of the range of phonetic criteria cited to identify its boundaries, the presence of only one or two of these criteria proves sufficient to label an intonation unit.

Chafe’s intonation units (1994:58-60) are identifiable using a variety of six criteria: 1) changes in f0 (the overall decline in pitch level and the falling pitch contour found at the end), 2) changes in duration (i.e. shortening and lengthening of syllables, where

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\(^3\) The term ‘intonation unit’ (IU) is widely used in the literature. The IU is the equivalent of the IP in the current dissertation, however, the original terms used by researchers have been used in the current section to indicate that varying criteria may apply in the definitions of these units. To be discussed in Chapter 3.

\(^4\) Auditorily an IU is perceived as a single unified contour, though how a coherent intonational contour is defined acoustically is not made clear.
shortening occurs on the initial syllables and lengthening on the final syllables), 3) changes in intensity (i.e. one or more phonetic segments are produced more loudly), 4) changes in vocalisation (i.e. pause), 5) changes in voice quality (most notably creaky voice), and 6) speaker changes. Similarly, Cruttenden’s intonation-group refers to units whose boundaries coincide with either pause, anacrusis (an acceleration of the initial unstressed syllables found at the beginning of an intonation unit), final syllable lengthening, or pitch changes on unaccented syllables (1997: 29-34).

These identifying criteria described above, have been applied to the intonation unit in a number of recent empirical studies investigating the relationship between prosodic units and syntactic units in a range of typologically diverse languages such as English, Mandarin, Japanese, Hebrew and Wardaman (Chafe, 1994; Croft, 1995, 2007; Iwasaki, 1993, 1996; Iwasaki & Tao, 1993; Izre’el, 2005; Matsumoto, 2000, 2003; Park, 2002; Wouk, 2008).

1.2 Interaction of prosody and grammar

The following sections will examine separately the main factors which have been studied in regard to prosodic phrasing. These include grammatical structure (Section 1.2.1), prosodic structure (Section 1.2.2) and discourse structure (Section 1.2.4). Studies which have examined a range of these factors are discussed in Section 1.2.3. A summary of the main findings is provided in Section 1.2.5.

1.2.1 Grammatical structure

Intonation and other prosodic features of duration and pause serve a range of functions in speech such as signalling units of syntax (e.g. Selkirk, 1984; Steedman, 2000), discourse aspects (e.g. Smith, 2004; Swerts, 1997) or basic units of information (e.g. Chafe, 1994; Croft, 1995; Halliday, 1967). Prosody serves to signal information structure; prosody both chunks information in a spoken utterance into coherent units and highlights those elements which are important or in focus. Prosodic phrasing then acts to unify different levels of linguistic representation of an utterance (Frazier,
Carlson, & Clifton Jr, 2006). Prosody signals cohesion and may further affect the interpretation of focus (Schafer, 1998).

It has been argued that the unit roughly corresponding to the idea or information unit is relevant to how language is segmented in the mind of a speaker. Chafe defines the idea unit using three criteria (intonation, pause and syntax) where all three need not be present, nor need the presence of a single criterion necessarily signal an idea unit (1980: 14). Intonation is found to play a major role in determining the idea unit, while syntax and pause are less likely to be regarded as indicators. Likewise McGregor refers to ‘information units’ which correspond to tone units, but which are not necessarily isomorphic to grammatical units (1990: 362). Zellner (1994) draws parallels between prosodic structures and performance structures, which are similar in nature to information units. Performance structures depend on both linguistic variables (e.g. syntactic boundaries) and psycholinguistic variables (e.g. length or symmetry). Conversely, it has been argued that prosodic phrasing is used by a speaker to signal the chunking of information to the listener (e.g. Himmelmann & Ladd, 2008; O’Connell & Kowal, 2008).

The notion of information units will be of importance to this study as the relationship between constituents defined using grammatical criteria, and constituents defined using phonetic and phonological cues, if one or both are affected by how information units are expressed, is investigated. It is clear that a significant amount of overlap exists between the boundaries of discourse segments, idea or information units, clauses, and syntactic units and to attempt to fully separate these would be impossible. That is, the boundaries of linguistic units, such as the clause and the idea unit, are highly likely to coincide making it difficult to isolate the specific factors contributing to correlations between prosodic and other structural boundaries.

1.2.1.1 Prosody in language processing

Prosody has been argued to play a role in higher-level linguistic processing, both for the speaker and the hearer (e.g. Himmelmann & Ladd, 2008; O’Connell & Kowal,
Aspects such as intonation and pause may be employed by a speaker to allow for the planning of the remainder of an utterance (some studies indicate that language production operates incrementally, whereby a speaker has not finished planning of a sentence before they start speaking (V. S. Ferreira, 1996; Roelofs, 1998)), to demarcate various kinds of boundaries to the listener, as well as to allow the listener more time to process spoken material (research shows that prosodic phrasing assists in sentence comprehension (e.g. Schafer, 1997)). Prosody may further be used to avoid ambiguity in speech. A study of the intonational phrasing of ambiguous sentences (Kraljic & Brennan, 2005) reveals that speakers typically prosodically disambiguate sentences regardless of whether the situation was ambiguous or not. Similarly a series of experiments (Snedeker & Trueswell, 2003) reveals that speakers generally provide prosodic cues to disambiguate sentences when needed, and that those listeners make use of such prosodic cues.

Furthermore research has shown that speech becomes difficult to understand for more than a brief period of time if an utterance is spoken in a monotone with equal weighting of each syllable (e.g. Duffy & Pisoni, 1992). These studies highlight the importance of prosody in language processing and the many purposes it serves.

1.2.1.2 The alignment of prosody and grammar

Previous research into the relationship between grammatical units and IPs have explored typologically diverse languages such as Wardaman (Croft, 2007; Merlan, 1994), English (Chafe, 1980; Croft, 1995; Merlan, 1994), Mandarin (Tao, 1996), Japanese (Matsumoto, 2000, 2003), Korean (Park, 2002) and Portuguese (Frota & Vigário, 2007). Findings from these studies indicate a tendency for complex syntactic units to be split across IPs with a strong correlation between intonational phrasing and the clause constituent. Investigations into the effects of syntactic complexity on prosody reveal that the more complex a syntactic unit is, the more likely it is to be prosodically divided through intonation and pause (Cooper & Paccia-Cooper, 1980; Croft, 1995; Grosjean, et al., 1979; Strangert, 1997). IP boundaries are often found to divide syntactically complex units (Croft, 2001), and pause durations are generally
longer when the preceding and/or following syntactic constituents are more complex (F. Ferreira, 1991; Strangert, 1991, 1997).

The study of pause and its relationship to linguistic constituency has been developing since the 1960’s beginning with the work of Goldman-Eisler (1968). In addition to the physiological need to breathe during speech production, pause serves several functions: the cognitive function (to allow the speaker to plan the remainder of the utterance) (e.g. Butcher, 1981; F. Ferreira, 1993; Goldman-Eisler, 1968), the demarcation function (to signal various kinds of boundaries) commonly found at clause boundaries (e.g. Butler, 1981; Chafe, 1980), and the rhetorical function (e.g. Carroll, 1996; Deese, 1980; Woodbury, 1985). The need to pause for breath during speech is an obvious necessity; however, the vast majority of pauses in speech are not produced for the purpose of breathing (Cruttenden, 1997: 30). Research shows some differences between breath and non-breath pauses, with breath pauses generally longer than non-breath pauses. Further, breathing pauses occur mainly at major linguistic breaks, while non-breathing pauses occur mainly at minor constituent breaks (Grosjean & Collins, 1979). A demarcative pause is typically found in connection with syntactic boundaries as well as in connection with the boundaries of smaller units of information and is therefore of a grammatical type. A rhetorical pause is one which functions as a storytelling device such as to emphasise, dramatise, or segment elements in the narrative for rhetorical purposes. The demarcative function and the rhetorical function may be ambiguous in some cases, as a pause may serve both (e.g. Butcher, 1981; Carroll, 1996; Deese, 1980). Rhetorical pauses largely share a demarcative function, while demarcative pauses need not share the rhetorical function. Thus the distinction between different functions is not necessarily a clear one and overlaps may occur (e.g. Carroll, 1996; Deese, 1980).

Studies have shown that the complexity of both a preceding and following constituent may influence pause patterning (e.g. Grosjean, et al., 1979). Complexity of a grammatical unit may be measured in the number or level (e.g. lexical, phrasal or clausal) of component constituents (1995: 856). Prosodic separation within clauses is
especially apparent where a subject NP is separated from its predicate VP due to the complexity of the NP. The more complex a NP constituent is, the more likely it is to be prosodically separated from its predicate. Other research, however, has shown that it is the complexity of just a preceding constituent that may affect pause patterning. A study of Swedish sentences (Strangert, 1997) reveals that the complexity of NPs and VPs in a sentence, as well as the length of the words preceding a boundary, affect pause durations where the more complex the phrase and the greater the number of words preceding the phrase boundary, the longer the duration of the following pause is found to be. In contrast, however, some studies have shown that it is the complexity of a following constituent that may affect pause patterning. In a study of Canadian English (F. Ferreira, 1991) initiation times are found to increase with the complexity of the following syntactic structure of the sentence, as well as with the number of phonological words in the sentence. These studies reveal a clear interaction between syntactic complexity and prosodic boundaries where prosody divides complex constituents, and pause durations show a positive correlation with the complexity of a preceding and/or following constituent.

A slightly different approach to the study of the interaction between grammar and prosody, is to investigate the relationship between the strength of the structural boundary and its prosodic cues, rather than the complexity of a constituent. Studies following this approach have shown that structural boundary strength correlates positively with prosodic boundary cues (e.g. Cooper & Paccia-Cooper, 1980; Gee & Grosjean, 1983; Ladd, 1988; 2008: 293; Thorsen, 1985, 1986). Intonational boundaries are typically found at major syntactic boundaries (Herman, 1997; Selkirk, 1995), as are pauses (Butcher, 1981; J.-Y. Choi, 2003; Cooper & Paccia-Cooper, 1980; F. Ferreira, 1991; Horne, Strangert, & Heldner, 1995; Oller, 1973; Strangert, 1991; Yang, 2007). It is generally found that pauses are more likely to occur at sentence boundaries than within a sentence (e.g. Grosjean, 1980b; Grosjean, et al., 1979; Yang, 2007), and that pauses located at major structural boundaries (such as sentence boundaries) are longer than those found elsewhere (such as within a sentence) (e.g. Butcher, 1981; Grosjean, 1980b; Grosjean, et al., 1979; Sanderman & Collier, 1995). Studies have
further shown that phrase final words and the following pauses are of a longer
duration than pauses found elsewhere (e.g. Cooper & Paccia-Cooper, 1980).

A study of Mandarin spontaneous conversational speech (Yang, 2007) reveals clear
correlations between boundary strength and pause duration with stronger boundaries
related with longer pause durations. Pauses were also more likely to be located at a
syntactic boundary than a non-boundary (syntactic) location. Final lengthening was
found to occur consistently starting from about the fifth syllable from the boundary
with a clear interaction between final lengthening and pause duration. Where a pause
ends a phrase, less lengthening occurs, and where no pause occurs at a phrase
boundary, final lengthening is more prominent. Both these strategies therefore have
the same result of creating a less filled interval phrase finally, which may function to
add time to allow for listener comprehension as well as speaker planning of the
following utterance. Yang attributes final lengthening to two factors; a speaker’s
attempt to delay in order to retrieve the next idea, as well as to assist the hearer in
identifying the end of a unit. Similarly, in a study of Balinese (Herman, 1997) pitch is
found to serve a delimitative function indicating syntactic constituent boundaries.
Phrases are accentuated on the final syllable of the head of the phrase as well as on
the final syllable of the phrase. Likewise, Lehiste (1979) shows that sentence and
paragraph (where a paragraph is a larger cohesive unit made up of sentences)
boundaries are marked by three main phonetic factors of final lengthening of
segments, pause duration, and voice quality factors (laryngealisation).

The correlation between prosodic boundaries and narrative boundary strength has
been documented in a number of studies. In a study of Brazilian Portuguese narratives
(Oliveira, 2000) prosodic differences are found between the different hierarchical
levels of structure found in the narrative, with stronger prosodic effects found at
stronger syntactic boundaries. Pitch reset ranges were higher between narrative
boundaries (found between narrative sections) than between clauses, and pauses
were generally longer and more frequent at narrative boundaries than between
clauses. Narrative boundaries were more commonly associated with low boundary
tones than clauses. In his later study, narrative boundaries were more likely to attract longer pauses than elsewhere (Oliveira, 2002b). Likewise in Ross’ (2006) study of Warrwa narratives, a positive correlation is found between boundary strength and pause duration, with longer pause durations found at narrative episode boundaries than within a narrative episode.

A major area within the study of prosodic behaviour at syntactic boundaries looks at clause boundaries. A large body of research shows a strong correlation between the clause unit and prosody, with clause boundaries commonly found to align with IP boundaries and pauses in a range of languages including English, Mandarin and Japanese (Iwasaki, 1996; Iwasaki & Tao, 1993; Izre’el, 2005; Matsumoto, 2003; Park, 2002; Schuetze-Coburn, 1994; Tao, 1996; Wouk, 2008). Some researchers treat the clause as the basic unit of spoken language (e.g. Halliday, 1989; Halliday, 2004), and the central unit of interaction (e.g. Thompson & Couper-Kuhlen, 2005). As such, the study of its prosodic boundaries and constituency may offer insight into the validity of such claims.

In addition to the interactions between grammar and prosody, recent studies have shown that there is a relationship between juncture and prosodic factors such as prosodic length measured in duration, syllables or the types of prosodic constituents (Zvonik, 2004), prosodic complexity measuring prosodic branching (Krivokapić, 2007b), and prosodic boundary strength (Horne, et al., 1995). Furthermore positive correlations have been found between pause durations and prosodic phrase length (Grosjean, et al., 1979; Krivokapić, 2007b; Zvonik & Cummins, 2002, 2003), as well as between pause durations and prosodic complexity (Krivokapić, 2007b). Some studies suggest that speakers balance their IPs into units of roughly equal sizes (Cooper & Paccia-Cooper, 1980; Fodor, 1998; Gee & Grosjean, 1983; Selkirk, 2000). The prosodic factors affecting prosodic phrasing will be examined in Section 1.2.2.

Ferreira (1988) suggests that both syntactic structure and semantic structure affect intonational phrasing and finds that sentences are divided in a way where the resulting
units are as semantically coherent as possible. Semantic coherence is defined as having a minimal number of dependencies across units. Ferreira claims that this type of semantic and prosodic organisation is advantageous to both the speaker and the listener. For the speaker this is an advantage as semantically coherent objects are easier to maintain in working memory. For the listener, semantic coherence within an IP facilitates comprehension.

The importance of semantic coherence between dependencies within IPs is highlighted in Selkirk’s proposal of the Sense Unit Condition (SUC) which states that ‘the immediate constituents of an intonational phrase must together form a sense unit’ (1984: 286). The distribution of IP boundaries can therefore be attributed to this semantic constraint. Selkirk has since modified her stance on the SUC by instead introducing constraints on the interface between syntactic and phonological representations rather than semantic constraints (Selkirk, 2005). Watson and Gibson (Duane Watson & Edward Gibson, 2004) have similarly recently proposed an alternative to the SUC, which is a processing constraint called the Anti-Attachment Hypothesis, and which likewise makes reference to syntactic phrasing. These approaches highlight the differences found in various researchers’ basic assumptions regarding the factors which influence prosodic phrasing, be they semantic or syntactic, and highlight the many factors that may interact with prosodic phrasing.

1.2.1.3 The clause and the intonation phrase

The relationship between the clause and the IP has been a source of much cross-linguistic investigation. Previous research into the relationship between grammatical units and prosodic units have explored typologically diverse languages such as Wardaman (Croft, 2007; Merlan, 1994), English (Chafe, 1980; Croft, 1995; Merlan, 1994), Mandarin (Tao, 1996), Japanese (Matsumoto, 2003), Korean (Park, 2002), Finnish (Helasvuo, 2001), Thai (Iwasaki, 1996) and Sasak (Wouk, 2008). Typically these studies investigate the grammatical units that prosodic units consist of, and less often investigate the prosodic unit patterning of grammatical units. Findings from these studies across a range of typologically varied languages indicate a strong correlation
between intonational phrasing and the clause constituent, as well as a tendency for complex units to be split across prosodic units. Factors which may affect the correlation between clauses and IPs are syntactic complexity and distance (where syntactic distance refers to the relationship between constituents – i.e. whether a core argument, such as a direct object, is syntactically closer to its predicate than an adjunct, such as a prepositional phrase), the type of genre studied, as well as the amount of new information given. Higher levels of syntactic complexity and syntactic distance may cause the clause to be more likely to be split across prosodic units. Genre may further affect the correlation between clauses and prosodic units with slightly higher clause to prosodic unit counts evident in narratives than in conversational speech.

1.2.1.3.1 Australian languages

Several studies have investigated the relationship between prosodic and grammatical phrasing in Australian languages. These include several Gunwinyguan languages such as Wardaman (Croft, 2007) and Nunggubuyu (Heath, 1984). Findings of Australian languages reveal some differences regarding the clause IP correspondence with a strong correspondence found in Wardaman (Croft, 2007) and Bininj Gun-wok (Carroll, 1996) and a weak correspondence found in Nunggubuyu (Heath, 1984).

Heath’s (1984) study of Nunggubuyu, a Gunwinyguan language, shows that the clause and intonationally defined units tend not to coincide. Heath’s study reveals that the clause is not the fundamental unit of the grammar or discourse, as it is problematic determining what the core clausal constituents are, and whether to assign peripheral constituents to the preceding or following clauses (1984: 515-516). As a result IPs do not usually correspond to a clause, which may be separated over two or three IPs. Conversely an IP may comprise two or more verbs or other core argument NPs. In this study, the breath/intonation group typically does not correlate to syntactically ‘logical’ clausal or phrasal divisions, as noun phrases are often uttered in isolation as an introduction or an afterthought (1984: 507). The mismatch then between grammatical and intonational units in Nunggubuyu tends largely to be a result of the intonational
grouping and dislocation of NP constituents, as has been widely attested in Australian languages. Intonational or prosodic dislocation of constituents refers to the fact that the constituents in question are given their own IP and potentially separated from surrounding material by pause. Further discussion of dislocated NPs is provided in Section 6.1.

In a study of verbal art in the Kunwinjku dialect of Bininj Gun-wok (Carroll, 1996), a simple impressionistic analysis of intonation is provided where IPs are characterised as ‘final’ and ‘non-final’, and no detail is given regarding non-peripheral pitch movements within the unit. Most pause units, however, are found to equal a syntactic unit – i.e. a phrase or clause, though a syntactic unit may also consist of more than one pause unit (1996: 88). In Bishop’s study of Bininj Gun-wok dialects, an examination of two Manyallaluk Mayali narratives showed a very high correlation between the clause and the IP with between 86% and 91% of clauses mapping onto single IPs (Bishop, 2003). See Table 5-33 and Table 5-34 in Section 5.8 for an overview and comparison of these figures for the following languages.

In Sharpe’s study of Alawa (1972), also a Gunwinyguan language, intonational phrasing and intonational contour types tend to correspond to grammatical units. The basic intonational patterns found belong to seven categories; three of which are found in utterance final position, one is found in phrase final position, two are found phrase medially, and the final is found in connection with quoted speech. The utterance and phrase final intonation patterns may all occur medially, though when they occur phrase finally they usually coincide with the end of grammatical sentences, clauses or grammatical phrases (1972: 37). The phrase final pattern is the tentative pause intonation pattern which has a very slightly rising, level, or very slightly rising and then falling intonation. The slight rise is most common in listing as well as in an introductory phrase in a sentence (such as ‘from there’, ‘after that’).

A detailed study of IPs and grammatical units, including clauses, in Wardaman, a Gunwinyguan language, and English (Croft, 2007) reveals considerable similarities
between the languages despite their typological differences. An examination of the grammatical units that make up an IP in Wardaman reveals that 50.3% of all IPs comprise simple clauses, 21.5% of IPs comprise phrasal (NP) units, 10.6% of IPs comprise ‘lexical’ units (which are predominantly interjections and adverbs), while 4.4% of IPs comprise complex sentences. A clause most commonly corresponds to a single IP. Just five percent of clauses, which includes only simple main clauses, adjoined relative clauses, and (finite) adverbial clauses, are broken across two or more IPs (Croft, 2007: 849). However, complex sentences with complements, relative clauses, or adjuncts, are more frequently separated into more than a single IP. This finding reveals that more complex structures are more likely to be prosodically divided than simpler structures. Clauses with NP arguments are produced as a single IP in 78.9% of all instances (Croft, 2007). It is found that the more complex the grammatical unit, the more likely it is to be separated into more than one IP. Wardaman displays the Full Grammatical Unit Condition — i.e. that IPs are almost always full grammatical units, where grammatical unit refers to a complete constituent. Ideally a grammatical unit is a grammatical element with all of its complements (the one exception being a clause preceding a final relative clause (1995: 847). Croft argues that the Full Grammatical Unit Condition generally holds due to the IP Storage Hypothesis (Croft, 1995: 872). This hypothesis states that ‘the constructions that are stored or precompiled are the grammatical units that (normally) occur in a single IP’. Speakers can heavily rely on these pre-fabricated grammatical units thus making communication highly efficient. Croft also points out that the average length of IPs in the Pear Stories is six words, which is close to the suggested size of short-term memory (1995: 873). More complex units are likely not to be stored whole, resulting in their separation over multiple IPs.

Exceptions to the Grammatical Unit Condition discussed by Croft (1995) are found to occur to a limited extent in Dalabon. This occurs in verbal words where it was found that in a small percentage of cases, a grammatical word can be divided into two and sometimes three prosodic units (Evans, Fletcher, & Ross, 2008; Ross, 2003). Divisions are found to take place at predictable locations restricted to certain affix boundaries.
and following certain phonological constraints. Divisions within a verbal word are located in positions where the paused-after material is at least dimoraic, and the remaining material in the verbal word is at least disyllabic. Certain morphemes of the verbal word, such as the realis marker or subordinate marker, always attach to the unit containing the pronominal prefix, while the verb root is never separated from the TAM markers by a pause, suggesting that these sequences of morphemes must form a coherent unit. These intra-verbal word prosodic divisions are likely to take place due to the verbal complexity and great length of grammatical verbal words. However, it should be noted that these occurrences are exceptions and that the Grammatical Unit Condition generally holds for Dalabon.

Croft states that it is likely that clause structure is universal in its role providing the minimal complete information unit (1991: 33). As the clause provides a highly significant unit of information organization, the examination of the structure of clauses may provide insight into the division of information and the reasons for such divisions (1991). Such claims regarding the idea of pre-fabricated constituents, the notion of a maximum amount of constituents which may be stored by a speaker at one time, the clause as a central information unit, as well as the idea that extreme complexity is avoided within a single prosodic constituent, are relevant to the current study which aims to examine such claims in Dalabon and Kayardild. The validity of such universal claims will be tested by examining whether these findings are reflected in the Dalabon and Kayardild data, which represent two extremely diverse typological profiles. This comparison will shed light on whether prosodic structure and syntactic structure function largely independently of each other or the degree to which they interact.

**1.2.1.3.2 Other languages**

In contrast to the relative paucity of studies of prosodic and grammatical units in Australian languages, analyses of more commonly studied languages such as English, German and Mandarin are common. Studies of these languages show similarities with a strong correspondence found between clauses and IPs. Some of the strongest
correlations between the clause and the IP have been found to occur in English (Chafe, 1987), one of the most studied languages.

In a study of English comprising mainly narratives, Chafe found 70-75% of IPs to be clauses (1987). In a later study of conversational speech Chafe found that 60% of substantive IPs are clauses (Chafe divided IPs into three types: substantive, regulatory and fragmentary) (1994). The difference between these results may be due to the genres studied, suggesting that genre may be a relevant factor in the grammatical content of IPs. As the corpus in the current study comprises spontaneous narratives, comparisons between different studies will make reference to the genre types in question. Similarly, Croft’s study of English reveals a very strong correspondence between the clause and the IP (1995). In his study of English narratives, 75% of all IPs are comprised of clauses. Of those IPs, 64% were comprised of full clauses, and nine percent lacked a subject. Findings reveal that English rarely splits clauses over more than one IP with just five percent of simple clauses split over more than one IP (Croft, 1995). Although rare, where grammatical units were divided by prosodic breaks, Croft offered syntactic complexity and syntactic distance as the motivations behind splitting syntactic units over several IPs.

In Croft’s study of grammatical units and IPs in English, the percentage of clausal IPs in English was found to be slightly lower at just over half of all IPs (2007). 47.8% of all IPs were comprised of a simple clause, 13.7% of IPs were phrasal (NP) units, 6.2% of IPs were comprised of ‘lexical’ units, while 18.3% of IPs comprised complex sentences. More complex grammatical units were more likely to be separated into more than one IP, suggesting that grammatical complexity results in prosodic juncture.

A study comparing the interaction between prosody and the clause constituent in English and Finnish reveals strong similarities across the languages in how clause units and prosodic units align. In this study of Finnish and English conversational speech, each comprising approximately 2000 IPs, there is a clear tendency for clause cores (i.e. a predicate and its core arguments) to be uttered under a single intonation contour.
Adjuncts may or may not appear in the same IP as the core clause. Where a core argument is uttered in a separate IP, it is more likely to be the object rather than the subject. Where NPs function as free constructions (i.e., they are independent of clausal syntactic structure) they most often get their own IP. The IP in this study (Helasvuo, 2001: 26) is loosely based on the conventions used by Du Bois (1993), though an exact definition is not given.

Other studies of English, however, have found a slightly less compelling clause IP correspondence. In a study comparing English, Japanese, and Mandarin IPs in conversational speech, English clausal IPs make up 53.6% of all IPs while non-clausal IPs account for 46.4% (Iwasaki & Tao, 1993). Of the clausal IPs, full clauses account for 82.5%, while semi-clauses account for just 17.5%. A full clause is where a verbal predicate and its associated core arguments are present in a single IP, while a semi-clause is where the IP has only a verbal predicate, and its associated core arguments are not given in the same IP, or not given at all.

A study of narratives in the polysynthetic language Dolakhae Newar reveals that 67.1% of the IPs (243 out of 362 IPs) are clausal, as defined by the presence of a clause final verb (Genetti & Slater, 2004). Of the 362 IPs in the narrative only 12% (43 out of 362 IPs) contain elements from more than one syntactic unit. These findings suggest that intonational phrasing tends to coincide with the clause and avoid grouping together constituents from separate syntactic units.

Similarly strong clause IP correspondences are found in Thai, where a study shows a high percentage of clausal IPs overall with some possible genre differences. In a study of narratives and conversation in Thai (Iwasaki, 1996), totalling 855 IPs, significant genre differences are found in clausal IP frequencies. 65.7% of the conversational data IPs are clausal, while 82% of IPs in the narratives are clausal. These findings suggest that genre may affect the correlation between clause units and IPs.
Several studies have looked at the relationship between the clause and the IP in Japanese, with the finding that a very high proportion of IPs tend to be clausal. In Matsumoto’s study of IPs in Japanese conversational data 68% of the approximately 1600 substantive IPs are clausal, while 32% are phrasal (2000). 57% of the clausal IPs are independent clausal IPs, while 11% are multi IP clauses. Clauses are typically uttered in a single IP, and where they are uttered over multiple IPs a higher proportion of multiple new NPs is found, than in a single IP clause. Matsumoto counted nominal and adjectival predicates as clauses. Of the clausal IPs, 72% are elliptical (Matsumoto, 2000). Elliptical clauses occur in a single IP 73% of the time, and in multiple IPs 27% of the time. 32% of multi-IP clauses contain more than one newly introduced NP, while 1.3% of single-IP clauses contain more than a one new NP. Only 6.5% of all clauses contained more than one newly introduced NP. Matsumoto finds that 27% of nominal IPs, 11% of adjectival IPs, and 48% of adverbial IPs were not part of a clause (2000) and were instead independent. Of all clauses 81% of clauses are single IPs, while the remaining 19% comprise multiple IP clauses, with 3 and 4 IPs possible, but found in just four percent of all instances. Matsumoto explains this as the ‘no more than two IPs per clause constraint’ (2000: 544). A multi-IP clause comprises on average 2.2 IPs, while a clause averages 1.2 IPs. Where a full clause comprises more than a single IP, these typically consist of a subject argument NP IP and a verb phrasal IP. The explanation given by Matsumoto for the occurrences of fragmentation of clauses over multiple IPs is that Japanese conversation has a constraint on more than one new NP per IP.

These high clausal IP correlations are echoed in Matsumoto’s in-depth study of IPs in Japanese conversation (Matsumoto, 2003). This study reveals that 57% of IPs are independent clausal IPs, where an independent IP can communicate a complete proposition by itself. Overall 68% of all IPs are clausal (independent and part of a multi-clause IP) and 32% are phrasal (2003: 58). Of the independent clausal IPs, 43% are subjectless while 29% have an overt subject. Of the independent phrasal IPs, argument NP IPs are most common at 50% followed by adverbial IPs at 37% (2003: 61). In Iwasaki’s earlier study of IPs in Japanese narratives, telephone conversations and face-to-face conversations, totalling 1013 IPs, phrasal constituents show a higher
correlation with the IP than clauses. Of all IPs only 42.2% were clauses, while 58.8% were phrasal (Iwasaki, 1993) suggesting that speakers of Japanese rely more on fragmented syntactic IPs than full clausal IPs.

In a separate study of Japanese conversational data of approximately 1000 IPs 45.4% were clausal and 54.6% were non-clausal (Iwasaki & Tao, 1993). Of the clausal IPs just a quarter are full clauses at 24.2%, while semi-clauses are at 75.8%. Nominal IPs are at 21.6%. Iwasaki and Tao explain the lower full clausal IP frequencies as resulting from interactional considerations, as speakers are likely to encode non-referential interactional information in non-clausal IPs. This study supports the findings of the above studies which indicate that clauses in Japanese most typically coincide with IPs.

Similar results have been found for German, where a study of clauses and IPs in German reveals a clear tendency for clause and IP boundaries to align. In a study of German conversation (Schuetze-Coburn, 1994) findings reveal that 54% of clauses correspond to IPs; that is they are produced as a single IP with both clause boundaries aligned with IP boundaries. Clauses comprise between 1 and 14 IPs with an average of 1.7. The vast majority of clause boundaries align with intonation boundaries at 96% (Schuetze-Coburn, 1994: 269). Of all IPs, findings reveal that 27% of IPs are clauses, where clauses are most prominent among the five hierarchical groups being compared (Schuetze-Coburn, 1994: 182). The five categories of IPs compared in this study are the word (29%), group (11%), clause, complex (one percent), and sentence (16%). In addition to these hierarchical groups, the category of ‘other’ is included, which groups together IPs which do not comprise any single unit of analysis (i.e. word, group, clause, complex and sentence). This group does not fit any of the five categories of IPs and accounts for a staggering 41% of IPs (Schuetze-Coburn, 1994: 182) and may contribute to the low amount of IPs comprising clauses. These percentages reveal that the clause corresponding to an IP is more commonly found than the IP corresponding to a clause.

A similarly strong clause IP correspondence is found in a study of Sasak, a Western Austronesian language most closely related to Balinese and Sumbawan (Wouk, 2008).
The syntax of the IP in a corpus of 1031 IPs of conversational speech reveals a strong clause to IP correlation with 51.7% of all IPs comprising a clause. Overall 33.7% of IPs are full clauses, while 17.9% of IPs are elliptical. Nominal expressions account for 22.5% of IPs, discourse/interactional IPs make up 12.1%, while 13.7% of IPs belong to the ‘other’ category, which includes adjectives, adverbs and connectives. Of these, adverb IPs account for just 1.9% of the IPs.

A study of Korean telephone conversations (Park, 2002) comprising 1211 IPs and 610 clauses reveals similar findings to those above; namely that the IP clause correspondence is a relatively strong one. In this study both core and oblique arguments were treated as arguments and coded as part of the clause. An examination of IP boundaries reveals that 51.1% of both single and multiple clause IPs show both boundaries aligning with IP boundaries, again suggesting a strong link between the clause and intonational phrasing. In contrast, 28.4% of clauses have just a left boundary alignment with an IP, 10.3% of clauses have a right boundary alignment with an IP, and 10.2% show no boundary alignment of their edges with IP boundaries. Of the simple single IP non-embedded clauses, 48.3% show both boundaries aligning with IP boundaries, while 17.9% of multiple IP non-embedded clauses show both boundaries aligning with IP boundaries. In regard to the embedded clauses, 15.8% of single IP clauses and 5.9% of multiple IP clauses show both boundaries aligning with IP boundaries. Looking at all clause types, the single clause IP comprises 29.2% of the clause-IP patterns found in the data, while clauses consisting of several IPs account for 22% of all clause-IP patterns (2002: 648). Overall clauses are produced as no more than a single IP (i.e. where none, one or both boundaries of the clause align with an intonation boundary) in 66.6% of cases, while a clause is separated into multiple IPs in 33.4% of cases. Park states that the IP has a cognitive basis based on the finding that conceptually closer clauses have a stronger tendency to share an IP than those that do not. Park also discusses the interactional basis of the IP where boundaries are placed to achieve specific interactional purposes. Similarly, in an earlier study of Korean conversational data (Kim, 1996) and summarised by Park (2002) 55.8% of all IPs are clausal units. In this study a clausal unit is defined as a finite verbal predicate that has
either a clausal connective or a sentence ender, with or without overt arguments (Kim, 1996: 60). These results support the above findings that a large proportion of IPs in Korean are clausal.

Slightly lower clausal IP percentages are found in a study of Italian spontaneous speech (Savy & Voghera, 2010). An investigation of prosodic phrasing in Italian dialogues reveals that just 41% of all clauses exactly equal an IP, and in 41% of all clauses a clause is larger than a single IP. Overall clause boundaries coincide with IP boundaries in 92.5% of all cases, where left boundaries almost always coincide with an IP. Where clauses and IPs align one-to-one, the clauses largely comprise verb clauses (53%) with copula and existential clauses the most commonly found. Half of all IPs are syntactic constituents smaller than the clause. Phrase length was not found to play a role in prosodic phrasing, with phrases ranging from 1 to 15 syllables. Where an IP was smaller than a clause, 50% were found to be spoken elements such as discourse markers, interjections, repair sequences and disfluencies.

Studies of Mandarin conversations have found similar result to those of Italian, though with some variation between studies. In a study of conversational data of approximately 1000 IPs in Mandarin, most IPs were found not to be clausal (Iwasaki & Tao, 1993). 39.8% of IPs were clausal and 60.2% were non-clausal. Nominal IPs are at 23.4%. Of the total clausal IPs found, full clauses account for 36.7% while semi-clauses account for 63.3%. The lower amounts of full clausal IPs are explained as a result of Mandarin speaker’s widespread use of referential manipulation in interaction. Varying forms of referential manipulation, such as referent establishment and referent highlighting, contribute to a higher frequency of NP being given their own IP and thereby lowering the percentage of clausal IPs significantly.

A later study of the grammatical structure of the IP in Mandarin conversation (Tao, 1996) (1675 IPs in total including fragmentary IPs), however, reveals a stronger clause IP correspondence where clausal IPs make up 47.9%, and non-clausal IPs makeup 52.1% of all IPs (Tao, 1996: 72). Of the clausal IPs, 40% are full clauses while 60% are
elliptical clauses (i.e. clauses where an argument specified by the verb is elided). Of the non-clausal IPs, 28.7% are nominal IPs, 13.9% are discourse-interactional IPs, and 9.7% belong to other categories (i.e. adverbs, connectors). 29% of IPs are elliptical clauses with zero arguments. Of the nominal IPs, only 47% were clausal (i.e. belonging to a clause), while the remainder (at 53%) of the nominal IPs were independent.

In a study of 2262 IPs in spontaneous spoken Hebrew (Izre'el, 2005), Izre’el finds that the basic structural unit corresponding to the IP is not the clause or the predication, as is the case in written language. A clause in Hebrew is defined as consisting of a noun phrase as subject, and a predicate phrase, which need not be a verb (Izre’el, 2005: 9). The focus of this study was to determine the clausal components which make up an IP and it was found that the IP may consist of a clause, but it need not. Izre’el argues that this finding suggests that the IP and not the clause is the basic structural unit of analysis in spoken Hebrew. Overall non-clausal IPs were slightly more common, making up just over half of all IPs with clausal IPs making up the remainder at just under half of all IPs. Although this figure is argued by Izre’el to be low, it is nevertheless close to half of all IPs and could be argued to be a high proportion. These findings further reflect those above for Japanese (Matsumoto, 2003), Korean (Park, 2002) and Mandarin (Tao, 1996), which in these studies are considered a high proportion.

The above findings reveal that the clause is more likely to correspond to an IP than for the IP to correspond to a clause. That is, a higher percentage of clauses exactly equal an IP, than the percentage of IPs which exactly equal a clause.

IPs then are more commonly found to comprise part of a clause (rather than a whole clause), and it is this tendency to prosodically divide clauses which will be examined in Section 6.1 for Dalabon and Kayardild. These sections will investigate where the clause is prosodically divided as well as why those locations are found to align with prosodic breaks.
1.2.2 Prosodic structure

Importantly, research reveals that it is not just grammatical structure which affects prosodic phrasing and pausing. Some studies of pause indicate that prosodic structure may have a stronger influence on pause location and duration than syntactic complexity. Correlations have been found between intonational phrasing and additional prosodic factors such as prosodic size (measured in number of syllables, duration in ms, or number of prosodic constituents) (Zvonik, 2004) as well as prosodic complexity (measured by prosodic branching, whereby a larger prosodic constituent is made up of several smaller prosodic constituents) (Krivokapić, 2007b).

In a series of experiments conducted on American English speaking subjects (F. Ferreira, 1991) findings demonstrate clearly that the greater the number of phonological words, as well as syntactic nodes, in an utterance, the longer it takes to initiate the utterance. Utterances that are long or complex tend to be divided by a pause, where the first pause unit comprises the subject, while the second unit comprises the verb phrase. The duration of the dividing pause will increase according to the syntactic complexity of the following verb phrase. Ferreira finds that pauses occur in pre- and post-verbal position, but mainly pre-verbal (1991: 223). Semantic plausibility was not found to affect initiation times. Ferreira argues that these findings indicate that a speaker transforms a semantic/syntactic representation to a phonological/phonetic representation during the silent initiation or pause interval (1991: 227).

In a study of synchronous English speech (Zvonik & Cummins, 2002) longer pauses are found to correlate with the length, in addition to the syntactic complexity of the preceding phrase. Synchronous speech refers to speech that is read aloud by two speakers simultaneously, and is believed to reduce inter-speaker variability, providing more reliable data of the patterns of pauses at IP boundaries. In this study, length and complexity were not disambiguated, and the main factor of pause duration was unclear. However, in Zvonik et al.’s later study of Irish English (2003) a correlation is found between pause duration and the length of preceding and following IPs. Shorter
pauses (less than 300ms) are found to follow and precede shorter prosodic phrases (less than ten syllables). A further study of synchronous speech in Irish English (Zvonik, 2004) reveals that pause durations at strong (sentence) boundaries are related to the length (measured in syllables) of a preceding or following phrase. Pauses measuring less than 300ms were found to occur almost exclusively when preceded and followed by short phrases of ten syllables or less. At weak boundaries (any non-sentence boundary), pause durations were found to depend only on the length of a preceding phrase.

Other studies have shown that both prosodic length and prosodic complexity interact with pause patterning. A study of English (Krivokapić, 2007b) into the effects of prosodic structure and phrase length on pause duration, reveals that both prosodic length and prosodic structure have an effect on pause durations. The study of American English synchronous speech tests the effects of the length of adjacent phrases, as well as the effects of prosodic branching on pause durations. Findings reveal that prosodic length affects pause durations with longer phrases connected to longer pause durations (both preceding and following). Prosodic structure affects pause durations with prosodic branching phrases preceded by shorter pauses. An IP boundary was identified by final lengthening and a boundary tone. Prosodic branching was present when an IP comprised multiple intermediate phrases (ip), where an ip was identified by a phrase accent. Krivokapić argues that post-boundary effects result from linguistic structure and cognitive factors, while pre-boundary effects are due to linguistic structure or information load factors. In a later study of English read speech (Krivokapić, 2010) pause duration reflects distant phrase length in syllables. The longer both the first and second phrase following a pause, the longer that pause will be. These results indicate that speakers have a large look-ahead when producing speech, as reflected in the prosodic structure.

Further studies have shown that pause duration correlates positively with prosodic boundary strength. A study of Swedish reveals that pause duration increases with prosodic boundary strength (Horne, et al., 1995). The positive correlation between
boundary strength and pause duration is further found in a study of English (J.-Y. Choi, 2003) which reports that pause durations increase when boundary strength increases (from non-boundary to intonational boundary). Furthermore, pause durations decrease depending on the preceding boundary tones. As some boundary tones are found to more typically signal finality while others signal continuation (Ladd, 1996: 114), the finding that certain boundary tones correlate with pause duration indicates that several different prosodic cues interact to signal boundary strength as well as turn-taking cues. This is due to the finding that final low boundary tones are typically found in connection with finality, to be discussed further in relation to the discourse implications in Section 1.2.4.

1.2.3 Competing factors

Although the above studies reveal that prosodic boundary locations and strength are influenced by a range of prosodic factors such as prosodic length and complexity (which measures prosodic branching), the following studies reveal that a range of the factors interact. Prosodic features not only play a role in prosodic phrasing, but may in certain cases override syntactic grouping.

In Grosjean et al.’s study of the relationship between syntactic complexity and pause, findings reveal that syntactic complexity as a pause predictor may be overridden when the boundary does not divide the sentence into equal lengths (1979). Pauses are generally more likely to be found within a syntactic unit if the syntactic constituent is more complex (1979). In this study syntactic complexity is measured by the number of nodes dominated by the boundary node itself (Grosjean, et al., 1979:69). A strong positive correlation is found between pause durations and syntactic complexity of both the following and preceding syntactic constituents. Although pauses are generally more likely to be found within a syntactic unit if the syntactic constituent is more complex (with a strong positive correlation found between pause durations and syntactic complexity of the following and preceding syntactic constituents), overall the syntactic boundary pause placements are overridden when the length of constituents is unequal. Speakers are more likely to pause mid sentence or mid syntactic
constituent, despite the predicted location of pause according to syntactic complexity thereby demonstrating that prosodic length is also a factor in determining pause location. A study by Gee and Grosjean (1983) based on the sentences examined in the previous study by Grosjean et al. (1979) reveals that prosodic structure, in addition to syntactic structure, achieve stronger pause duration predictions than syntactic structure alone.

A study on the effect of syntactic boundaries on the temporal organization of utterances reveals that the temporal structure of utterances depends primarily on their syllabic structure, regardless of the type of syntactic boundaries involved (Lehiste, 1972). Furthermore, durational structure was affected by the number of syllables rather than by the number of segments or by the presence of boundaries suggesting that prosodic units (measured in syllables) operate independently of syntactic structure and affect temporal structure more than syntactic structure.

Research by Ferreira likewise suggests that prosodic structure is a more important factor in determining pause duration than syntactic structure. Ferreira’s (1993) experiments on the effects of syntax on sentence prosody indicate that pausing and word lengthening are not direct effects of syntactic structure, but instead reflect the influence of prosodic structure. In one experiment Ferreira studied word and pause durations of a complex NP with four different syntactic conditions. In contrast to expectations, an increase in the number of syntactic right brackets does not correlate with an increase in either word or pause duration (1993: 240). Furthermore Ferreira found that within a timing interval (which is assigned to a lexical item and an adjacent pause), the more a word is lengthened, the shorter the pause (and the inverse), but that across timing intervals, the more the word is lengthened, the longer the pause. This result indicates that within a sentence a pause occurs to fill in the time left in a timing interval after both word length and word lengthening have been applied.

A study of two varieties of European Portuguese (Frota & Vigário, 2007) investigates the effects of prosodic complexity and length, and syntactic complexity on intonational
phrasing. This study reveals that different language varieties may show different factors which contribute to intonational phrasing. In this study syntactic complexity is measured using the absence or presence of branching in subjects and objects. Prosodic length was measured in syllables and degree of prosodic branching was measured using number of prosodic words. In both varieties spoken in Lisbon (SEP) and Braga (NEP) the intonational phrasing patterns found were (SVO) and (S)(VO). Results differed between SEP and NEP, where prosodic length was a relevant factor in SEP, while the degree of prosodic branching was relevant to NEP intonational phrasing. In NEP, higher degrees of prosodic branching rather than syntactic complexity created the (S)(VO) intonational phrasing pattern. In contrast, SEP favoured the (SVO) pattern, except in the case of a long branching subject (ten syllables long) where the (S)(VO) pattern was attested. These findings reveal subtle language specific differences in the motivation (prosodic length and complexity and syntactic complexity) behind intonational phrasing thereby supporting the need for further language specific research into prosodic phrasing.

Subtle differences between prosodic phrasing in closely related dialects are found in a study of two varieties of Argentinean Spanish (Feldhausen, Gabriel, & Pešková, 2010). Both varieties overwhelmingly favour the (S)(VO) phrasing, as is found in Peninsular Spanish. The (SVO) phrasing, however, was more commonly found in the Buenos Aires variety than the Northern Patagonian variety. The slightly higher amount of (SOV) phrasing found in the Buenos Aires variety reflects the (SOV) prosodic phrasing of Italian, by which it is heavily influenced, while the Northern Patagonian variety on the other hand, favours the (S)(VO) phrasing most typical of Peninsular Spanish. Speech rate was found to be a factor affecting prosodic phrasing with the (SOV) phrasing pattern more commonly found with more rapid speech rates.

A study of Dutch (Wheeldon & Lahiri, 1997) reveals that sentence production latency is affected by the number of phonological words in the upcoming sentence. In contrast, however, a study of read German speech (Kentner, 2007) reveals that pause durations positively correlate with the length of a preceding phrase and not with the length of a
following phrase. These results are in agreement with those of Watson and Gibson (2004) and indicate that speakers do not always complete planning an upcoming utterance before uttering it.

Speech rate is likewise found to be an important factor affecting prosodic phrasing in a study of read Korean speech (Jun, 2003), where results indicate that the accentual phrase comprises fewer syllables at normal rate than at fast rate. Speaking tempo and its effects on prosodic phrasing will be looked at in more detail in Section 5.1 for Dalabon and Kayardild.

The finding that a combination of factors affects prosodic grouping is highlighted by a number of studies whose aim it is to correctly predict the locations of where prosodic breaks will occur in speech. Rules to predict the locations of prosodic breaks and pauses have been devised by a number of researchers (e.g. Bachenko & Fitzpatrick, 1990; Cooper & Paccia-Cooper, 1980; Gee & Grosjean, 1983; Grosjean, et al., 1979; Keller et al., 1993). These prediction schemes are based on varying criteria, such as syntactic complexity and prosodic length, and show varying degrees of success. A study evaluating various prosodic boundary placement prediction theories (D. Watson & E. Gibson, 2004) by Cooper and Paccia-Cooper (1980), Gee and Grosjean (1983), and Ferreira (1988) reveals that multiple factors interact. Watson and Gibson propose their own model, called the Left hand side/Right hand side Boundary hypothesis (LRB), which makes use of two factors: the size of a preceding constituent and the size of a following constituent in phonological words. These studies reveal then that, although syntactic factors play a role in prosodic boundary location and strength, prosodic factors of length and complexity may override syntactic groupings. The study of prosodic units must therefore include a variety of complex factors, where some factors may be more dominant than others.

1.2.4 Discourse structure

In addition to the effects of grammatical and prosodic structure on prosody, research into the role of prosody in speech has revealed a strong interaction between prosody
and discourse structure (e.g. Cruttenden, 1997; Gussenhoven, 2004; Smith, 2004; Swerts & Geluykens, 1994; Swerts, Geluykens, & Terken, 1992), as well as idea or information units (e.g. Chafe, 1980: 13-16; 1994: 164-165; Grimes, 1975; Halliday, 1967, 1970a, 1970b; McGregor, 1990: 363).

Discourse structure has widely been found to affect prosodic phenomena such as pausing and intonation (e.g. Cruttenden, 1997; Gussenhoven, 2004; Smith, 2004; Swerts & Geluykens, 1994). In spoken discourse, pauses and intonation boundaries are often found to directly precede a word of high lexical content (e.g. Cruttenden, 1997) or in connection with words of special importance or newsworthiness (e.g. Ladd, 1996, 2008), at a discourse boundary edge (e.g. Swerts, 1997; Swerts, et al., 1992), or at a topic shift (e.g. Smith, 2004). Furthermore, pausing and intonation are often used to add suspense or drama to spoken discourse.

In a study of Japanese, German and English (Féry & Ishihara, 2010) the effects of syntax and information structure on prosody can be largely separated, with syntax affecting the prosodic phrasing and default pitch scaling, and information structure affecting the f0 of the entire domains of focus and givenness.

In Grosz and Hirschberg’s study (1992) of discourse boundaries, it was found that pitch range and pauses were associated with discourse segment boundaries. In a study of a news and direction-giving corpora (Nakatani, Hirschberg, & Grosz, 1995), discourse segment boundaries were associated with prosodic features of pitch range, amplitude and timing.

In Herman’s study of the phonetic cues associated with discourse structures (Herman, 1998, 2000) f0, rms amplitude⁵, and durational factors were found to mark discourse

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⁵ Root mean square intensity measured in decibels (dB).
structure. Similarly, Swerts et al. (1992) show that larger-scale topical discourse units are marked by intonation and pause duration. Overall, pause durations tend to be longer at discourse boundaries, with major discourse segments or units marked by longer pauses than elsewhere in the discourse (Hirschberg & Nakatani, 1996; Strangert, 1991; Swerts, 1997; Swerts, et al., 1992; Yang, 2004).

Research in Swedish spontaneous narratives (Hansson, 1998) reveals that, in addition to occurring at syntactically motivated positions such as between sentences, pauses occur after discourse markers and conjunctions, and before accented content words. Over half (at 57%) of the analysed sentences are preceded by pauses. Just over a quarter (at 27%) of the pauses appear mainly at clause boundaries, before adverbial phrases and phrases expressing negations, between repeated words (usually a conjunction or the subject of the sentence), and before appositions and lexical hedges or fillers. Pauses preceding sentences and after discourse markers are longer than pauses found before accented content words. This finding may be linked to a speaker’s need to spend more time planning an upcoming sentence rather than their need to search for a word or for discourse prominence-marking purposes.

Likewise, major topic shifts tend to be marked by longer pauses (Brown, Curry, & Kenworthy, 1980; Lehiste, 1979; Passonneau & Litman, 1993; Smith, 2004). A study of topic transitions in the read speech of two American English speakers reveals that pauses located at a topic shift are significantly longer (at 1316 and 1578ms) than those found elsewhere (ranging from 688 to 1070ms) (Smith, 2004). It was also found that final word and final syllable-rhymes are longer at topic shifts than elsewhere revealing a strong interaction between discourse and prosody.

The interaction between discourse and prosody extends to the signalling of discourse finality and continuation. Pierrehumbert and Hirschberg (1990: 304-308) for example claim that high final boundary tones convey whether an IP should be interpreted with respect to a succeeding phrase (i.e. that it is ‘forward-looking’), but that low boundary tones do not convey directionality. A study of Greek TV news speech (Bannert et al.,
2003) shows that thematic segmentation was marked by both intonation and pause, where topic finality was strongly correlated with final lowering of f0 and longer pauses. These findings, however, are based on TV news speech and must be treated with caution as the presentation of news is often found in connection with prosodic exaggeration (e.g. Wennerstrom, 2001). Likewise Brown et al. (1980: 30) claim that high final boundaries indicate that there is more to come on the same topic, while final low boundaries are often associated with the end of topics.

Swerts et al. (1992) find that topic-finality, as measured by clause position, strongly corresponds with final low boundary tones, and topic-continuity strongly corresponds with not-low boundary tones. The few exceptions were found in relation to non-clause-final positions aligning with low boundary tones where, although the message is complete, the final unit is a kind of afterthought providing additional material redundant from an informational viewpoint. A later study of Dutch monologues (Swerts & Geluykens, 1994) reveals the strong correlation of final lowering pitch contours and finality, and final high-ending contours and non-finality. An investigation of f0 maxima and words of high topicality revealed that topic peaks are more prominent than non-topic peaks. In addition, larger levels of information units exhibit declination and pitch resets at their boundaries. Furthermore, pauses were found to occur between all topical units, but not at all clause boundaries. In addition to these structural boundaries, pauses were further found to occur within syntactic units such as between a preposition and a noun. Swerts et al. (Swerts & Geluykens, 1994) also found that all three speakers in the study had the same correlation of pause duration to discourse boundary locations, with the longest pauses found between the largest information units, and the shortest found at non-discourse boundary locations. These findings confirm the connection between prosody and discourse structure, while documenting the possibility of mismatches between syntactic and prosodic constituency.

Similar mismatches between prosody and discourse structure are found in a study of Australian English (Stirling et al., 2001) where pause duration was not found to be a
significant indicator of discourse segment boundaries, although pitch range reset was found to be a reasonable indicator of a new discourse event.

1.2.4.1 Word order

As word order is essentially free in both Dalabon and Kayardild, the ordering of words within a clause reflects pragmatic features of discourse, making the study of the interaction between prosody and ordering of constituents significant. The word order of clauses is relevant to the current study, as the typical prosodic phrasing patterns found within the clause may reflect the ordering of constituents within a clause.

Studies which have investigated the impact of pragmatics on word order in Australian languages include studies of Gooniyandi (McGregor, 1990), Mawng (Hellmuth, Kügler, & Singer, 2007a, 2007b; Singer, 2005) and Pitjantjatjara (Rose, 2001). Other studies which explore word order from a syntactic viewpoint have looked at Pitjantjatjara (Bowe, 1990), Wanyi (Laughren, Pensalfini, & Mylne, 2005) and Warlpiri (Hale, 1983; Laughren, 2002; Legate, 2002, 2007; Simpson, 1991, 2007).

The word order of many Australian languages has been widely found to be very flexible (e.g. Austin & Bresnan, 1996; Blake, 1983; Hale, 1992) and has been found to reflect pragmatic features of discourse, with a general tendency for core argument NPs to precede rather than follow the verb. This ties in with the finding that the initial position is often connected to ‘topic’, ‘focus’, ‘prominence’, ‘new information’ or ‘left-dislocation’, while the final position is connected to ‘afterthought’, ‘antitopic’ or ‘right-dislocation’ (e.g. B. Baker & Mushin, 2008; Bowe, 1990; Donaldson, 1980; Evans, 1995a; Heath, 1984; Mushin, 2005; Simpson, 2007; Simpson & Mushin, 2008). Mithun refers to this pragmatic tendency as the ‘newsworthiness principle’, where an element in the discourse may be considered newsworthy where it represents significant new information, where it introduces a new topic, or where it makes a significant contrast (1987: 39). Hale builds on this tendency describing these word ordering principles as the expression in focus preceding the predicate, and the expression out of focus following the predicate or being elided altogether (1992).
In a study of four dependent-marking languages, Warlpiri, Jiwarli, Nyangumarta and Garrwa (Mushin, 2006; Simpson & Mushin, 2008), NPs are found to occur in clause-initial position, when they are prominent in the discourse, where prominence, in this context, does not necessarily imply that the information in the NPs is new to the discourse. Discourse prominence may be analysed as one feature of the categories of both focus and topic (following e.g. H.-W. Choi, 1999; Meakins & O’Shannessy, 2010; Simpson & Mushin, 2008) and refers to the relative importance of information in the discourse. Discourse prominence relates to how a speaker ranks information in the discourse and attributes significance to certain pieces of information, which may be new or old. Discourse prominence is therefore not equivalent to focus which presents new information (which may be either prominent or non-prominent) or topic which presents given information (which also may be prominent or non-prominent).

The discourse salience of initial position is further supported by a common topicalisation construction found in Warlpiri. This construction comprises a topic constituent which appears to the left of, and intonationally separated from, the clause which it relates to (Simpson, 2007: 408). An earlier study of Warlpiri shows that elements found in clause-initial position are discourse prominent. AV (agent verb) order occurs two times more often than VA (verb agent) order (Swartz, 1991: 56, 62) revealing that nominals are given prominence in a clause more often than they are not. Likewise, in Ngiyambaa initial position is noted for its discourse salience, while there is also a tendency for argument NPs to precede rather than follow the verb (Donaldson, 1980: 236). Prominent elements in Gurindji discourse are likewise fronted (Meakins & O’Shannessy, 2010). Similarly, clause initial position in Jiwarli is found to be a pragmatically important position where new topics or significant information are introduced, where information is reintroduced, as well as where contrast is made (Austin, 2001). Subjects typically precede verbs in intransitive clauses, while agents typically precede verbs as well as being found clause initially. In Bininj Gun-wok, there is a clear tendency to place episode-initial and contrastive material before the verb, and non-episode-initial new material after the verb (Evans, 2003a: 549). In Bininj Gun-wok (Evans, 2003a: 549) core argument NPs typically precede rather than follow the
verb in transitive clauses. New paragraphs commonly contain core argument NPs before the verb (Evans, 2003a: 551). Similarly a new argument mention tends to occur pre-verbally, as do contrastive mentions of arguments. In contrast, an established referent typically occurs in post-verbal position, where this includes the afterthought NPs (Evans, 2003a: 553). Other material which tends to occur in post-verbal position includes adjuncts, which for example denote location or instrument, as do argument NPs in presentative, existential and thetic constructions. In Jaminjung the left periphery of clauses tends to be associated with discourse new topics, which may be separated from the rest of the clause by a pause (Simard, 2010: 252).

Prosodically dislocated nominals found in clause-final position in Australian languages are typically ascribed the function of clarifying, repeating and adding extra information to the discourse. These are often considered to be afterthought-like constructions. Ngandi displays afterthought constructions where the afterthought NP tends not to occur in the same IP as the predicate (Mithun, 1987). Mithun claims these constructions used to clarify or repeat a referent are examples of the one-idea-at-a-time tendency found in Ngandi. In Bininj Gun-wok, the afterthought type clause-final NPs (Evans, 2003a: 548) may serve the function of adding extra information about an argument, though these NPs may be subjects or verbs, however, due to the difficulties of assigning core arguments to a clause as morphosyntactic dependencies are lacking, it can be difficult to ascertain. These afterthought NPs are also sometimes used to identify the antecedent NP in subordinate clauses (Evans, 2003a: 630). Afterthought-like constructions are likewise found in Wanyi (Laughren, et al., 2005: 369) where they serve to add extra material to the clause such as clarifying a referent. In Ngiyambaa afterthought constructions are separated from the predicate by IP boundaries and pauses (Donaldson, 1980: 44). Right dislocated constructions in Light Warlpiri and Gurindji Kriol function as an afterthought or repair device, and can be used to repair a broken topic chain. These constructions may also be used to highlight accessible topics. Generally the post-verbal referent is the clause topic and is known from prior discourse (Meakins & O'Shannessy, 2010). Post-verbal prosodically dislocated nominals in Pitjantjatjara are often preceded by a pause and are given their own
separate IP, in addition to the preceding verbal phrase typically having clause final intonation (Bowe, 1990: 128). These instances are also characterised by the preceding phrase’s ability to comprise a grammatical sentence, though with some ellipsis of nominal arguments. Post-verbal NPs act to further specify or elaborate on an already mentioned referent and are used for pragmatic purposes in oral narratives. For these reasons Bowe argues that these instances may be better analysed syntactically as extra-sentential fragments. Furthermore, speakers claim that these instances are cases where the NP had been ‘forgotten’ in the first part of the sentence (Bowe, 1990: 128).

Ellipsis of nominal arguments is a common feature of Australian languages. In a study of Pitjantjatjara (Bowe, 1990) a very high amount of clauses at 67% contain a verb only and no core argument NPs, as ellipsis of nouns is very common. In a study of Bardi (Bowern, 2008), ellipsis of NP arguments is common with 47.4% of clauses containing no NP arguments. Similarly, in Swartz’s study of oral Warlpiri narratives 47% of clauses were verb only (1991). Austin finds ellipsis of nominal arguments in JIwarli a frequent occurrence, with clauses commonly containing just a verb, or a verb and just one argument nominal (2001). Evans states that in Bininj Gun-wok the most common clause pattern, with 54%, is for clauses to lack an overt nominal, instead relying on pronominal prefixes on the verb (Evans, 2003a). Likewise Garde (2008) states that ellipsis in Bininj Gun-wok conversation is very common. NP arguments are also commonly elided in Ngiyambaa discourse (Donaldson, 1980). Findings such as these suggest that the very presence of NP arguments indicate that their status is marked in the discourse (e.g. Bowern, 2008; Mushin, 2005; Swartz, 1988).

### 1.2.4.2 Prosodically dislocated nominals

In Australian languages, it has been found that NPs located at the periphery of their clause are often given their own IP separated from the clause by both IP boundaries and pauses (e.g. Croft, 2007; Heath, 1984; Mithun, 1987). As discussed in Section 3.3.2, such NPs may further be difficult to identify as belonging to a preceding or following clause (e.g. Croft, 2007; Heath, 1984), where case marking is absent or ambiguous and may even be considered to be syntactically independent constituents. Prosodic
dislocation of nominals in discourse is found universally where these ‘constructions, can be identified in most, if not all, languages of the world, independently of language type and genetic affiliation’ (Lambrecht, 2001: 1051). In the present study such examples are referred to as prosodically dislocated nominals (to be examined in detail in Section 6.1). This term has been chosen to avoid making any claims regarding the status of the nominals as being syntactically independent constituents or belonging to a clause. As such the term makes reference only to the fact that these nominals in question are given their own IP and further separated from surrounding material by pause. Such nominals have been referred to in the literature as ‘loose nouns’ (Heath, 1984) ‘lone NPs’ (Croft, 1995, 2007), and ‘satellite nominals’ (Cutfield, in prep.; Evans, 2003a). As discussed in Section 6.1 prosodically dislocated nominals may be found clause initially where they tend to signal a pragmatically important position. Alternatively these dislocated nominals may be found clause finally. These clause-final prosodically dislocated NPs have been widely found in Australian languages where they serve to emphasise or elaborate on an already established referent, or where they tend to act as afterthought-like comments to the discourse.

Prosodically dislocated nominals in Australian languages may be difficult to correctly analyse as belonging to a particular clause or grammatical unit over another (due to free word order), and they are often analysed as independent constituents. In Wardaman (Croft, 2007), for example, prosodically dislocated nominals are realised as a separate tone unit (or what is referred to as an IP in this thesis), prosodically separated from other constituents with which they form semantically coherent units. Although Croft states that it is not possible to assume that a noun phrase does not belong to either of the clauses it occurs between due to a lack of context, he finds that one fifth of all lone noun phrases are grammatically ambiguous. Of these grammatically ambiguous cases approximately half are prosodically closer to one neighbouring verb than the other (2007: 33). Likewise, NPs in Nunggubuyu are not always readily identified as belonging to one particular predicate over another (Heath, 1984). Pause cannot be used as an indication of which predicate these NPs belong to, as pauses may occur between apposed nouns as well as between co-referential nouns
and adjectives (Heath, 1984: 500). These issues are generally irrelevant to Dalabon and Kayardild, however, as case-marking, context and prosodic phrasing provides sufficient information regarding the assignment of nominals to a clause. See Section 3.3.2 for further discussion.

As discussed in Section 1.2.4.1, the tendency for core argument NPs to precede rather than follow the verb is reflected in a number of studies of Australian languages, where clause-initial position is often connected to discourse prominence. Prosodically dislocated nominals found in clause-initial position are therefore prominent in the discourse, and are found in a wide range of Australian languages including Warlpiri (Simpson, 2007: 408), Gurindji Kriol (Meakins & O’Shannessy, 2010), Pitjantjatjara (Bowe, 1990), Garrwa (Mushin, 2005). In Pitjantjatjara the intonational phrasing of clause-initial NPs may alter interpretations of the clause slightly; a prosodic break separating a clause-initial NP from its predicate results in a topic comment reading, while a single IP is read as a definite interpretation (Bowe, 1990: 50). In Wanyi, these ‘extraposed’ NPs are analysed as left-dislocated topic phrases (Laughren, et al., 2005: 375), while in Garrwa left detached nominal constituents (which are separated from the rest of the clause by a pause) are analysed as syntactically external to the core clause (Mushin, 2005: 259).

Prosodically dislocated nominals in clause-final position are commonly found in Australian languages, where they typically act to clarify, repeat and add extra information to the discourse, as discussed above in Section 1.2.4.1. They may further act as a repair device and can be used to repair a broken topic chain. These clause-final nominals may be considered afterthought-like constructions and are found in a range of Australian languages including Ngandi (Mithun, 1987), Bininj Gun-wok (Evans, 2003a: 548), Wanyi (Laughren, et al., 2005: 369), Ngiyambaa (Donaldson, 1980: 44), Light Warlpiri and Gurindji Kriol (Meakins & O’Shannessy, 2010), and Pitjantjatjara (Bowe, 1990: 128).
The prosodic dislocation of nominals has furthermore been observed in a range of other unrelated languages including Japanese, for example, which employs post-verbal nominals as afterthoughts (Kuno, 1978). Seneca, an American Indian language, is another language which displays post verbal NPs separated from a grammatically coherent unit by a pause (Chafe, 1976: 53). Although a subject first language, Seneca may employ this ‘anti-topic’ or afterthought construction. In Mithun’s study of Cayuga and Coos, afterthought constructions are encountered, where they generally do not occur in the same IP as their predicate (1987: 49). These constructions serve to repeat or clarify the identity of a referent. Likewise in English where a clause contains one or more arguments, the final argument gets its own IP (Croft, 1995: 863). The functions of these prosodically dislocated NPs are identical to those found in Australian languages discussed above. In English, for example Croft finds that independent lone NPs, in pre- and post-verbal position, perform four specific discourse functions: topic, presentative, elaboration, as well as summarisation (Croft, 1995: 847). See also Tao (1992) for similar discourse functions of prosodically dislocated nominals. A detailed analysis of prosodically dislocated nominals is given in Section 6.1.

1.2.5 Summary

The above studies reveal that a combination of factors affects the location and strength of prosodic boundaries marked by intonation and pause where syntactic, prosodic, and discourse factors all contribute to the patterning of prosodic boundaries. Stronger syntactic (e.g. a clause boundary is stronger than a word boundary found within a clause), prosodic (e.g. an IP boundary is stronger than a phonological phrase boundary) and discourse structural boundaries are marked by stronger phonetic cues (where strength may refer to the number of phonetic cues present, as well as the degree of these phonetic cues – i.e. a longer pause duration is considered a stronger cue than a short pause duration). These findings have motivated the current study which aims to investigate how these different factors affect prosodic phrasing in two typologically diverse Australian languages. The study of two diverse languages will
allow for comparisons of the interaction between prosody and linguistic structure, and further allow for statements regarding the universality of prosodic constituency.

1.3 Aims

In view of the previous discussion concerning the interaction between prosody and grammatical structure, three main questions will be addressed in this dissertation:

The first question will investigate the strength of the relationship between the clause and prosodic constituency. The prosodic factors found at the boundaries of clauses and within clauses will be investigated. It is hypothesised that intonational boundaries and pauses will be more commonly found at a clause boundary than within, and furthermore, that pauses found at clause boundaries will be longer than those found elsewhere. This is in line with a substantial amount of cross-linguistic research (Fant, Kruckenberg, & Ferreira, 2003; Iwasaki, 1996; Iwasaki & Tao, 1993; Izre’el, 2005; Matsumoto, 2003; Park, 2002; Schuetze-Coburn, 1994; Tao, 1996; Wouk, 2008). It is hypothesised that the prosodic marking of clause boundaries will behave similarly in both Dalabon and Kayardild despite the language differences, with clause boundaries more clearly marked by intonation and pausing than elsewhere within the clause. It is hypothesised that within the clause constituent there may be some differences between how Dalabon and Kayardild employ prosodic phrasing, due to the grammatical structures of the languages.

The second question will investigate the extent to which grammatical complexity is reflected in prosodic constituency. This will be achieved by for example examining whether prosodic breaks act to divide grammatically complex units. This question will be investigated to compare findings with previous research, which has largely shown that grammatically complex constituents tend to be broken over several prosodic constituents (Cooper & Paccia-Cooper, 1980; Croft, 1995; Grosjean, et al., 1979; Strangert, 1997), as well as there often being a maximum and average size of a grammatical constituent (Croft, 1995). It is hypothesised that intonational boundaries will divide extremely grammatically complex constituents, though typically only at
word boundaries and not within a word. It is further hypothesised that different grammatical structures will impact strongly on IP boundaries as well as pause placement and duration. It is hypothesised that longer ‘projections’ of syntactic structure, such as that found in Kayardild and discussed above, will produce longer pauses between syntactic units due to the need for speaker planning as well as listener comprehension. Likewise, it is hypothesised that the shorter ‘projections’ of syntactic structure found in Dalabon where syntactic dependencies between units are quite weak will not necessarily warrant the need for longer pauses for speaker planning or listener comprehension purposes.

The third question to be investigated is whether prosodic length (measured in duration) will impact on prosodic constituency, and whether prosodic breaks will be found to divide prosodically long or complex units. It is hypothesised that Dalabon and Kayardild will behave similarly in regard to these questions. It is hypothesised that prosodically long and/or complex units will be more likely to be divided by prosodic breaks, in line with previous research (Krivokapić, 2007b). It is hypothesised that stronger prosodic boundaries will correlate with longer and/or more complex prosodic constituents (where prosodically complex refers to prosodic structure consisting of more than a single lower level prosodic structure, e.g. a prosodically complex IP comprises two or more intermediate phrases), as has been found in previous literature (Krivokapić, 2007b). Further the types of boundary tones in relation to their adjacent pauses as well as their syntactic position will be investigated, as previous findings reveal that strong syntactic boundaries are prosodically marked by both pitch pattern and pausing (Croft, 2001).

A key source of motivation for the present study is to examine how prosodic structure is used to group and separate grammatical constituents, and which factors (be they grammatical, semantic or discourse related) play a role in prosodic phrasing. It is hypothesised that prosodic phrasing can be used both to segment grammatically complex units into smaller units as well as to indicate the semantic integration of events using grammatical constituents such as the clause. It is hypothesised that
prosodic structure is somewhat independent from grammatical structure despite the general tendency for these structures to align, in accordance with a range of research (Ladd, 2008; Nespor & Vogel, 1986; Selkirk, 1978).

Intonation tune types will be examined in relation to grammatical constituents in order to investigate for any correlations between prosodic and grammatical constituents. Specifically, it is hypothesised that final low boundary tones will occur more often clause-finally, while final high boundary tones will occur more often in clause-medial position, which is in line with previous research (which shows that finality of utterance is often marked by falling pitch contours, while incompleteness is often marked by high or rising pitch contours (e.g. Brown, et al., 1980; Pierrehumbert & Hirschberg, 1990)). Intonational differences will further be explored between clause types (e.g. main versus subordinate clauses), as well as between nominals with varying functions within the clause, in order to identify any relationship between prosodic and grammatical structures.
Chapter 2. Language overview

2.1 Dalabon

Dalabon is an agglutinating, head-marking polysynthetic, prefixing and suffixing language. It is a severely endangered language from Southwest Arnhem Land, spoken by fewer than ten people. Approximately half of these are fluent speakers of a mature age while several younger people are semi-speakers or have a passive knowledge of Dalabon. Today the speakers of Dalabon live in several dispersed locations throughout Arnhem Land such as Barunga, Wugularr (Beswick), Manyallaluk (Eva Valley), as well as Katherine in the south and Bulman, Weemol Jabiru, Kunbarllanjnja (Oenpelli), and Maningrida further north.

2.1.1 Language family

Dalabon belongs to the Gunwinyguan family which is non-Pama-Nyungan (Evans & Merlan, 2003).

![Figure 2-1 Proto Gunwinyguan language family adapted from Evans (2003a)]
2.1.2 Previous work

A dictionary of the language has been published (Evans, Merlan, & Tukumba, 2004), but a comprehensive grammar is lacking. Previous work on Dalabon includes sketch grammars (Capell, 1962; West, 1964), some studies of the pronominal prefix system (Alpher, 1982; Evans, Brown, & Corbett, 2001), an examination of subordination strategies (Evans, 2006), a study of verb conjugations (Evans & Merlan, 2003), some studies of the demonstratives (Cutfield, 2005a, 2005c, in prep.), a survey of pointing gestures (Cutfield, 2005b), and a study of semantic aspects (Ponsonnet, 2008). Studies related to the phonetics and prosody of Dalabon include an initial sketch of some phonological aspects (Sandefur & Jentian, 1977), work on the status of the phonological word (Evans, et al., 2008; Fletcher, Evans, & Ross, 2004, 2005; Ross, 2003), as well as studies of intonation and prosody (Fletcher, 2007, in press; Fletcher & Evans, 2002).

2.1.3 Phoneme inventory

The phoneme inventory of Dalabon is quite typical of Australian languages with a small vowel inventory and a range of places of articulation for the consonant inventory. Short and long consonants contrast phonemically. See Table 2-1 for the vowel inventory and Table 2-2 for the consonant inventory. Orthographic spelling conventions are given in brackets. The sixth high central vowel was not present in an earlier account of Dalabon (Sandefur & Jentian, 1977), but has since been recognised in later accounts (Alpher, 1982; Capell, 1962; Evans, et al., 2004). These will be used throughout the current dissertation in language examples given.

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i (i)</td>
<td>ü (û)</td>
<td>u (u)</td>
</tr>
<tr>
<td>Mid</td>
<td>e (e)</td>
<td></td>
<td>o (o)</td>
</tr>
<tr>
<td>Low</td>
<td>a (a)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2-1 Dalabon vowel phoneme inventory (adapted from Evans, et al., 2008)
Table 2-2 Dalabon consonant phoneme inventory (adapted from Evans, et al., 2008)

<table>
<thead>
<tr>
<th>Manner of articulation</th>
<th>Place of articulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bilabial</td>
</tr>
<tr>
<td>Stop</td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td>p (b)</td>
</tr>
<tr>
<td>Long</td>
<td>p: (bb)</td>
</tr>
<tr>
<td>Nasal</td>
<td>m (m)</td>
</tr>
<tr>
<td>Rhotic</td>
<td>r (rr)</td>
</tr>
<tr>
<td>Lateral</td>
<td>l (l)</td>
</tr>
<tr>
<td>Semivowel</td>
<td>w (w)</td>
</tr>
</tbody>
</table>

Phonotactically, all syllables have structure C₁ V (C₂) (C₃) (h), where C₁ must have lower sonority than C₂. Generally stops are voiced in onset position and voiceless in coda position. Long stops are only found stem-internally.

2.1.4 The verbal word in Dalabon

As Dalabon is a highly polysynthetic language and as grammatical structure is central to this study, a discussion of the verbal word will be given here. Verbal words in Dalabon may be complex, encoding subject, object, TAM, and sequential markers, as well as incorporating adverbials and nominals (e.g. Evans, et al., 2008). The possible complexity of verbal words enables these to be quite long. The template for the verbal word in Dalabon is shown in Table 2-3.
Table 2-3 Template structure of the verbal word in Dalabon

The darker shaded slots in Table 2-3 represent units which may potentially be fused together, and optional slots are shown in brackets. Object pronominal encoding in Dalabon presents a variety of complexities with three basic possibilities: a) the subject/object combination may be represented by a special portmanteau form, b) the object pronominal may be realised as a free pronoun positioned to the left of the subject pronominal, or c) the object pronominal may be realised as a reduced form of the object pronoun which may merge with the subject pronominal (Evans, et al., 2001; Evans, et al., 2008).

Within the verbal word, other slots may be filled by incorporated nominals and adjectives. A verbal word with all of the slots filled is, however, uncommon. An intransitive verbal word minimally consists of the verb root, the TAM, and the subject pronominal. A transitive verbal word minimally consists of the verb root, the TAM, and the subject/object pronominal. A transitive verbal word with noun incorporation and reduplication is shown in 2-1).

2-1) ka-h-njerrh-ngorr-ngorrka-ninj ...
    3/3lo-R-body-REDUP-carry.on.shoulder-PI
    ‘He was carrying the animals on his shoulder.’ (JC 1:18)

The verbal word in Dalabon generally comprises its own prosodic constituent, though exceptions are found. Where a complex word is segmented, the sequence containing the pronominal prefix, sequential, causal and status markers must never be separated.
Likewise, the sequence containing the comitative applicative marker, the root, the reflexive/reciprocal and TAM markers must never be separated (Evans, et al., 2008; Ross, 2003) as demonstrated in 2-2) where the pronominal prefix and the realis status marker are separated from the remaining verbal word by an intonational break. This suggests that Dalabon speakers segment sequences of words within the verbal word in a structured manner.

2-2) openingdays ka-h / wayirningi-nj djeya na ...
opening.days 3SG-R sing-PP there now
‘He’d sing there at opening ceremonies.’ (JW 7:19)

2.1.5 The clause

Due to the importance of grammatical structure to this study an overview of the clause in Dalabon will be given here, while a fuller description will be given in Section 3.3.2. Dalabon makes use of main, subordinate, and verbless clauses. Word order is free and the syntactic dependency relations between a head and its modifiers are typically difficult to establish owing to the minimal morphological marking found on nominals. Typically, context and prosodic phrasing allows for straightforward identification of the relations between a head and its modifiers. Issues regarding the assignment of clause boundaries are discussed in detail in Section 3.3.2.

In Dalabon, subjects and objects are encoded on the verb, while object pronominals are also sometimes realised as a free pronominal directly preceding the verbal word. A clause in Dalabon therefore minimally comprises a verbal word, as the predicate and its core arguments are encoded on the verb. 2-3) shows a clause in Dalabon where the predicate and its core argument is found on the final verbal word. The first three adverbs are adjuncts of the clause as they are not arguments selected by the predicate and could be omitted without affecting the grammaticality of the clause.

2-3) kenbo yelek djarra nga-dja-ning-yan ...
then slowly here 1SG-just-sit.down-FUT
‘Bye and bye, but I’ll stop here for a while first.’ (JW 5:28)
However, overt noun phrases may precede or follow the verbal word, and elaborate or modify its meaning, sometimes in conjunction with an afterthought-like mention. These NPs do not always directly or obviously belong to the following or preceding clause, and examples of this found in the corpus have therefore been classified as such to indicate their status as potentially syntactically independent.

A clause in Dalabon often comprises a verbal word with the predicate and its core arguments encoded on the verb as shown in 2-4) and 2-1) above.

2-4)  
\[buka-ing-kah-ka-ng \ldots\]
\[3>3hi-then-REDUP-take-PP\]
‘Then he took him’ (JC 2:0)

The clause in Dalabon is a potentially problematic constituent to identify given that all of the obligatory material is given in the verbal word (as outlined above) and optional nominal elements show minimal morphological marking which is mainly limited to possessive markers and the feminine kin suffix. Where optional material is given (such as overt specified nominals) it may be difficult to determine whether the optional elements belong to the previous or the following clause, or alternatively neither. A situation where the nominal may or may not belong to the previous or following clause is given in 2-5). Here the nominal \(djidirowk\) meaning ‘water-filled hump on a paperbark tree’ may belong to either the first or the last clause, or possibly neither. Case morphology is lacking and cannot assist in determining clause boundaries. Generally, however, context and prosodic phrasing assist in identifying clause boundaries in Dalabon, as discussed in detail in Section 3.3.2. In the few cases where context and prosodic phrasing cannot assist in clause boundary assignment, such as below in 2-5), the nominal is labelled independent of a clause.

2-5)  
\[bah \quad wah \quad yila-h-dja-kolhngun-inj \ldots\]
\[but \quad water \quad 1PL>3SG-R-just-drink-PI\]
‘But we would still drink water.’
djidjirdowk ...
water-filled hump on a paperbark tree

dulh-kah yala-h-bon-inj yila-h-bardm-inj /
tree-LOC 1PL-R-go-PI 1PL-R-chop-PI

‘We would go to the tree and chop it.’ (MT 4:12)

A range of different subordination strategies exists in Dalabon, including the use of special prefix forms on the verb, verb incorporation, and the use of case suffixes (Evans, 2006). These have all been given the subordinate label. The pronominal prefixes which mark subordination status of verbs are the subordinate, apprehensive, and purposive forms. In the Dalabon corpus, the use of subordinate pronominal forms is the most common type of subordination strategy. An example of a clause with a subordinate pronominal prefix is shown in 2-6).

2-6) nga-ye-wurdurd-ni-nj nah-ngan bulu-ngan
1SG-SUB child-be-PI mother-my father-my

bûrra-h-ka-ng Djawonj ...
3PL>1SG-R-take-PP Djawonj

‘When I was a child, my mother and father took me to Jawoyn (country).’ (MT 1:39)

Verb incorporation, which involves the embedding of an untensed form of a verb inside the tensed form of another (Evans, 2006), is very rarely encountered in the Dalabon corpus. Apprehensive forms do not require their clauses to be subordinate, though they are typically found in subordinate clauses, as they signal an undesirable possibility generally found in connection with a main clause explaining the reasons for the preventative course of action. The apprehensive forms can also stand alone when used as a ‘warning’ clause. Purposive forms are used to signal a purpose or consequence of the main clause action.

The verb prefix -buh ‘because’ indicates interclausal relations and is used to signal the subordinate status of a clause. The case suffixes employed in Dalabon to signal subordination are the locative -kah, the genitive/purposive -kûn, the temporal suffix -
kûno, the ergative/instrumental -yi(h), and the ablative -walûng. 2-7) shows an instance of a non-verbal predicate appearing in connection with a subordinating case suffix and is therefore classified as a subordinate clause. Here the adjectival predicate ngirringirrmi is followed by the ergative case suffix -yi.

2-7) ka-h-ngirringirrmi-yi ka-h-yenjdjung ...
3SG-R-white-ERG 3SG-R-talkPRS
‘That white-skinned one can talk.’ (AB 2:56)

2-8) shows an example of the temporal case suffix used as a subordination strategy.

2-8) ka-h-yu-rr-inj ... mudda ka-h-yinhyin-inj-kûno ...
3SG-R-lay.oneself-RR-PI sun 3SG-R-do-PI-TEMP
‘He stretched himself out, when the sun was about like that.’ (JW 2:39)

An example of a clause using the purposive suffix as a subordination strategy is shown in 2-9).

2-9) ngale ... nga-h-yongiyan djarra ...
yeah 1SG-R-lieFUT here
kunborrk ... nga-h-miyan-kûn ...
kunborrk.dance 1SG-R-getFUT-PURP
‘Hey, I’ll sleep the night there, so I can get the corroboree music.’ (JW 2:27)

Finally, subordination may be marked using a nominalised form of the verb which does not contain a pronominal prefix (Evans, 2006). The range of syntactic strategies available to indicate subordination status in Dalabon is infrequently used in the corpus (to be discussed in Section 5.2.3). Instead the use of prosody to mark cohesion of events will be examined, where it will be demonstrated that prosody may also be used as a means of signalling temporal co-occurrence.

Nominalised verb forms have not been encountered in the Dalabon corpus used in the present study. In Dalabon, verbless clauses comprise nominal or adjectival predicates
which are typically not inflected for TAM, and a pronominal prefix is found on the predicate. Verbless clauses in both Dalabon and Kayardild generally resemble copula constructions found in a range of languages and often encode identity, group membership, existence, location and possession (Curnow, 1999). Schultze-Berndt (2000) subdivides verbless clauses into three major types: 1) equative clauses which assert or negate the identity of referents (such as ‘She (is) your mother’), 2) ascriptive clauses which characterise the referent (such as ‘it (is) no good’), and 3) existential clauses which highlight the existence of an entity, which is often a particular location (such as ‘there (is) a dog’).

The definition of the clause, the different clause types found, and the difficulties in defining clause boundaries in both Dalabon and Kayardild will be discussed in detail in Section 3.3.2.

2.1.6 Intonation

The phonetic and phonological cues often cited to determine prosodic domains are generally absent in Dalabon as morphemes are assembled with no changes. There are no morphophonemic processes such as vowel harmony, assimilation or dissimilation which can be used to determine prosodically defined units. The only phonotactic clue to morpheme boundaries is that long stops and the trilled /r/ may only occur word-internally. Stress assignment likewise does not assist in determining the boundaries of prosodic units. The few fast speech assimilations that are found occur in larger domains such as the IP as defined by pause and rhythm.

Likewise in closely related Bininj Gun-wok, there are few cues in the segmental phonology to identifying prosodic domains (Bishop & Fletcher, 2005: 339) as the main prosodic domain cues are tonal and durational. In Bininj Gun-wok the relevant prosodic domains are the foot, the phonological phrase, the IP, and the utterance.

Earlier work on the prosodic constituency of Dalabon (e.g. Evans, et al., 2008; Ross, 2003) suggests that Dalabon has two levels of intonational constituency (Fletcher, in
press; Fletcher, et al., 2004); the accentual phrase and the IP. The prosodic hierarchy in Dalabon is shown in Figure 2-2.

![Diagram of prosodic hierarchy in Dalabon](image)

**Figure 2-2 The prosodic hierarchy in Dalabon proposed by Fletcher (in press)**

The accentual phrase is characterised by a pitch accent or prominence as well as a phrase tone at the rightmost edge. In addition a pitch reset is found on the following word. Accentual phrases show falling or rising contours at the right edge (Fletcher, in press; Ross, 2003). An IP is characterised by a boundary tone at the right-most edge, final lengthening of the final syllables, as well as an optional pause. A large degree of overlap is found between the prosodic word, the accentual phrase and the IP.

The syllables aligning with major pitch targets in IPs show slight durational lengthening and higher rms amplitudes than surrounding unaccented syllables. As these syllables generally occur at IP boundaries (both left and right), this indicates that intonation largely serves a delimitative role in Dalabon (Fletcher & Evans, 2002). The IP will be described further in Section 3.3.5.

Studies of the intonation of Dalabon reveal a limited range of intonational tunes (Fletcher, 2007, in press), with the typical ‘hat-pattern’ the most commonly occurring. The second most common contour is the high plateau tune. Also found are the fall-rising and high-rising tunes. The ‘hat pattern’ IP in Dalabon generally (Fletcher, in press; Ross, 2003) consists of one, two and occasionally three peaks. IPs typically show an initial rise to the first peak at the left edge, and a final fall following the final peak at
the right edge. This pattern has been attested in the closely related Bininj Gun-wok (Fletcher & Evans, 2000).

The boundary tones of Dalabon used in the current analysis will be discussed in detail in Section 3.3.5.3.1.

2.2 Kayardild

Kayardild is a dependent-marking, agglutinating, suffixing language. Traditionally Kayardild was spoken on the Southern Wellesley Islands off the north coast of Australia. Today it is a severely endangered language spoken by fewer than ten people on Bentinck Island and some surrounding islands. In its traditional form, it is spoken by one speaker in her mid-eighties, while a variety similar to the traditional language is spoken with varying degrees of fluency by several younger speakers, all women around sixty years of age (Round, 2009). See Evans (1995a: 8-50) for a more detailed description of the linguistic situation of Kayardild.

2.2.1 Language family

Kayardild belongs to the Tangkic family which is non-Pama-Nyungan and is the only Tangkic language still spoken today. See Figure 2-3 for an overview of the Tangkic language family tree.
2.2.2 Previous work

A comprehensive grammar (Evans, 1985, 1995a), and dictionary (Evans, 1992) of Kayardild exists. Other work includes studies of the case system (Evans, 1995b, 2003b; Evans & Nordlinger, 2004; Nordlinger, 1998; Sadler & Nordlinger, 2006), lexical semantics (Evans, 1994), odd topic marking (Evans, 1988), and work on the intonation (Fletcher, et al., 2002; Round, 2009, 2010) and phonetics (Fletcher & Butcher, 2003), including segment duration (Round, 2002). Earlier work on Kayardild includes Tindale’s field journals (1960, 1963) and Hale’s field notes (1960a, 1960b).

2.2.3 Phoneme inventory

As in Dalabon, the vowel and consonant phoneme inventories of Kayardild are quite typical of Australian languages with a small vowel inventory and a range of places of articulation for the consonant inventory. In Kayardild, short and long vowels contrast phonemically. See Table 2-4 for the vowel inventory and Table 2-5 for the consonant inventory. Orthographic spelling conventions are given in brackets.
Kayardild has three syllable types. The first syllable type is open with the structure $C_1 V_1$, where $V_1$ may be any vowel long or short. The second type includes closed syllables with the structure $C_1 V_2 (C_2) C_3$, where $V_2$ is any short vowel, $C_3$ is any consonant, and $C_2$ is a liquid provided that $C_3$ is a peripheral nasal. The third syllable type has the structure $C_1 V_3 C_4$, where $V_3$ is a long vowel and $C_4$ is typically a non-peripheral nasal (Evans, 1995a: 66-67).

Prosodic truncation of word-final /a/ is found before a planned pause at the end of an IP (Evans, 1995a: 63).

### Table 2-4 Kayardild vowel phoneme inventory (adapted from Evans, 1995a)

<table>
<thead>
<tr>
<th>Place of articulation</th>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td>i (i)</td>
<td>u (u)</td>
<td></td>
</tr>
<tr>
<td>Long</td>
<td>i: (ii)</td>
<td>u: (uu)</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>a (a)</td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long</td>
<td>a: (aa)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2-5 Kayardild consonant phoneme inventory (adapted from Evans, 1995a)

<table>
<thead>
<tr>
<th>Place of articulation</th>
<th>Bilabial</th>
<th>Apico-alveolar</th>
<th>Apico-postalveolar</th>
<th>Lamino-dental</th>
<th>Lamino-palatal</th>
<th>Velar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop</td>
<td>p (b)</td>
<td>t (d)</td>
<td>ʈ (rd)</td>
<td>ʈ (th)</td>
<td>ʈ (j)</td>
<td>k (k)</td>
</tr>
<tr>
<td>Nasal</td>
<td>m (m)</td>
<td>n (n)</td>
<td>ɳ (rn)</td>
<td>ɳ (nh)</td>
<td>ɳ (ny)</td>
<td>ɳ (ng)</td>
</tr>
<tr>
<td>Rhotic</td>
<td>r (rr)</td>
<td></td>
<td>ɬ (r)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral</td>
<td>l (l)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semivowel</td>
<td>w (w)</td>
<td></td>
<td></td>
<td></td>
<td>j (y)</td>
<td></td>
</tr>
</tbody>
</table>
2.2.4 Case marking in Kayardild

As grammatical structure is a core element of this study, an overview will be given of the rich case marking in Kayardild, one of its most interesting features. The syntactic dependency range of Kayardild is quite large compared to a polysynthetic language such as Dalabon. As stated above, the syntactic dependency range of Kayardild is quite large as case marking demonstrates the syntactic relationships between constituents and spans the entire range of main and subordinate clauses. By this it is meant that the case marking found on a noun may convey several different types of syntactic relationships, where the different cases may be sorted according to the syntactic level at which they occur (Evans, 1995a: 103). The case marking system of nouns is highly complex, as a case may refer to the constituent of the N itself, and/or the higher NP and/or the higher clause and/or the main clause. A noun may then collect up to four different levels of case marking (resulting in case stacking), where each signals different levels of syntactic relationships. Adnominal and relational cases are marked over entire NPs, with adnominal case marking embedded NPs and relational case marking NPs at the clause level. Complementizing case is marked over all words in a complement clause including the verb. Modal case is basically found on all NPs except the subject and certain other NPs outside the VP. Associating case marks all NPs in the VP but only in a clause with a nominalised verb.

A sentence in Kayardild displaying case marking is given in 2-10). Modal case suffixes, which are identical to case markers, attach to non-subject NPs to indicate tense, aspect and mood. In 2-10) the NPs *dulki warraya dulki* all receive modal locative case suffixes which mark that the proposition has taken place. See Evans (1995a: 398-450) for a full explanation of the different modal cases and their meanings.

\[
\begin{align*}
2-10) & \quad ngalda & \quad warra-j & \quad burdumbanyiya & \quad jardi \\
& \quad \text{we.excl.PL} & \quad \text{go-ACT} & \quad \text{ignorant} & \quad \text{mob} \\
& \quad mungurru-wa-tha & \quad \text{dulk-i} / & \quad \text{knowledgeable-INCH-ACT} & \quad \text{place-MLOC}
\end{align*}
\]
Verbal case suffixes act to convert morphological nouns to morphological verbs by marking tense, aspect and mood, as shown in 2-11). Here the nominals *dulk* ‘country’ and *mungkiji* ‘own’ both receive the verbal allative inflection -iiwa/-wa, followed by the verb-final potential inflection -thu.

Complementizing case suffixes attach to each word in a subordinate clause and indicate interclausal relations. An example of complementizing case suffixes is given in 2-12). Note the case stacking here on the nominal *wuran* ‘food’. The modal proprietive case -kuu is the case which the potential verb inflection generally selects for its complements. The complementizing case marks every word of a finite subordinate clause, in this case the complementizing oblique case -ntha indicates that the nominal belongs to the subordinate clause. The case stacking on *wuran* ‘food’ signals this word’s relationship to both the embedded subordinate clause, as well as the main clause; a single embedded noun then encodes information about two levels of syntactic structure.
Finally, Kayardild displays case suffix accumulation on nominals, where up to four case suffixes may be found. An example of a nominal bearing four case suffixes is given in 2-13). Here the nominal dangka 'man' bears an adnominal genitive -karra, a relational instrumental -nguni, a modal ablative -naa, and a complementizing oblique case -nth.

The implications of such a complex case marking system, is that speakers are required to mark, and listeners are required to decode, dependencies between constituents in an entire clause and possible subordinate clause, which may include stacked case marking. The cognitive load of such a task may influence prosodic features of intonational phrasing and pausing. It is hypothesised that the different syntactic levels associated with the different case marking may correspond to different strengths of prosodic marking, e.g. longer pauses may be present in association with case marking of constituents signalling higher syntactic embedding.

The analysis given in Evans (1995a) will be adhered to in the current dissertation, although Round (2009) proposes some changes to the morphological analysis given in Evans (1995a).
2.2.5 The clause

As discussed above in Section 2.1.5, clause boundaries (main and subordinate) are generally easy to identify in Kayardild due to the rich system of case marking. Some issues are found, however, in correctly identifying the boundaries of verbless clauses and this will be discussed below. The following will provide a discussion of the various clause types in Kayardild, accompanied by examples from the corpus.

A range of subordination strategies are found in Kayardild, which include the use of case marking to display the subordinate status of all constituents of a clause, as well as nominalised clauses. Where case marking is used to signal subordination, the complementizing use of case adds oblique or locative inflections to constituents of a subordinate clause. These subordinate clauses normally precede or follow a main clause, but have been found to be embedded (Evans, 1995a: 93).

The following 2-14) comprises a main clause, shown in the first two lines, and a finite subordinate clause, shown in the final line. The subordinate clause is here signalled by the immediate complementized oblique suffix -jurrka, found on the verb kina in the second clause, as well as the complementized oblique suffix -ntha found on the subject of the clause. This inflection is most commonly found in subordinate clauses but may occur in main clauses (Evans, 1995a: 258).

2-14) ra-ngurrng ... ngilirr ...
   south-BOUND:NOM cliff/cave:NOM

   dathin-a ni-ya wirdi-j /
   there-NOM 3SG-NOM remain-ACT

   yulkaan-da yulkaan-d ...
   for.ever-NOM for.ever-NOM

   yululu-ntha kina-jurrka dangka-walad...
   light-COBL tell-IMM:COBL person-LOT:NOM

‘On Sweers Island, where there’s a cliff, that’s where he remained, forever and ever, as his light indicated.’ (AD 110:33)
Non-finite subordinate clauses comprise verb stems which co-occur with nominal case marking and which may not have their own independent subject. A clausal nominalisation is shown in 2-15). Here the subordination is found on the final word which contains the verb stem *markuu* ‘get mulgri’ with the nominalising formative *-n*, and the consequential suffix *-ngarrba*.

2-15) *dangka-a bukawa-thu markuu-n-ngarrba*
    person-NOM die-POT get.mulgri-N-CONS
    'People can die of mulgri,’ (AD 21:10)

Kayardild further shows verb nominalisation, or lexical nominalisation (Evans, 1995a: 453), also using the nominalising suffix *-n*. These lexical nominalisations further take nominal inflections and act syntactically as nominals. Although Kayardild shows a range of subordination these are relatively uncommon in the corpus, to be discussed in Section 5.2.3.

Verbless clauses, or nominal clauses, in Kayardild comprise a nominal predicator and often lack tense or modality marking (Evans, 1995a: 313). These are commonly found in the corpus as shown in 2-16). A significant issue with defining verbless clause boundaries in Kayardild is that nominal constituents all carry nominative case. A verbless clause comprising multiple nominals then may be considered either a single clause or multiple clauses depending on the analysis taken (or alternatively multiple independent nominals). An alternative analysis of these nominal constituents is that they are independent syntactic constituents, as mentioned in Section 1.2.4.2. As a result of these, issues in identifying verbless clauses in Kayardild is problematic. For these reasons many of the results reported in this study have either separated the verb types from one another (so as not to potentially give inaccurate results) or excluded verbless clauses altogether, though where verbless clauses are excluded, this has been flagged. Nevertheless, these constructions are significant in the context of the literature, as discussed above, and as they make up a significant proportion of the Kayardild corpus, and have therefore been included here.
The clause types described above will be examined in detail in Chapter 5 in relation to their prosodic phrasing.

2.2.6 Intonation

In Round’s analysis of Kayardild, five prosodic domains are posited (2009: 313). These are the utterance, the breath group, the prosodic word, the foot and the syllable. See Figure 2-4. In this analysis the Strict Layer Hypothesis may be violated, as prosodic domains may be recursive e.g. a prosodic foot may dominate a prosodic foot. The current dissertation is concerned with the domain of the IP (as based on purely phonetic grounds which can therefore not be recursive), and as such makes no claims regarding whether recursivity of lower prosodic domains is possible.

The prosodic domains including and below the prosodic word are based on lexical constraints, while the breath group and the utterance are based on postlexical constraints. The domains of the breath group and the utterance typically span multiple words.
Following Evans (1995a: 63-64), Round’s prosodic domain of the breath group is defined as a stretch of speech bounded by planned pauses and is a domain characterised by truncation processes found at its right edge (2009: 315) as well as distinct intonational patterns found at the right and left edges (2009: 400-405). Phonologically, an unplanned pause does not constitute a breath group boundary, as supported by a lack of breath group final truncation as well as the absence of characteristic breath group final pitch movements found in connection with speech disfluencies (Evans, 1995a: 63). Earlier studies of the breath group in Kayardild (Round, 2002, 2006) found significant phonetic lengthening of segments at the left and right edges. Lengthening was found to typically occur on the initial and final CVC sequences of a breath group, in comparison to breath group internal segments. The left edge of the breath group domain is marked by a low (L) boundary tone, while high (H) boundary tones are always found at the right edge (Round, 2009: 427-429). The breath group can be compared to the utterance domain in cross-linguistic analyses. Intonationally, the utterance domain is marked at both its right and left edges by low L boundary tones (Round, 2009: 427-429). The boundary tone located at the right edge of a breath group indicates its relationship to the following breath group. A final rise or final plateau indicates that it belongs with the following breath group to form a cohesive sequence, while a final fall signals the conclusion of a cohesive sequence of breath groups. A cohesive sequence of breath groups may comprise a sentence fragment, a whole sentence or a larger unit (Round, 2009:396).

Round gives an alternative analysis of the higher level prosodic domains whereby the breath group is a subordinate utterance constituent in a system which permits recursive embedding of utterance domains (Evans, 2006; Evans, et al., 2004).
Studies of the intonation of Kayardild reveal a limited range of intonational tunes (Round, 2009: 382) with three major tune types. These are: the global falling tune (where the pitch level drops throughout), the global rising tune (where the pitch level rises throughout) and tunes which are basically flat (plateau). In addition to its edge-marking function, a study of Kayardild reveals that intonation is further used to highlight particular lexical items (Fletcher, et al., 2002). The boundary tones of Kayardild used in the current study will be further discussed and illustrated in Section 3.3.5.3.2.
Chapter 3. Methods and Materials

This chapter will provide an overview of the data used in the current dissertation. Furthermore, a detailed description will be provided of the annotation conventions used to label the data, with accompanying examples to illustrate some of the relevant points.

3.1 Corpus

The data used in this study consists of nine narratives ranging from 94 to 1226 seconds in duration, totalling approximately 75 minutes of data. See Table 3-1. The narratives are recounted by eight different speakers and were recorded between 1984 and 2008. The narratives were kindly provided by Nicholas Evans, Sarah Cutfield and Erich Round. The data comprises the speech of four Dalabon speakers (two male and two female) and four Kayardild speakers (two male and two female). This allows for male-female speaker differences, as well as providing inter-speaker variation within languages. In order to demonstrate any inter-speaker variation, results are often given for each narrative in addition to the languages overall throughout the dissertation. Speaker abbreviations are given to identify the speakers in each of the examples given in this dissertation. Note the two Kayardild narratives by the speaker Pat Gabori recorded over 20 years apart. The narratives comprise myths and personal narratives. As the speech used in this study comprises narratives, it provides a corpus of spontaneous speech rich in the various phenomena that occurs in natural everyday speech. Such spontaneous speech contrasts with idealised laboratory or read speech often used in language research, but which is poor in the types of phenomena that occur in the language used and heard in everyday speech.
Several of the narratives were initially annotated using the speech analysis software package Elan (see Wittenburg et al., 2006: 430) by the researchers responsible for originally gathering the data (Erich Round and Sarah Cutfield). The data was then transferred into the speech analysis software package Praat (Boersma & Weenink, 2010) where intonation and segmental information was annotated. The files were cut into 30 to 60 second long files and then converted into the speech analysis software package EMU where annotation was completed (Cassidy & Harrington, 2004; Harrington 2010). The sound files were initially annotated on a number of tiers; the segment tier, the intonation tier, the text tier, the gloss tier, the translation tier, the syllable tier, the function tier, the clause tier, and the morpheme tier. The present results make use of four of these tiers; the clause, the function, the morpheme and the intonation tiers.

The task of transcribing data from spoken discourse is itself important as it provides a written representation of the data which often forms the basis of analysis. Unfortunately, when dealing with higher level units such as phrases or utterances, the task of transcription has not been well documented or conventionalized (see e.g. Himmelmann, 2006 for discussion) and as a result researchers often have to make

---

**Table 3-1 Overview of texts**

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Speaker abbreviation</th>
<th>Title</th>
<th>Recording year</th>
<th>Total time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice Bohm (Yalkanjdjara)</td>
<td>AB</td>
<td>My life</td>
<td>1991</td>
<td>511</td>
</tr>
<tr>
<td>Maggie Tukumba</td>
<td>MT</td>
<td>Tukumba history</td>
<td>2004</td>
<td>1226</td>
</tr>
<tr>
<td>Jack Chattam</td>
<td>JC</td>
<td>Mimih story</td>
<td>1992</td>
<td>421</td>
</tr>
<tr>
<td>Jimmy Weeson</td>
<td>JW</td>
<td>Djourli gets Bongolinj</td>
<td>2008</td>
<td>480</td>
</tr>
<tr>
<td>Alison Dundaman</td>
<td>AD</td>
<td>Nyinyaaki</td>
<td>1987</td>
<td>805</td>
</tr>
<tr>
<td>Roma Kelly</td>
<td>RK</td>
<td>Eclipse of the moon and the newly dead</td>
<td>1984</td>
<td>307</td>
</tr>
<tr>
<td>Pat Gabori</td>
<td>PG1</td>
<td>Invoking the moon</td>
<td>1984</td>
<td>94</td>
</tr>
<tr>
<td>Pat Gabori</td>
<td>PG2</td>
<td>Rock cod story</td>
<td>2005</td>
<td>560</td>
</tr>
<tr>
<td>Dawn Naranatjil</td>
<td>DN</td>
<td>Wind magic</td>
<td>1993</td>
<td>120</td>
</tr>
</tbody>
</table>
judgment calls on how to go about the task (as discussed in Section 3.3.5.1). The transcription methods used for each of the tiers as they were annotated in EMU (Harrington 2010) will be described in detail in Section 3.3.

3.2 Statistical analyses

This study relies on both qualitative and quantitative analyses. The quantitative results include frequency and durational measurements, as well as a range of statistical analyses which were performed on the data using the statistical package R, version 2.5.1. (Millar, Harrington, & Vonwiller, 1997). The level of significance used in the current study is 0.05 (5%).

3.3 Annotation conventions in EMU

The syntactic and prosodic analysis of the data was represented through the annotation of four separate tiers (in addition to the text, gloss and translation tiers). In order to enable comparison between the various prosodic and grammatical aspects of Dalabon and Kayardild, uniform annotation conventions were used across the languages apart from the intonation tier, where the languages display different tonal events (as discussed in Section 3.3.5.3.1 for Dalabon and Section 3.3.5.3.2 for Kayardild). In regard to the study of grammatical structure and complexity, the morpheme, function and clause tiers will be used. On the clause level, the different clause types have been labelled. Syntactic categorization is notoriously difficult to apply to cross-linguistic study, as the criteria may not be applicable across languages. As one of the key goals in this study is to examine the prosodic and grammatical structure of Dalabon and Kayardild from a typological viewpoint, it is necessary to make use of an approach that will allow for cross-linguistic comparisons while capturing the grammatical information deemed necessary. Some of the approaches used in previous studies are unsuitable for this study (i.e. syntactic node counts) given the typologies of Kayardild and Dalabon. For this reason several approaches have been chosen to examine grammatical structure from several different perspectives. These approaches can be applied to both Dalabon and Kayardild and have furthermore been
used to investigate these issues in other languages. These include the study of the clause constituent, the study of morphological complexity using morpheme counts, and the study of lexical constituents using lexeme counts. In order to further capture typological distinctions between the two languages these approaches are accompanied by numerous examples from the corpus. The following sections will outline the various tier annotation systems used to extract results in this study.

3.3.1 Pause

Pauses were annotated on the clause, function and morpheme tiers. Pauses are defined as a silent pause of more than 200 milliseconds in duration. The minimum pause duration for this study was set in order to be consistent with much of the research in the field (e.g. Butcher, 1981; Carroll, 1996; Fletcher, 1987; Fletcher, et al., 2004; Krivokapić, 2007b; Ross, 2003), which therefore allows for comparisons between studies. Silent pauses (as opposed to filled pauses or fillers, such as the English ‘ah’ and ‘um’) were identified by not showing any voiced component in the acoustic waveform.

The minimum and maximum durations of pause have been widely discussed in the literature. Some scholars have set the minimum pause duration anything above 0 milliseconds (e.g. F. Ferreira, 1993), some at above 130 milliseconds (e.g. Dankovičová, 1997; Hieke, Kowal, & O’Connell, 1983), while others have set it at between 100 and 300 milliseconds (e.g. Griffiths, 1991: 346). Some researchers have set the maximum pause duration at 3 seconds (e.g. Griffiths, 1991: 346) but as a large proportion of the pauses in this study exceed this figure a maximum pause duration has not been set in the current dissertation. For some statistical procedures, outliers above certain measurements have been removed for more reliable results. These instances will be discussed as they arise.

Fillers, also known as filled pauses, such as English ‘ah’ and ‘um’, were very rare in the corpus, and were annotated as speech segments and not pauses. Ferreira (1993) distinguishes between the two pause types, silent and filled, stating that the pause types are distinct and should be treated separately in theories of sentence production.
Ferreira states that silent pauses should be treated as timing based, while filled pauses reflect separate factors such as word-finding difficulty. O’Connell and Kowal (2008) argue that fillers are commonly found as indicators of disfluency, planning problems, as well as rhetorical functions. For these reasons, the few instances of filled pauses found in the corpus have not been annotated as pauses.

3.3.2 Clause tier

On the clause tier, clause boundaries were labelled. In the present study, the definition of a clause is consistent with the definition commonly used cross-linguistically (e.g. Givón, 2001: 110-111; Van Valin & LaPolla, 1997: 25-31). A clause is defined as a construction which includes a predicate and its core or obligatory arguments and its peripheral or optional adjuncts, where the predicate need not be verbal and may be adjectival or nominal. Core arguments are those arguments that are selected by the predicate, while adjuncts are not arguments of the predicate.

Table 3-2 shows the labels used to categorise clauses. Clauses were categorised according to their type as main, subordinate, as well as verbless in order to allow for comparisons between clause types.

Where examples are given in the text, subordinate clauses have been given in bold typeface to enable easy identification of clause boundaries. A further category of ‘other’ was given to constituents which were classified independent of any clause structure, or where the clausal membership was difficult to identify.

<table>
<thead>
<tr>
<th>Clause type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main clause</td>
</tr>
<tr>
<td>Subordinate clause</td>
</tr>
<tr>
<td>Verbless clause</td>
</tr>
<tr>
<td>Independent/other constituent</td>
</tr>
</tbody>
</table>

Table 3-2 Clause types used
Difficulties in correctly identifying clause boundaries in spontaneous discourse in relation to Australian languages have been raised by a number of researchers (e.g. Heath, 1984: 514ff; 1985: 100ff; McGregor, 1990: 362; Merlan, 1994: 225-226; Schultze-Berndt, 2000:107ff). These difficulties of correctly assigning clause boundaries arise due to the presence of ‘free’, ‘independent’ ‘loose’ or ‘satellite’ nominals (Croft, 1995, 2007; Cutfield, in prep.; Evans, 2003a; Heath, 1984). These nominals may be difficult to assign to a preceding or following clause, due to a lack of case marking, as well as due to free word order commonly found in Australian languages.

As discussed in Section 2.2.5 in Kayardild clause constituents are easily identifiable as case marking signals the syntactic relations between constituents in a clause. Despite the lack of morphological marking on Dalabon NPs to assist in correctly identifying clause boundaries, the vast majority of NPs in Dalabon were easily assigned to one clause over another due to context and clear prosodic phrasing. The functions of NPs in Dalabon and Kayardild are discussed in Section 6.1.1.

Clause boundaries will be used not only to correctly identify clauses, but to examine prosodic marking in relation to syntactic boundary strength. A grammatical boundary may therefore be classified as either a non-boundary (a grammatical boundary found between words) or a boundary (a grammatical boundary found between clauses). The following sections will describe the annotation conventions used to mark constituents below the level of the clause.

### 3.3.3 Function tier

On the function tier the constituents were labelled according to their lexical category. An overview of the annotation conventions for the grammatical constituents used in both Dalabon and Kayardild is shown in Table 3-3. Certain categories, such as interruptions and speech disfluencies, were labelled in order to allow them to be excluded for the purposes of statistical results. An NP consists of nominals, where nominal refers to nouns, adjectives, demonstratives and numerals. These parts of speech have been merged under the ‘nominal’ heading as Dalabon and Kayardild like
many Australian languages do not distinguish between these parts of speech in their morphosyntax (e.g. Dixon, 1982). The grammatical functions of NP constituents were further annotated according to their grammatical functions as described below.

<table>
<thead>
<tr>
<th>Constituent labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noun phrase</td>
</tr>
<tr>
<td>Verb</td>
</tr>
<tr>
<td>Particle</td>
</tr>
<tr>
<td>Adverb</td>
</tr>
<tr>
<td>Idiophone</td>
</tr>
<tr>
<td>Interjection</td>
</tr>
<tr>
<td>Conjunction</td>
</tr>
<tr>
<td>Independent constituent/uncertain of constituent</td>
</tr>
<tr>
<td>English</td>
</tr>
<tr>
<td>Speech disfluency</td>
</tr>
<tr>
<td>Interruption, different speaker, etc.</td>
</tr>
</tbody>
</table>

Table 3-3 The labelling categories used for the function tier

An NP may consist of one or more nominals and is annotated accordingly with a number to indicate the number of nominals comprising each NP. Information on whether NPs comprise one or more nominal constituents will be used for analyses of constituent length and complexity in relation to prosodic boundaries. Many studies have found, for example, that complexity of NP and VP constituents affects prosodic boundary strength (e.g. F. Ferreira, 1991; Strangert, 1997), and this will be investigated in the present dissertation.

NPs, adjectives and adverbs are further specified depending on their function as either S (subject), O (object), iO (indirect object), A (adverbial), or X (where a noun phrase does not strictly belong in a clause as discussed above, or where the constituent is difficult to identify and therefore analyse this label is posited). Table 3-4 shows the functions used in this study.
### Noun phrase function

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
</tr>
<tr>
<td>Object</td>
</tr>
<tr>
<td>Indirect object</td>
</tr>
<tr>
<td>Adverbial</td>
</tr>
<tr>
<td>Independent phrase, difficult to analyse</td>
</tr>
</tbody>
</table>

**Table 3-4 Constituent functions**

Similar studies have used a range of approaches including syntactic nodes, phrase boundaries and other categories to investigate the relationship between syntax and prosody. Grosjean et al. make use of the Complexity Index (CI) which measures syntactic nodes (1979). Yang’s study of Mandarin looks at phrase and sentence boundaries (2007). Croft’s study of English (1995) and Wardaman (2007) narratives makes use of the grammatical unit which comprises categories such as clause types (relative, adverbial, subjectless, clause + adjunct, etc.), phrases (NP, PP, etc.), and coordinate sentences. By using the grammatical unit as a basis of analysis, Croft’s method allows for cross-linguistic comparisons between the typologically distinct languages, English and Wardaman. Likewise, the approach taken in the current dissertation makes use of the syntactic constituent the clause in addition to lexical categories such as verb and nominal (although nominals are further identified on a phrasal level using NP), in order to allow for direct comparisons between two structurally distinct languages, Dalabon and Kayardild. This approach is accompanied by analyses of examples from the corpus in order to examine syntactic structure in detail.

#### 3.3.4 Morpheme tier

On the morpheme tier, each overt morpheme was labelled individually, with bound morphemes marked with hyphens. Where a morpheme is not pronounced (e.g. in Kayardild in the case of the pre-pausal nominative marker -a being deleted) this goes unmarked. Where a morpheme or several morphemes are indistinguishable, this has been annotated accordingly. Information regarding morpheme counts will be used to
investigate morphological complexity and its relationship to prosody. As Dalabon is a polysynthetic language, where the verbal word encodes all arguments of the verb and may equal a sentence in languages such as English, lexeme counts cannot be used to measure complexity.

3.3.5 Intonation Tier

In the current study the IP is the prosodic unit of interest and not a smaller prosodic unit such as the phonological phrase or the accentual phrase. This is for two main reasons; 1) The IP is the most clearly identifiable prosodic unit cross-linguistically and research of the interaction between syntax and prosody typically makes use of the IP, thereby allowing for cross-linguistic comparisons. 2) The lack of a prosodic domain below the level of the IP in Kayardild which is based on phonetic criteria. As outlined in Section 2.2.6, the prosodic domains below the IP in Kayardild are based on lexical constraints, as opposed to phonetic criteria. Further to these two main points, in Dalabon the prosodic domain directly below the IP, the accentual phrase, is defined using phonetic criteria which also apply to the IP, with the main difference between the two prosodic domains being the absence or presence of pause. As discussed in Section 2.1.6, the accentual phrase in Dalabon is characterised by a pitch accent or prominence as well as a phrase tone at the rightmost edge. Accentual phrases show falling or rising contours at the right edge, and are followed by a pitch reset on the following constituent. The overlap of the phonetic criteria of the IP and the accentual phrase, make it problematic to clearly distinguish the two prosodic domains. For this reason, the IP, as it is defined in Section 3.3.5.2, will be used as the prosodic unit of interest in the current study.

3.3.5.1 Annotation issues

Difficulties in correctly assigning IP boundaries are well known to researchers of intonation (Cruttenden, 1997:29; Du Bois, et al., 1992; Himmelmann, 2006; Ladd, 2008; Stelma & Cameron, 2007). Difficulties identifying IP boundaries may arise in instances where the phonetic cues associated with IP boundaries occur at locations
other than IP boundaries for various reasons, as cues such as final lengthening, pausing and anacrusis (an acceleration of the initial unstressed syllables found at the beginning of an IP) may occur in the middle of an IP (Cruttenden, 1997). Alternatively, depending on the prosodic model used, the phonetic cues may be difficult to recognise altogether and can result in either splitting or lumping together of IPs. Boundary assignment difficulties are clearly demonstrated in Stelma and Cameron’s (2007) study outlining the many differences found between the IP boundary assignment by three researchers of varying experience. Similarly, in a study of six German corpora (outlined in O’Connell & Kowal, 2008), although intonation breaks were not transcribed, the transcribers introduced verbal changes, revealing the differences to be found across transcribers.

In addition to the difficulties of correctly identifying the phonetic boundary cues is the issue of circularity when defining both prosodic and syntactic units (e.g. Cruttenden, 1997; Du Bois, et al., 1992; Ladd, 1996). Crystal states that ‘...if it is the case that we ultimately want our intonational information to be used in the description of grammatical contrasts, then it is undesirable to introduce grammatical considerations into the primary definition of any contours’ (Crystal, 1969: 205). The tendency to define syntactic or information units based on their phonetic realisations, and, conversely, the tendency to define prosodic units based on syntactic knowledge due to a lack of phonetic evidence has been noted. As a result, researchers warn against the urge to think syntactically when identifying IPs (e.g. Du Bois, et al., 1992: 101). Cruttenden notes the difficulty of assigning intonation-group boundaries based on external phonetic criteria alone and acknowledges that internal criteria, such as judgment calls based on knowledge of the language, must also play a part in boundary assignment. Cruttenden describes the assignment of boundaries as ‘something of a circular business; we establish some intonation-groups in cases where all the external criteria conspire to make the assignment of a boundary relatively certain; we note the sorts of internal intonational structure occurring in such cases and this enables us to make decisions in those cases where the external criteria are less ambiguous’ (1997: 29). However, Ladd strongly warns against allowing definitions to become circular stating that ‘unless the syntactic and the phonological structures are defined in their
own terms, the whole exercise becomes purely circular’ (Ladd, 1996: 289). A prosodic domain must therefore have explicit phonetic definitions according to Ladd (1996: 289) and not make reference to syntactic information. This explicit phonetic view of prosodic domain criteria is not shared by all researchers, as some have used syntactic information in their definitions of prosodic domains (e.g. Nespor & Vogel, 1986; Selkirk, 1984). A further issue regarding the definitions of prosodic domains is that theoretical observations may become incompatible where the definitions involve conflicting criteria, for example where the internal criteria are present while the boundary criteria are lacking (e.g. Ladd, 2008: 288).

For the reasons given above, the labelling of IPs in the present study has avoided any reference to syntactic knowledge and has relied solely on the phonetic cues described in Section 3.3.5.2 below. The issue of potentially conflicting criteria has been avoided as the IP is, in the present study, defined purely on the phonetic correlates of its boundaries, making no reference to its internal structure (e.g. pitch accents, etc.). These choices have been made to allow a comparison of purely phonetically defined units and purely syntactically defined units, where the definitions do not involve any assumptions regarding how the prosodic and syntactic structures will map onto each other.

A further issue concerning the annotation of intonation units is that a clear pitch trace cannot always be obtained using the speech software EMU or Praat, or that pitch halving or doubling occurs (for a further explanation see Section 3.3.5.3). Pitch traces may be unclear for a number of reasons including the poor recording quality of some of the narratives (especially those recorded many years ago) and which may further contain background noise (where narratives were recorded in the field rather than under laboratory conditions) and the tendency for some speakers to use creaky voice (especially in IP final position). Where clean pitch traces could not be obtained, analysis was based on auditory information gained through repeated and careful listening.
3.3.5.2 The intonation phrase defined

In the present study an IP is defined using the following auditory and acoustic criteria: 1) a complete pitch contour ending with a final tonal event (boundary tone), 2) a pitch reset found at the beginning of an IP, 3) a reset of the baseline of the pitch contour (where the baseline refers to the ‘valleys’ found in the pitch contour), 4) a pause found at the boundary of two IPs, 5) final lengthening of the final segment of an IP, and 6) anacrusis (an acceleration of the initial unstressed syllables found at the beginning of an IP). Where one or more of these cues are found, an IP boundary has been labelled. In many cases most of these cues are lacking and only a few of the cues are used to determine the location of an IP boundary – i.e. IP boundaries were assigned based on perceived level of right boundary juncture, which may or may not be accompanied by a pause. It is presumed that the right-most edge of an IP is preceded by a high pitch accent (H*), where a high pitch accent is realised for the most part as a pitch peak on the penultimate or antepenultimate syllable of an IP. For purposes of ease, only H* pitch accents have been labelled in the current chapter.

To illustrate how these criteria have been applied, the following examples from the corpus are given. The ToBI-style annotations of boundary tones are included in these examples although a detailed description of these annotation conventions is given in Section 3.3.5.3.1 for Dalabon and Section 3.3.5.3.2 for Kayardild. Figure 3-1 illustrates the pitch trace of a Dalabon sentence comprising four IPs, with glosses and translation given in 3-1). The first IP is identified by a final falling tone (transcribed here with a L% boundary tone), and is preceded by a pause and followed by a brief juncture. The second IP shows a slight audible pitch reset in contrast to the preceding IP, a final rising tone (transcribed with a ^H% boundary tone), as well as a following pause. The third IP follows a pause and displays a falling tone (transcribed here with a L% boundary tone). This IP is further accompanied by extra final lengthening of the final syllable and is followed by a brief audible juncture (although neither of these prosodic cues can be identified from the pitch trace). The fourth IP follows a brief juncture, ends
on a final mid high level tone (transcribed with a H% boundary tone) and is followed by a pause.

3-1) mak nûnda rongkûrrh / nawoydo...
not that quiet.snake dingo

nawoydo / bula-h-buyhwo-ninj ...
dingo 3PL>3-R-show-PL

‘Not (just) the quiet snake, they (my dads) used to show me dingos.’ (AB 6:14)

Figure 3-1 Pitch trace of four intonation phrases in Dalabon (AB 6:14)

An IP from Kayardild is shown in Figure 3-2 with glosses and translation given in (3-2). Here the final boundary of the IP is marked by a final falling tone (transcribed with a L% boundary tone) and followed by a pause. This IP shows the typical ‘flat hat pattern’, as attested in many languages cross-linguistically (t’Hart, et al., 1990) starting with a default pitch level (transcribed with a % boundary tone) immediately followed by a slight initial rise into the first pitch accent at the left edge of the IP and ending with a final fall at the right edge.

3-2) jani-jani-j ...
search-REDUP-ACT

‘We looked around.’ (AD 15:42)
Figure 3-2 Pitch trace of an intonation phrase with a flat hat pattern in Kayardild (AD 15:42)

Figure 3-3 shows a pitch trace of two IPs in Kayardild, with glosses and translation provided in 3-3). The first IP follows a pause and ends with a steep fall (transcribed with a L% boundary tone) followed by a noticeable juncture. The second IP shows a reset of pitch starting at a default pitch level (transcribed with a % boundary tone) and ends with a final fall (transcribed with a L% boundary tone) followed by a pause.

3-3) nga-da ra-rung-ku warra-ju ...
1SG-NOM south-ALL-MPROP go-POT

dangka-walad ra-ra ...
person-LOT south-NOM

‘I’m going to the south (I said). (There are) people in the south.’ (PG2 5:47)

Figure 3-3 Pitch trace of two intonation phrases in Kayardild (PG2 5:47)

The examples above illustrate the labelling of IP boundary tones. The boundaries of IPs are labelled using the modified ToBI style conventions developed specifically for Dalabon and Kayardild, and will be explained and illustrated in detail in Section 3.3.5.3.1 and Section 3.3.5.3.2.
3.3.5.3 Tones and break indices (ToBI)

On the intonation tier, the boundaries of IPs were labelled with boundary tones following the ToBI conventions developed for both Dalabon (Evans, et al., 2008; Fletcher, 2007, in press; Fletcher & Evans, 2002) and Kayardild (Fletcher, et al., 2002; Round, 2009) with some modifications. Boundary tones were assigned based on auditory and visual inspection of fundamental frequency (f0) signals, henceforth pitch traces. Pitch traces were calculated in EMU using a standard autocorrelation algorithm. As speech analysis programs do not always indicate 100% accurate pitch readings (e.g. Ladefoged, 2003: 84) due to, for example, pitch halving or doubling, pitch traces were checked using the speech analysis software Praat as well as through repeated and careful listening. Halving of pitch traces occur where the pitch tracker algorithm misses every second peak ‘believing’ it to be a result of sound quality rather than periodicity. Pitch doubling errors occur where the algorithm mistakenly interprets peaks in the signal which are not vocal fold openings but are instead caused by creaky voice (Gussenhoven, 2004: 6).

The ToBI system of transcribing intonation and prosody uses a set of conventions which are expressed in clear phonetic terms to mark tones and break indices which represent prosodic constituency. ToBI was originally developed for the transcription of three dialects of English; general American, standard Australian and British English (Beckman & Ayers Elam, 1997), but has since been modified to apply to typologically unrelated languages such as Korean (Jun, 2005), Japanese (Venditti, 2005) and Bininj Gun-wok (Bishop, 2003; Bishop & Fletcher, 2005; Fletcher & Evans, 2000). The four different levels of prosodic annotation of ToBI are: the tone level, the break level, the word level, and the miscellaneous level.

The tone indices component of ToBI marks pitch accents, phrase accents and boundary tones as being either high (H) or low (L). Diacritics are used to assign tones to the various prosodic constituents. An asterisk (*) is used to indicate a stressed syllable which attracts a pitch accent. Pitch accents may be simple (i.e. H or L) or bitonal (i.e. L+H). Where pitch accented tones have associated tones, these are labelled using the
plus symbol (+). Downstepped high tones are labelled using the exclamation mark (!H), and upstepped high tones using the hat symbol (^H). A dash (−) is used to indicate a phrase tone, which is the tone found at an intermediate phrase edge. The boundary tone is labelled with a percentage symbol (%) and aligns with the tone found at the edge of an IP.

The break indices component of ToBI measures perceived prosodic juncture between constituents. The four break indices are; 0, 1, 3 and 4, where 0 marks the lowest degree of perceived juncture and 4 marks the highest degree of perceived juncture. The break index 0 is used to indicate the presence of morphophonemic rules and is only used where it is not possible to auditorily distinguish the original word boundary. The break index 1 is used to indicate a word boundary with a minimal degree of juncture. The break index 3 is given to indicate a greater perceived juncture than a break index 1 but less juncture than a break index 4, and corresponds to an accentual phrase boundary. The break index 4 is given to mark the highest degree of perceived juncture and generally corresponds to an IP boundary (e.g. Ladd, 2008: 105). The label 2 is given only to indicate uncertainty as to the nature of the perceived juncture in question.

The word level provides an orthographic transcription of each word in the utterance, while the miscellaneous level is used to mark disfluencies, comments, and other miscellaneous material.

As the relevant range of intonational categories may differ between languages, the ToBI-style labelling conventions must accommodate the evident language differences. For the purposes of this dissertation, only the tone indices component of ToBI was labelled, and of the tonal events, generally only boundary tones were labelled. Where relevant, high pitch accents (H*) are labelled. Section 3.3.5.3.1 and Section 3.3.5.3.2 outline the tonal events relevant to Dalabon and Kayardild, and which are used in the present study.
3.3.5.3.1 ToBI labelling for Dalabon

The left and right edge boundary tone annotations which are relevant to Dalabon and used in the present study are outlined in Table 3-5. Analyses of Dalabon within the ToBI framework to date describe five right edge boundary tones, three left edge boundary tones, and a single high pitch accent (H*). The left edge boundary tones are low (%L), high (%H) and unmarked (%). The low tone (%L) is used when the speaker begins an IP with a boundary tone notably low for that speaker’s pitch range. Likewise the high tone (%H) is used when the left edge of an IP begins with a high tone relative to the speaker’s pitch range. The unmarked tone (%) is used when there is no perceptible low or high tone present, and the boundary tone is within the average pitch range of the speaker. The right edge boundary tones include the low rising (LH%), the high falling (HL%), the mid/high plateau (H%), the rising (^H%), and the low (L%).

<table>
<thead>
<tr>
<th>Left edge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>The default left edge boundary tone. The most commonly occurring boundary tone found at the left edge of the IP.</td>
</tr>
<tr>
<td>%L</td>
<td>Low left edge boundary tone. Associated with a very low f0 target at the left edge of the IP.</td>
</tr>
<tr>
<td>%H</td>
<td>High left edge boundary tone. Associated with a very high f0 target where there is no evidence of an initial H* pitch accent in the first word at the left edge of the IP.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Right edge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L%</td>
<td>Final low boundary tone. Associated with a low f0 target at the right edge of the IP.</td>
</tr>
<tr>
<td>H%</td>
<td>Final high boundary tone. Associated with a high f0 target at the right edge of the IP.</td>
</tr>
<tr>
<td>HL%</td>
<td>Final falling boundary tone. A fall in the f0 contour from a high to a mid high (or low) level at the very right edge of the IP, where there is no evidence of an IP final H* pitch accent.</td>
</tr>
<tr>
<td>LH%</td>
<td>Final rising boundary tone. A rise in the f0 contour from a relatively low to a mid high level at the very right edge of the IP.</td>
</tr>
<tr>
<td>^H%</td>
<td>Final expanded high boundary tone. An unusually high rise in the f0 contour from a mid level to a high level at the very right edge of the IP.</td>
</tr>
<tr>
<td>~%</td>
<td>Fragmentary intonational contour – boundary tone target not met. Not associated with pre-boundary lengthening.</td>
</tr>
</tbody>
</table>

Table 3-5 Summary of boundary tones in Dalabon
The following Figure 3-4 to Figure 3-8 illustrate how some of these boundary tones have been employed in Dalabon. A default left edge boundary tone (%) and a low right edge boundary tone (L%) are shown in Figure 3-4, with glosses and translations provided in 3-4).

3-4) ka-h-yo ...
3SG-R-liePP
‘He stretched out.’ (JW 3:7)

Figure 3-4 Default left edge (%) and final low (L%) boundary tones (JW 3:7)

Further examples of a default left edge boundary tone and a low right edge boundary tone are shown in Figure 3-5 with glosses and translation provided in 3-5).

3-5) korrehkûn bala-h-dja-ni-nj kanihdja ...
already 3PL-R-just-live-PI there
‘They already lived there.’ (MT 9:0)

Figure 3-5 Default left edge (%) and final low (L%) boundary tones (MT 9:0)
A final low rising contour (LH%) is shown in Figure 3-6, with glosses and translation provided in 3-6). Here the final boundary tone rises slightly from a low level.

3-6)  

wawurd-ngu  ka-h-burlh ...

brother-your  3SG-R-appearPRS

‘There’s your brother.’ (JW 5:9)

The following example of quoted speech in Figure 3-7 shows a final high rising boundary tone (H%), where the rise begins from a mid level to end at a high level. Final high boundary tones are often associated with incompleteness of an utterance, as well as typically being found in connection with listing intonation (e.g. Fletcher, 2007). In this example of quoted speech the final high boundary tone is found in connection with an imperative.

3-7)  

morlû  bula-h-marnû-mang ...

didgeridoo  3PL-R-BEN-pick.upPRS

‘Get me a didgeridoo!’ (JW 5:41)
Where intonational fragments were present in the corpus, boundary tones were labelled as incomplete using the tilde symbol (~). The crucial phonetic cue used to determine fragmentary units was the incompleteness of a pitch contour – i.e. where the speaker breaks off before the projected intonation contour is complete. The phonetic cues used to determine whether an IP was a fragmentary unit are: 1) the pitch contour is incomplete – i.e. no final boundary tone is present, 2) the presence of creaky voice, 3) the presence of pause, and 4) an absence of final lengthening on final syllables. In addition to the phonetic cues, syntactic incompleteness was often found in connection with intonational fragments, though this condition was not used as a defining criterion to avoid the circularity of defining a prosodic unit using syntactic information, as discussed in Section 3.3.5.1. The first of these four criteria was essential in determining that an IP was fragmented, while the remaining criteria were optional and not always present.

A pitch trace of an intonational fragment where the intonational tune is incomplete is shown in Figure 3-8 with its transcription given in 3-8). Here the second IPU is intonationally fragmented due to the lack of a final boundary tone, the presence of creaky voice, an absence of perceivable final lengthening, as well as the presence of a following pause. The final grammatical constituent wad~ found in the fragmentary unit is furthermore syntactically incomplete.
The left and right edge boundary tone annotations relevant to Kayardild and used in the present study are outlined in Table 3-6. Analyses of Kayardild within the ToBI framework posit five right-edge boundary tones and three left edge boundary tones (Fletcher, et al., 2002). In this analysis the five right edge boundary tones in Kayardild are high (H%), low (L%), downstepped (!H%), upstepped (^H%) and falling (LH%). The three left edge boundary tones are high (%H), lowered high/mid (%!H), and low ( %L). The boundary tones which will be used in the present dissertation follow Fletcher, Evans and Round (2002).
<table>
<thead>
<tr>
<th>Left edge</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>The default left edge boundary tone. The most commonly occurring boundary tone found at the left edge of the IP.</td>
</tr>
<tr>
<td>%L</td>
<td>Low left edge boundary tone. Associated with a very low f0 target at the left edge of the IP.</td>
</tr>
<tr>
<td>%H</td>
<td>High left edge boundary tone. Associated with a very high f0 target where there is no evidence of an initial H* pitch accent in the first word at the left edge of the IP.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Right edge</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L%</td>
<td>Final low boundary tone. Associated with a low f0 target at the right edge of the IP.</td>
</tr>
<tr>
<td>H%</td>
<td>Final high boundary tone. Associated with a high f0 target at the right edge of the IP.</td>
</tr>
<tr>
<td>LH%</td>
<td>Final rising boundary tone. A rise in the f0 contour from a relatively low to a mid high level at the very right edge of the IP.</td>
</tr>
<tr>
<td>!H%</td>
<td>Final lowered high boundary tone at the right edge of the IP.</td>
</tr>
<tr>
<td>^H%</td>
<td>Final expanded high boundary tone. An unusually high rise in the f0 contour from a mid level to a high level at the very right edge of the IP.</td>
</tr>
<tr>
<td>~%</td>
<td>Fragmentary intonational contour – boundary tone target not met. Not associated with pre-boundary lengthening.</td>
</tr>
</tbody>
</table>

Table 3-6 Summary of boundary tones in Kayardild

A recent study by Round (2009) of the intonation of Kayardild builds on this analysis and posits changes to the inventory of tonal events relevant to Kayardild. In the present study the annotation of boundary tones follows that found in Fletcher, Evans and Round (2002).

The following 3-9) comprises two IPs where both begin with a default left edge boundary tone and end with a low boundary tone, shown in Figure 3-9.

3-9)  

dulk-u mungkiji-wu / wirdi-ju ...  
country-MPROP own-MPROP remain-POT

‘(I) will remain in my own country.’ (DN 2:48)
The following 3-10) illustrated in Figure 3-10 shows two IPs, the first begins with a default boundary tone (%) and ends with an upstepped high boundary tone (^H%). The second IP begins and ends with low boundary tones.

3-10) nga-da kang-kuru... kurrka-kuru ra-rung-kuru ...
   1SG-NOM  word-MPROP  grasp-PROP  south-ALL-MPROP

   ‘I can speak the language of the south.’ (PG1 3:21)

3-11) illustrated in Figure 3-11 shows an intonational fragment followed by two IPs. The intonational fragment begins with a default boundary tone (%) and has an incomplete pitch contour. A final high boundary tone (H%) is found on the first IP. The final IP in this example shows a high left edge boundary tone (%H) and ends with a final falling boundary tone (L%).

3-11) nga-da barruntha-ya / nga-da barruntha-ya ...
   1SG-NOM  yesterday-MLOC  1SG-NOM  yesterday-MLOC
"mara nga-da wirrka-ju...
wind 1SG-NOM dance-POT
‘Yesterday I was able to dance up the wind.’ (DN 1:0)

Figure 3-11 Final upstepped high (^H%), high left edge (%H), and final low (L%) boundary tones (DN 1:0)

In 3-12) the initial intonational fragment begins with a low boundary tone (%L) shown in Figure 3-12. The following IP begins with a default boundary tone (%) and ends with a falling low contour.

3-12) namu mak~ ... namu maku-wa kirrik ...
NEG woman NEG woman-NOM fig:NOM
‘not female fig trees...’” (RK4:7)

Figure 3-12 Default left edge (%), intonational fragment (~%) and final low (L%) boundary tones (RK 4:7)
Chapter 4. The intonation phrase

This chapter will provide a detailed overview of the IP in Dalabon and Kayardild. The different contour patterns observed in the corpus will be discussed and illustrated in detail in Section 4.1 for Dalabon and in Section 4.2 for Kayardild. Following this, the makeup of the IP in terms of constituents will be given in Section 4.3, and the durations of IPs will be examined in Section 4.4. These aspects of the IP have been included here to illustrate certain characteristics typical of the IP which will be relevant in Chapter 5 and Chapter 6, which examine the IP in relation to syntactic constituency in more detail. In Section 4.5, examples of intonational fragments found in the corpus will be examined. A summary of the main findings is provided in Section 4.6. This overview of the IP in Dalabon and Kayardild will provide the prosodic basis for the grammatical analyses following in Chapter 5 and Chapter 6.

4.1 IP contour types of Dalabon

In this section an outline of the different contour types found in Dalabon will be given. Throughout this dissertation pitch contour patterns will be described using IPA terminology, in addition to using the ToBI-style annotations described above in Section 3.3.5.3 above. The Dalabon corpus displays intonation contours which show global declination, contours with global rises, and plateau contours which are globally flat, as shown in Table 4-1. These tune types will be examined in relation to the clause in Section 5.3 and Section 5.7, and in relation to nominal constituents in Section 6.1.3.

<table>
<thead>
<tr>
<th>Global fall</th>
<th>Identified by a falling pitch level throughout the contour</th>
<th>Figure 4-1, Figure 4-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global plateau</td>
<td>Identified by a flat pitch level throughout the contour</td>
<td>Figure 4-4, Figure 4-3</td>
</tr>
<tr>
<td>Global rise</td>
<td>Identified by a rising pitch level throughout the contour</td>
<td>Figure 4-6, Figure 5-31</td>
</tr>
</tbody>
</table>

Table 4-1 Pitch contour types of Dalabon
Typically IPs in Dalabon begin with a rise from a low or midrange to a higher pitch within a speaker’s pitch range. At the rightmost edge IPs typically end with a fall from a mid or high range to a low pitch range with final lowering, again all within the speaker’s pitch range. The most commonly occurring contour type is the hat pattern (discussed in Section 2.1.6), attested in many languages cross-linguistically (t’Hart, et al., 1990), which begins with neutral or low pitch at the leftmost edge and rises into a high pitch accent before falling at the rightmost edge. The flat hat pattern is more commonly found than the pointy hat pattern. This contour type is often found in connection with syntactic declarative statements in Dalabon, as is also found in a range of typologically unrelated languages (Fletcher, in press).

In 4-1) the IP consists of the typical hat pattern with a slight rise at the leftmost edge and a final fall across the final two syllables at the right edge, as shown in Figure 4-1.

4-1) \[ \text{kanihdja yala-h-dja-lng-yo ...} \]
    \[ \text{there 1PL-R-just-SEQ-livePP} \]
    ‘Then we were still living there.’ (MT 12:36)

![Figure 4-1 Typical hat pattern (MT 12:36)](image)

The following example given in 4-2) further illustrates an IP showing the hat pattern in Figure 4-2. Here a slight rise is found on the pitch contour at the left edge with the highest point found on the root of the initial verb \textit{dudjm} ‘return’ before the pitch falls across the final three syllables at the right edge. Typically within the verbal word, pitch accents align with the verb root. Note that this is an example of an IP corresponding to two verbs which will be further discussed in Section 6.2.
The second most commonly occurring contour type in the Dalabon corpus is the high plateau contour. This contour rises into a mid or high flat plateau and ends with a final high boundary tone. The final syllable of the high plateau contour may further be lengthened for up to several seconds to produce a semantic effect of distance or prolongation (Sharpe, 1972). Bishop and Fletcher refer to extreme versions of this pattern as the ‘stylized’ sustained high contour (Bishop & Fletcher, 2005). This contour type is often found in connection with continuation, listing, and is commonly found in narrative and interactive discourse in Australian languages such as Alawa and Mara (Sharpe, 1972), Iwaidja (Birch, 2002) and Nunggubuyu (Heath, 1984). The high plateau contour was likewise commonly found in the narratives examined in previous studies of Dalabon (Evans, et al., 2008; Fletcher & Evans, 2002; Ross, 2003), and is also found in the dictionary corpus in instances where speakers give a lengthy explanation of terms where it appears to serve a floor-holding function (Fletcher, in press).

The plateau contour is illustrated in Figure 4-3 where both of the final two IPs display a sustained period of high pitch across the entirety of the IP and end with final high boundary tones, indicating incompleteness of the utterance. The speaker continues to explain that after having children she returned to her land when land rights were granted. This coda to the episode displays final lowering and ends with a final low.
boundary tone at a very low point in the speaker’s pitch range, thereby signalling the completion of the episode.

4-3) bah / nga-ling-wurruwurring-m-inj / nga-h-wururd-mad-inj ...
and 1SG-SEQ-old-VBZ-PI 1SG-R-child-appear-PI
‘When I was older, I had children.’ (MT 1:47)

Figure 4-3 Plateau contour (MT 1:47)

A further example given in 4-4) of the plateau contour is illustrated in Figure 4-4, where the two clauses, both comprising overt subject NPs and place adverbials, are separated by a pause. Both IPs again display high right edge boundary tones which signal continuation. The speaker continues on to talk of her mother’s burial, where the completion of the topic is signalled by a final low boundary tone.

4-4) nah-ngan kanihdja ka-ling-moyh-rakka-ng ...
mother-my there 3SG-SEQ-sick-fall-PP

nah-ngan ka-ling-kurnh-wudjm-inj ...
mother-my 3SG-SEQ-country-die-PI
‘My mother got sick there. My mother passed away in that country.’ (MT 13:38)
An example of a high plateau with an extremely lengthened final syllable (underlined in the transcription), or stylised sustained high contour, is given in 4-5) and illustrated in Figure 4-5. Here the lengthening of the final syllable together with the high monotone pitch indicates the prolonged duration spent living in Barunga by the speaker. The stylised sustained high contour has been found to denote temporal or spatial extension or duration in a wide range of Australian languages (e.g. B. Baker, 1999; Birch, 1999; Bishop, 2003; Heath, 1984; Sayers, 1976; Sharpe, 1972; Yallop, 1977).

4-5) *yala-h-dja-ni-nginj* ...

1PL-R-just-be-Pl

‘We just stayed (there).’ (MT 10:24)

A less commonly found contour type than the hat pattern and the high plateau is the final rising terminal, which ends with a rise into a mid or high tone. This contour is associated with continuation and incompleteness and is frequently observed in
narratives, explanations and listing in Dalabon (Fletcher, in press). The final rise in 4-6) is illustrated in Figure 4-6, where it most likely represents continuation, as the speaker has just begun a story and is introducing the characters.

4-6) wanjing-kûn ka-h-bo-ng ... kanh mimih ...
    one-GEN 3SG-R-go-PP that mimih
    ‘Once there was a Mimih (a type of rock spirit),’ (JC 1:3)

The contour patterns described and shown above have been attested by previous research into the intonation of Dalabon (Fletcher, 2007, in press; Ross, 2003).

4.2 IP contour types of Kayardild

The Kayardild corpus displays intonation contours which show global declination, contours with global rises, and plateau contours which are globally flat. These findings are in accordance with those of Round (2010), and furthermore reflect the Dalabon findings. The basic flat hat contours are found, as are the high tone-onset phrases which resemble high plateau contours with or without a final fall (Fletcher, et al., 2002). The three main pitch contour types of Kayardild are listed in Table 4-2. These tune types will be examined in relation to the clause in Section 5.4 and in relation to nominal constituents in Section 6.1.4.
Global fall
Identified by a falling pitch level throughout the contour
Figure 5-45, Figure 6-55

Global plateau
Identified by a flat pitch level throughout the contour
Figure 4-8, Figure 5-47

Global rise
Identified by a rising pitch level throughout the contour
Figure 4-9

Table 4-2 Pitch contour types of Kayardild

As in Dalabon, the most commonly occurring contour type in Kayardild is the flat hat pattern which begins with a rise at the leftmost edge before falling at the rightmost edge. The hat pattern contour displays global declination. This type of contour is often found in connection with syntactic declarative statements, as was also found in Dalabon. A typical pointed hat pattern contour is illustrated by both IPs in 4-7) illustrated in Figure 4-7. The first IP begins with a rise from a low point in the speaker’s range, which rises into the high pitch accent found on the initial syllable of the word *rarungku* ‘south’, before ending with a significant fall in pitch at the rightmost edge. The second IP begins with a rise and also ends with a significant drop in the speaker’s tonal range.

4-7) nga-da thaa-thu rar-ung-ku ...
1SG-NOM return-POT south-ALL-MPROP

dulk-iwa-thu mungkiji-wa-thu ...
country-VALL-POT own-VALL-POT
‘I want to return south (Bentinck Island), to my own country’ (DN 1:33)

![Diagram of pointed hat pattern contour](image-url)

Figure 4-7 Pointed hat pattern contour (DN 1:33)
The second most commonly found intonation contour type in Kayardild is the globally flat or plateau contour. The plateau contours in Kayardild typically begin with a rise at the left edge and are flat to the right edge where a slight rise or fall may be found. An example of a globally flat plateau intonation contour is found in 4-8) and illustrated in Figure 4-8 where the IP displays a slight rise on the final syllable of the IP.

4-8) bithiin-da marri-ju ...
man-NOM hear-POT
‘The (young) men have to listen,’ (AD 12:0)

Figure 4-8 Plateau contour (AD 12:0)

The globally rising contour is a less commonly found contour than the globally flat and hat pattern contours, as was also found in Dalabon. A globally rising intonation contour of the example given in 4-9) is illustrated in Figure 4-9. Here the pitch begins at a low mid level rising steadily to a sustained flat contour in the middle of the IP and finishing with a final rising boundary tone.

4-9) nga-da ra-rung-kiya ...
1SG-NOM south-ALL-MLOC
‘I’m out to the south.’ (PG2 10:0)
The intonational patterns described above have also been attested by previous research into the intonation of Kayardild (Fletcher, et al., 2002; Round, 2009, 2010).

4.3 IP constituent counts

An overview of the constituent counts found per IP in Dalabon and Kayardild will be given here. As typologically diverse languages will encode information differently, it is hypothesised that an IP in a polysynthetic language will comprise fewer grammatical words than an IP in an analytic language which will comprise more grammatical words per IP. Rather than grammatical word counts then, the number of morphemes found per IP may be a better indicator of the amount of information encoded in an IP in a polysynthetic language. It should be noted, however, that presuming a close correlation between morphemes and information units is problematic due the differences of meaning encoded in various morphemes (see e.g. Chafe, 1985: 16 for discussion).

Figures for the average number of morphemes per IP, and words per IP, as well as standard deviations (SD) of these averages are given in Table 4-3 for Dalabon and in Table 4-4 for Kayardild. In Dalabon an IP comprises 3.2 morphemes and 2.3 words on average. IPs in Dalabon show considerable inter-speaker variation with the number of morphemes per IP ranging from 2.8 to 3.6, and the number of words per IP ranging from 1.9 to 2.7. Kayardild IPs comprise 3.9 morphemes and 2.3 grammatical words, which is very similar to the figures for Dalabon. These results further reveal some considerable inter-speaker variation, as was likewise found in Dalabon. In Kayardild the
number of morphemes per IP ranges from 3.3 to 4.7, while the number of words per IP ranges from 1.9 to 2.5. Furthermore standard deviations reveal a wide spread of values for both Dalabon and Kayardild revealing that IPs may consist of few or many words. This wide spread of values may reflect the finding that IPs, in addition to comprising few words, may also comprise two or more clauses (therefore resulting in high word and morpheme counts), to be discussed in detail in Section 6.2.

<table>
<thead>
<tr>
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<th>Morpheme</th>
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<th>Word</th>
<th>SD</th>
</tr>
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<td>2.6</td>
<td>2.6</td>
<td>1.6</td>
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<td>MT</td>
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<td>2.1</td>
<td>2.7</td>
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</tr>
<tr>
<td>JC</td>
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<td>1.8</td>
<td>2.0</td>
<td>1.2</td>
</tr>
<tr>
<td>JW</td>
<td>2.8</td>
<td>1.6</td>
<td>1.9</td>
<td>1.1</td>
</tr>
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<td>Dalabon</td>
<td>3.2</td>
<td>2.1</td>
<td>2.3</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Table 4-3 Morpheme and word frequencies per IP in Dalabon

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<th>Morpheme</th>
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<th>Word</th>
<th>SD</th>
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<td>2.4</td>
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<tr>
<td>DN</td>
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<td>2.4</td>
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</tr>
<tr>
<td>PG1</td>
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<td>1.9</td>
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<td>0.9</td>
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<tr>
<td>PGZ</td>
<td>3.3</td>
<td>2.0</td>
<td>1.9</td>
<td>1.1</td>
</tr>
<tr>
<td>RK</td>
<td>3.9</td>
<td>2.1</td>
<td>2.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Kayardild</td>
<td>3.9</td>
<td>2.1</td>
<td>2.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Table 4-4 Morpheme and word frequencies per IP in Kayardild

The findings in Table 4-3 reveal slightly higher results than a previous study of Dalabon, which showed that an IP on average consists of approximately 1.9 grammatical words (Fletcher, et al., 2004). Similar results are found in Bishop’s study of the Bininj Gun-wok dialects where a survey of phrasing across Manyallaluk Mayali, Kune and Kunwinjku reveals that IPs consist of between 1.5 and 2.1 words (Bishop, 2003:56). As in Dalabon, these figures reflect the polysynthetic nature of Bininj Gun-wok, where much information in the clause is incorporated into the verb, thus reducing the use of free nominal and adverbial words to instances where further specification is required. In Seneca the IP consists of two modal words on average in conversational speech (Chafe,
In contrast to these polysynthetic languages where IPs contain few words, studies of analytic languages reveal higher numbers of words per IP. Studies of English have found that on average an IP consists of four to five words (Altenberg, 1987; Chafe, 1985; 1994:65; Crystal, 1969) or six words (Croft, 1995). A study of conversational Mandarin reveals that the IP on average consists of 3.5 words, where a free morpheme is considered a word (Tao, 1996: 53). A study of IPs in conversational German reveals that an IP comprises on average 4.3 words ranging from one to 12 words (Schuetze-Coburn, 1994: 265). A further difference between the above studies is the type of discourse analysed with studies of conversational speech showing lower word per IP counts than spontaneous narrative. This finding suggests that it may be important to factor in the type of discourse analysed in these studies.

In regards to studies of morpheme counts per IP, an IP comprises 3.2 morphemes in Dalabon and 3.9 morphemes in Kayardild. In contrast, an IP in the highly polysynthetic language Seneca on average comprises approximately eight morphemes, while an IP in English, an analytic language, also comprises approximately eight morphemes (Chafe, 1985:16). Both Dalabon and Kayardild IPs on average consist of a smaller number of morphemes compared to both Seneca and English. In Dalabon this finding may be a result of the high number of NPs found in the corpus (see Section 5.5.1), which generally do not attract morphological suffixing and are often given their own IP. In Kayardild the low morpheme to IP ratio may be a result of the frequent prosodic juncture (including pausing) found in the corpus.

The Dalabon findings presented above support the hypothesis that IPs in polysynthetic languages will comprise a small number of grammatical words due to the high morphological encoding found on verbal words which is generally found in polysynthetic languages. In contrast, analytic languages such as English show somewhat higher word to IP ratios. Surprisingly, Dalabon IPs comprise fewer morphemes per IP than both polysynthetic and analytic languages in previous research, which may be a result of the high amount of morphologically simple NPs, which are often given their own IP, as discussed in Section 6.1.2. As shown in Table 6-1
a relatively high percentage of NPs in Dalabon at 16.8% are given their own IP and found at the periphery of a clause. Again this finding may reflect discourse type with spontaneous monologues analysed. A previous study of three Dalabon narratives (Cutfield, in prep.) reveals that IPs most commonly do not contain a verb (but may include verbless predicates) with the second most common IPs comprising just a verb. IPs which are made up of a verb and subject or object NP are uncommon. These results are reflected in the Dalabon corpus used in the current study, and explain the high occurrence of IP boundaries found within a clause.

In contrast to a polysynthetic language such as Dalabon, it is predicted that Kayardild, being a dependent-marking language, will comprise a higher number of words per IP. Interestingly, however, this prediction is not borne out by the data, as the Kayardild figures are very similar to those given for Dalabon, with Kayardild IPs comprising more morphemes and slightly less words than Dalabon. IPs in Kayardild then consist of a slightly larger number of morphemes at 3.9 compared to Dalabon (3.2 morphemes), yet a significantly smaller number than both Seneca and English (approximately eight morphemes). The low grammatical word counts per IP in Kayardild may be caused by the high frequency of pausing found in the corpus, compared to that of Dalabon (see Section 5.1 for further details regarding pause patterns in Dalabon and Kayardild). Frequent pausing results in short IPs which may be especially needed for planning purposes in Kayardild. This finding confirms the hypothesis (discussed in Section 1.3) that Kayardild speakers need more planning time due to the complexity and far-reaching span of case-marking on all constituents within a clause (see Section 1.3 and Section 2.2.4 for discussion).

The Kayardild findings then challenge the assumption that IPs in less synthetic languages will comprise a higher number of words than IPs in more synthetic languages, which may be due to the high levels of prosodic phrasing (including pausing – see Section 5.1 for details) found in Kayardild. The higher frequency of prosodic phrasing may result from a heightened need for planning and comprehension time for both speaker and listener due to the structure of Kayardild which requires syntactic
marking of all constituents in order to show the syntactic dependencies between constituents. These results may furthermore reflect the unscripted nature of the discourse analysed, as speech genre has been shown to affect prosody (e.g. Chafe, 1987; Chafe, 1994; Goldman-Eisler, 1968; Iwasaki, 1996; Iwasaki & Tao, 1993; Yaeger-Dror, 2002).

4.4 IP durations

The average physical duration of IPs in milliseconds (ms) found in each of the Dalabon narratives is given in Table 4-5. These results reveal considerable inter-speaker variation with IP durations ranging from 847 to 1142 ms with an overall average of 1032 ms. This variability is expected as a high level of inter-speaker variability is typically found in natural spontaneous discourse (Fletcher, 2010). Standard deviations reveal a considerable range of values reflecting the wide range of variability of the IP durations in the corpus. The durations in Table 4-5 reflect the morpheme and word counts per IP for each individual speaker given in Table 4-3.

<table>
<thead>
<tr>
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<th>Mean duration (ms)</th>
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<tbody>
<tr>
<td>AB</td>
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<td>726</td>
</tr>
<tr>
<td>MT</td>
<td>1213</td>
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<tr>
<td>JC</td>
<td>927</td>
<td>612</td>
</tr>
<tr>
<td>JW</td>
<td>847</td>
<td>464</td>
</tr>
<tr>
<td>Dalabon</td>
<td>1032</td>
<td>649</td>
</tr>
</tbody>
</table>

Table 4-5 IP durations in Dalabon

The average durations of IPs of each of the Kayardild narratives is given in Table 4-6. These results reveal considerable inter-speaker variation as expected, with IP durations ranging from 894 to 1179 ms. Standard deviations reveal a considerable range of values.
<table>
<thead>
<tr>
<th></th>
<th>Mean duration (ms)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>1012</td>
<td>525</td>
</tr>
<tr>
<td>DN</td>
<td>1179</td>
<td>560</td>
</tr>
<tr>
<td>PG1</td>
<td>894</td>
<td>478</td>
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<tr>
<td>PG2</td>
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<td>526</td>
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<tr>
<td>RK</td>
<td>1073</td>
<td>507</td>
</tr>
<tr>
<td>Kayardild</td>
<td>1020</td>
<td>525</td>
</tr>
</tbody>
</table>

Table 4-6 IP durations in Kayardild

The Kayardild results in Table 4-6 closely resemble those found for Dalabon given in Table 4-5 where IP durations range from 847 to 1142 ms with an overall average of 1020ms. The similarities in IP durations for Dalabon and Kayardild then reflect the morpheme counts per IP found in both Dalabon and Kayardild.

### 4.5 Intonational fragments

This section will give an overview of intonational fragments, which are found in the corpus in connection with speech disfluencies. Although disfluency is unlike other types of prosodic phrasing, given that it is unplanned and unintentional, its study may reveal some interesting insight into the underlying processes at work in speech production, for example through instances where speakers experience difficulty planning and producing an utterance. Research has shown that spontaneous speech contains a significant amount of speech disfluencies in the form of filled pauses, repetitions and repairs (Shriberg, 2001). In natural conversation these disfluencies have been found to affect up to ten percent of words and over one third utterances (Shriberg, 2001: 153). For these reasons, a brief overview of typical examples of disfluencies will be included in the current dissertation. These incomplete prosodic units, or intonational fragments, however, are not to be confused with IPs which are fully formed IPs with final boundary tones.

The following Dalabon examples of disfluency are all found in connection with intonational fragments where a final boundary tone is lacking, as in 4-11), as well as the presence of a pause, as in 4-10). In 4-10) the clause is divided into four IPs, where
the first IP boundary follows a speech disfluency, as made evident by the incomplete word \textit{wu\~}{ }which carries an incomplete intonational contour, as shown in Figure 4-10. The final disfluent segment in the IP is underlined in the transcription. The second and third IPs carry sustained high right edge boundary tones which signal incompleteness of utterance, while the last IP ends with a final fall signalling completeness of utterance.

4-10) \textit{ngey wu\~}{ }... \textit{wulkûn-djan-ngan / me dis ySIB-FEM-my}

\textit{ngey ... njerr bûla-h-bowo-ng ...}
\textit{me 1DUOBJ 3PL-R-leave-PP}

‘They left us two, me and my little sister.’ (AB 1:53)

The final IPU in 4-11), with the pitch trace illustrated in Figure 4-11, shows an instance where a grammatical verbal word is interrupted by two junctures. The final disfluent segment in the IP is underlined in the transcription. Here the verbal word is separated into three IPs, where the initial two are intonational fragments lacking final boundary tones. The initial intonational fragment contains just the pronominal prefix + realis marker \textit{kah\~}, while the second intonational fragment is an incorporated nominal -\textit{yaw-} ‘child’. The third IP which comprises the verb root and tense marker, -\textit{kodjingalminj}, is complete ending with final lowering (here transcribed with a final low boundary tone).
Figure 4-11 Pitch trace of a speech disfluency (MT 15:11)

The locations of the disfluencies shown above in 4-11) are in accordance with previous studies of the grammatical and prosodic mapping of complex verbal words in Dalabon (Evans, et al., 2008; Fletcher, et al., 2004, 2005; Ross, 2003) where the pronominal prefix and realis marker remain a single prosodic unit, as do the verb root and TAM marker.

Several prosodic constituents in the Kayardild corpus likewise appear to be evidence of speech disfluencies. These prosodic constituents are typically incomplete syntactic constituents and lack a final boundary tone making the intonational contour incomplete. The final disfluent segment in the IP is underlined in the transcription. An example of speech disfluency in Kayardild is given in 4-12) with the pitch trace of the intonational fragment illustrated in Figure 4-12. Here the first IPU shows an intonational fragment as it is lacking a boundary tone and displaying some creaky voice at the rightmost edge. The disfluency is made evident by the incomplete syntactic constituent *wa~* which is completed in the following IP *wambalu* ‘bush’.

4-11) *Kamarrang* yawrno *ka-h-kodj~* ...
Kamarrang small 3SG-R-head

*ka-h~/* *yaw~/* *kodj-ngalm-inj* ...
3SG-R child head-appear-PI

‘The younger Kamarrang, he was born.’ (MT 15:11)

4-12) *dathin-ku* *ril-ung-ku* *wa~* ...
there-MPROP east-ALL-MPROP dis

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wambal-u  ra-yii-ju ... ni ...  
bush-MPROP  spear-M-POT  he:NOM  
‘Heading east wards through the bush he was being speared at.’ (AD 110:13)

Figure 4-12 Intonational fragment (AD 110:13)

The example given in 4-13) and illustrated in Figure 4-14 comprises an initial intonational fragment which is lacking a target boundary tone and is followed by a complete IP. The disfluent segment in the IP is underlined in the transcription. The fragmented lexical item da~ provides further evidence of the incompleteness of the phrase.

4-13)  wuu-ju  wuran-mu-ju  ngalawan-ju /  da~/  
give-POT  food-VDON-POT  1PL-MPROP  dis  

wambaj-u  wuu-ju  ngalawan-ju ...  
calm-MPROP  give-POT  1PL-MPROP  
‘(You) must give us food, must give us calm weather, must give (us) great calm.’ (DN 2:15)

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The examples of prosodic disfluency shown in the above examples in both Dalabon and Kayardild typically show the complete repetition or correction of the disfluent segment. These prosodic units are characterised by an incomplete pitch contour lacking a final boundary tone. Creaky voice is furthermore commonly found in connection with these examples of disfluency. These intonational fragments are not to be confused with IPs which display complete pitch contours and final boundary tone targets.

4.6 Summary

As typologically diverse languages will encode information differently, it was hypothesised that an IP in a polysynthetic language will comprise fewer grammatical words than an IP in an analytic language which will comprise more grammatical words per IP. The findings presented above contradict this hypothesis, as IPs in Kayardild were found to comprise slightly fewer words and slightly more morphemes than in Dalabon.

Dalabon IPs comprise on average 3.2 morphemes and 2.3 words, which is slightly higher than previous findings of Dalabon where IPs on average consists of 1.9 words (Fletcher, et al., 2004). Kayardild IPs comprise 3.9 morphemes and 2.3 grammatical words. The Dalabon findings, however, support the hypothesis that IPs in polysynthetic languages comprise a small number of grammatical words due to the high morphological encoding found on verbal words, which is generally found in polysynthetic languages.
Surprisingly, however, Dalabon and Kayardild IPs comprise fewer morphemes per IP than both polysynthetic and analytic languages in previous research. The number of morphemes per IP in both Dalabon and Kayardild is significantly less than studies have found in both Seneca and English, where IPs on average comprise eight morphemes. In Dalabon, this result may be due to the high amount of morphologically simple NPs, which are often given their own IP (to be discussed in Section 6.1).

The number of words per IP in both Dalabon and Kayardild is similar to studies of polysynthetic languages, such as Bininj Gun-wok where IPs comprise between 1.5 and 2.1 words, and Seneca where IPs average two words. Other studies, however, show that IPs comprise a higher number. In English IPs comprise four to six words, in Mandarin 3.5 words, and in German 4.3 words. A comparison of IP durations reflects these similarities in constituent counts. The low word count per IP in Dalabon may be due to the relatively high percentage of NPs in Dalabon which are given their own IP and found at the periphery of a clause. The morpheme content of IPs, however, is far lower in both Dalabon and Kayardild than studies of English and Seneca have shown. In Dalabon this may be due to the high relative percentage of NPs given their own IP. In Kayardild the low morpheme to IP ratio may be due to the frequent prosodic juncture found. Again these finding may reflect discourse type with spontaneous monologues analysed. IPs in Dalabon often comprise a single verb or NP, and this finding explains the high occurrence of IP boundaries found within a clause. The low grammatical word counts per IP in Kayardild may be caused by the high frequency of pausing found in the corpus, compared to that of Dalabon (see Section 5.1 for further details regarding pause patterns in Dalabon and Kayardild). The higher frequency of prosodic phrasing in Kayardild may result from a heightened need for planning and comprehension time for both speaker and listener due to the structure of Kayardild which requires syntactic marking of all constituents in order to show the syntactic dependencies between constituents. The high frequency of prosodic breaks may, however, reflect the discourse type (e.g. Chafe, 1987; Chafe, 1994; Goldman-Eisler, 1968; Iwasaki, 1996; Iwasaki & Tao, 1993; Yaeger-Dror, 2002). The Dalabon and Kayardild findings may
further reflect cultural practices in both Kayardild and Dalabon to produce short IPs in narratives, possibly as part of the performance integral to the story-telling tradition.
Chapter 5. The clause

This chapter provides a detailed grammatical and prosodic analysis of the clause constituent in Dalabon and Kayardild, accompanied by examples from the corpus. The prosodic phrasing of the clause in Dalabon and Kayardild will be examined, testing the hypothesis that major syntactic boundaries align with stronger prosodic cues (pause and IP boundaries) than minor syntactic boundaries. This chapter will furthermore outline some of the major grammatical findings relating to the clause, as found in the corpus. These findings will be central to the investigation of the interaction between the grammar and prosody of Dalabon and Kayardild, and will be similarly relevant to Sections 6.1 and 6.2.

As discussed in Section 3.3.2, the clause is defined as a grammatical construction which includes a predicate, its core arguments and adjuncts, where the predicate need not be verbal and may be adjectival or nominal. Core arguments are those arguments that are selected by the predicate, while adjuncts are not arguments of the predicate. In Dalabon, context typically supplies adequate information to assign the roles of argument versus adjunct. In Kayardild, case marking on nominals provides information regarding their status as argument versus adjunct. In the few instances where the roles could not be determined the nominals were labelled as ‘other’ and were not included in the various analyses. Also as discussed in Section 3.3.2, verbless clauses in Dalabon comprise nominal or adjectival predicates which are typically not inflected for TAM, and a pronominal prefix is found on the predicate. Verbless clauses in Kayardild comprise a nominal predicator and often lack tense or modality marking making accurate boundary assignment difficult, as discussed in Section 2.2.5.

The structure of this chapter is as follows. Quantitative results of pause results in relation to the clause are given in Section 5.1, and results pertaining to IP boundaries in relation to the clause are given in Section 5.2. A brief overview of the frequencies of the different clause types is provided in Section 5.2.3. Following these quantitative analyses, qualitative descriptions and examples of the prosodic phrasing of the
different clause types will be provided for Dalabon in Section 5.3 and Kayardild in Section 5.4. Following these chapters, grammatical analyses of the clause will be provided for Dalabon and Kayardild. An overview of the clause and its constituents is given in Section 5.5. The word order of clauses will be provided in Section 5.6 followed by a description of the intonation patterns found in connection with the various word order patterns in Section 5.7. Finally, a quantitative examination of clause durations and any significant differences between clause types will be given in Section 5.5.3. A discussion of the main findings of the chapter will be provided in Section 5.8.

It is hypothesised that the syntax of Dalabon and Kayardild clauses will show a large degree of ellipsis of nominals, as is found in Australian languages generally (e.g. Mushin, 2005). Dalabon will display a higher degree of ellipsis due to the encoding possibilities on the verb where argument referents are encoded as pronominal prefixes on the verb. It is further hypothesised that Dalabon and Kayardild, both having free word order, will display similar word order tendencies reflecting pragmatic principles, as has been found in a range of Australian languages (e.g. B. Baker & Mushin, 2008). This includes the tendency for argument NPs to appear in clause-initial position when introducing new information to the discourse.

As discussed in Section 1.3, it is hypothesised that there will be some significant differences between the clause constituent in Dalabon and Kayardild due to the typological differences between the languages. Dalabon clauses will comprise fewer words and as a consequence be of a shorter duration in ms. Dalabon clauses will further have a lower number of NPs than Kayardild. Kayardild clauses will comprise more words, have a higher amount of NPs, and have longer durations than Dalabon. Dalabon being highly polysynthetic, it is hypothesised that referents will be encoded on the verb to a large extent, thereby minimising the overall amount of NPs used in Dalabon. Due to this, the duration of clauses is likely to be shorter in Dalabon than in Kayardild. In contrast, it is hypothesised that clauses will be longer in Kayardild due to the higher average number of words per clause (although note from the previous chapter, that there are the same average number of words in the IP in Kayardild).
Pausing, along with other features of prosody, is claimed to play a role in higher-level linguistic processing by allowing for speaker planning, listener processing time, as well as to demarcate various kinds of boundaries (e.g. Himmelmann & Ladd, 2008; O'Connell & Kowal, 2008). It is hypothesised that more speaker planning time, as well as listener comprehension time, may be needed in Kayardild due to the longer ‘projections’ of syntactic structure (as discussed in Section 1.3 and Section 2.2.4). This may result in longer pauses between syntactic units. Similarly, it is hypothesised that the shorter ‘projections’ of syntactic structure found in Dalabon due to the weak syntactic dependencies between units will not necessarily warrant the need for longer pauses for speaker planning or listener comprehension purposes.

In regard to pause, the hypothesis will be tested in both Dalabon and Kayardild in Section 5.1 that pauses are both more frequent (i.e. that a clause boundary will more likely attract a pause than a word boundary within a clause) and longer at clause boundaries than within a clause, in line with previous research on pause patterning (Butcher, 1981; Grosjean, 1980b; Grosjean, et al., 1979; Sanderman & Collier, 1995; Yang, 2007). This follows from the finding that stronger syntactic boundaries, such as clause boundaries, are more likely to be more marked prosodically, for example by pause location and duration. It is further hypothesised that the complexity of a syntactic constituent (measured in morpheme and word counts as well as the syntactic embedding signalled by case marking) may affect surrounding pause durations, as research has found that the syntactic complexity of an utterance may affect the surrounding pause or initiation times (e.g. F. Ferreira, 1991; Zvonik & Cummins, 2003).

In regard to intonational phrasing, the universality of the clause and IP alignment will be tested in both Dalabon and Kayardild in Section 5.2.1. It is hypothesised that clause boundaries will generally align with IP boundaries, as has been found universally in languages as typologically diverse as English, Wardaman (Croft, 2007), Japanese (Matsumoto, 2003) and Mandarin (Tao, 1996). These studies further reveal that although clause boundaries typically align with IP boundaries and pauses, the opposite
does not hold, as clauses are often made up of several IPs, and this will likewise be examined in Dalabon and Kayardild.

Further, the hypothesis that certain grammatical locations will attract certain types of boundary tones will be tested in Section 5.2.2. Specifically, it will be investigated whether clause boundaries display a higher proportion of final low boundary tones than IP boundaries found within clauses. As discussed in Section 1.2.2, research has shown that final lowering (i.e. an extra suppression of local pitch range associated with final low boundary tones) is typically found in connection with finality, while final high boundary tones indicate that there is more to come on the same topic (e.g. Brown, et al., 1980; Pierrehumbert & Hirschberg, 1990).

In line with the hypotheses stated above, findings will reveal that clause boundaries typically align with an IP boundary, as well as a pause, in both Dalabon and Kayardild, and that pauses found at clause durations are statistically longer than those found within a clause. IP boundary tones found clause-finall will show higher degrees of final low boundary tones than within a clause in both Dalabon and Kayardild. In the sections that follow I will further show that there is no clear correspondence between the prosodic phrasing and the grammatical complexity of a clause.

5.1 Pause and the clause

This section will investigate the relationship between the clause and pause by examining the overall patterning of pauses found within a clause, as well as pauses found at a clause boundary. Pause durations in ms, frequencies and percentages will be examined in both Dalabon and Kayardild and results will be compared both within and between the languages in order to establish the overall trends found. The results presented here are based on token counts and durations of pauses. As discussed in Section 3.3.1, silent pauses measuring 200ms or more were labelled and identified through a lack of voicing in the acoustic waveform.
As discussed in Section 1.2 pausing in speech has been found to correlate with a number of factors including syntactic constituency and complexity, boundary strength, prosodic length of constituents, finality of a unit, and discourse functions such as topicality and emphasis. Furthermore, pausing, along with other prosodic aspects such as intonation, is claimed to play a role in higher-level linguistic processing, both for the speaker and the hearer. A speaker may use pausing to allow for the planning of the remainder of an utterance, to demarcate various kinds of boundaries to the listener, as well as to allow the listener more time to process the spoken material (e.g. Himmelmann & Ladd, 2008; O'Connell & Kowal, 2008). Research has shown that pauses are more commonly found to occur at major structural boundaries, such as clause and sentence boundaries, than elsewhere (Grosjean, 1980b; Grosjean, et al., 1979; Yang, 2007), and furthermore that pauses located at major structural boundaries are longer than those located elsewhere (e.g. Butcher, 1981; Fant, et al., 2003; Grosjean, 1980b; Grosjean, et al., 1979; Sanderman & Collier, 1995).

5.1.1 Boundary and non-boundary pauses

In this section pauses have been divided into two main categories – boundary pauses (or inter clause pauses) and non-boundary (or intra clause pauses) – in order to test hypotheses regarding structural boundary strength. Boundary pauses are those located at clause boundaries, while non-boundary pauses are those located within a clause. The results presented below confirm the hypotheses that pauses are more likely to occur at clause boundaries than within clauses, and that pauses are longer at clause boundaries in both Dalabon and Kayardild. Interestingly, both intra and inter clause pause durations are significantly longer in Kayardild than in Dalabon.

Table 5-1 provides an overview of pause counts and percentages, as well as mean durations of pauses found at clause boundaries and pauses found within clauses for both Dalabon and Kayardild. As predicted, the pauses located within a clause are fewer and shorter than those located at a clause boundary. In line with the hypothesis stated above then, the results in Table 5-1 confirm that both Dalabon and Kayardild speakers are more likely to pause before or after uttering a clause, than within a clause with
approximately three quarters of all pauses found at clause boundaries in both Dalabon and Kayardild. The percentage of pauses found at clause boundaries is very similar in Kayardild (at 71.9%) and in Dalabon (at 73.8%). Furthermore, the pause overview reveals that pause durations at clause boundaries tend to be considerably longer than those found within clauses for both languages. In Dalabon, intra clause pauses average 735ms in duration, while inter clause pauses are significantly longer on average, at 1147ms in duration. In Kayardild, intra clause pauses average 819ms in duration, while inter clause pauses are significantly longer on average, at 1543ms in duration. What is surprising here is the large difference between pause durations in each language, with pauses significantly longer in Kayardild than Dalabon. Despite this finding, however, both languages confirm the hypothesis that longer pauses are found at stronger syntactic boundaries. The finding that pause durations are longer in Kayardild than in Dalabon may be a result of a heightened need for planning time for the speaker.

<table>
<thead>
<tr>
<th></th>
<th>Total pause count</th>
<th>Intra clause count</th>
<th>Intra clause mean</th>
<th>Intra clause percentage (of pauses)</th>
<th>Inter clause count</th>
<th>Inter clause mean</th>
<th>Inter clause percentage (of pauses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalabon</td>
<td>837</td>
<td>219</td>
<td>735</td>
<td>26.2</td>
<td>618</td>
<td>1147</td>
<td>73.8</td>
</tr>
<tr>
<td>Kayardild</td>
<td>520</td>
<td>146</td>
<td>819</td>
<td>28.1</td>
<td>374</td>
<td>1543</td>
<td>71.9</td>
</tr>
</tbody>
</table>

Table 5-1 Overview of pause duration measurements in ms for Dalabon and Kayardild

T-tests were conducted to establish whether the durations of pauses found within clauses, and at clause boundaries belong to different groups in Dalabon and Kayardild. As predicted, the t-test results (shown in Table 5-2), show that the groupings are significantly different revealing that the pause types (those found within a clause and at a clause boundary) belong to separate groups.

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalabon</td>
<td>8.2179</td>
<td>417.814</td>
<td>2.629e-15</td>
</tr>
<tr>
<td>Kayardild</td>
<td>5.5883</td>
<td>428.747</td>
<td>4.085e-08</td>
</tr>
</tbody>
</table>

Table 5-2 T-test results of Dalabon and Kayardild inter and intra pauses
The overall pause durations for Dalabon and Kayardild are displayed graphically in the following box plot in Figure 5-1 where outliers measuring above 5000ms in duration have been removed. In the Kayardild data 17 of all pauses measure 5000ms or more, while there were no pauses measuring more than 5000ms in the Dalabon data. The outer ‘whiskers’ of the box-plots contain approximately 99.3% of the values. The midsection of the box indicates the mean of the pause durations, while circles denote the outliers. The box plot reveals that the Dalabon pause durations show a smaller spread of values with a lower mean, while a larger spread of values as well as a higher mean is seen in the Kayardild pause durations. Kayardild furthermore has more outliers than Dalabon. These results indicate that the pause durations in the two languages fall into different groups, with the Dalabon values generally centred around lower durations than the Kayardild values.

Figure 5-1 Box plot of pause durations in Dalabon and Kayardild

In order to outline the distributions of values within each language a histogram of pause durations in Dalabon and Kayardild is given in Figure 5-2. Again outliers measuring more than 5000ms have been removed. The histograms reveal very similar distributions of values with the most commonly found pause durations measuring between 500 and 1000ms.
As mentioned in Section 3.1, measurements were taken for each of the narratives in order to determine the degree of inter-speaker variability in the narratives. Table 5-3 provides counts, durations and percentages of pauses found at clause boundaries (inter clause pauses) and pauses found within clauses (intra clause pauses). The results for each of the narratives as well as the combined Dalabon corpus given in Table 5-3 reveal strong similarities across the narratives. There is a small degree of variation in regards to intra and inter pause durations, but hardly any variation in the percentages of pauses found within clauses and at clause boundaries.

<table>
<thead>
<tr>
<th></th>
<th>Total pause</th>
<th>Intra clause count</th>
<th>Intra clause mean</th>
<th>Intra clause percentage (of pauses)</th>
<th>Inter clause count</th>
<th>Inter clause mean</th>
<th>Inter clause percentage (of pauses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>137</td>
<td>39</td>
<td>615</td>
<td>28.5</td>
<td>98</td>
<td>1099</td>
<td>71.5</td>
</tr>
<tr>
<td>MT</td>
<td>395</td>
<td>107</td>
<td>901</td>
<td>27.1</td>
<td>288</td>
<td>1266</td>
<td>72.9</td>
</tr>
<tr>
<td>JC</td>
<td>135</td>
<td>37</td>
<td>729</td>
<td>27.4</td>
<td>98</td>
<td>882</td>
<td>72.6</td>
</tr>
<tr>
<td>JW</td>
<td>170</td>
<td>36</td>
<td>693</td>
<td>21.2</td>
<td>134</td>
<td>1342</td>
<td>78.8</td>
</tr>
<tr>
<td>Dalabon</td>
<td>837</td>
<td>219</td>
<td>735</td>
<td>26.2</td>
<td>618</td>
<td>1147</td>
<td>73.8</td>
</tr>
</tbody>
</table>

Table 5-3 Intra and inter clause pause counts and mean durations in Dalabon
T-tests were run for the different pause types for each narrative in order to determine whether the intra and inter clause pause types belong to statistically significant different groups. The results given in Table 5-4 reveal that the pause types belong to different groups for almost all of the narratives, supporting the hypothesis that pauses found at clause boundaries are longer than those found within a clause. Results are highly significant for all of the narratives except for the narrative recounted by JC.

<table>
<thead>
<tr>
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<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td>AB</td>
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<td>95.202</td>
<td>2.656e-08</td>
</tr>
<tr>
<td>MT</td>
<td>-4.4072</td>
<td>181.229</td>
<td>1.790e-05</td>
</tr>
<tr>
<td>JC</td>
<td>-1.473</td>
<td>63.977</td>
<td>0.1456</td>
</tr>
<tr>
<td>JW</td>
<td>-7.1342</td>
<td>108.182</td>
<td>1.163e-10</td>
</tr>
</tbody>
</table>

Table 5-4 T-test results of inter and intra pauses in Dalabon

In order to establish any inter-speaker variability in the Kayardild corpus, Table 5-5 shows pause measurements for each of the Kayardild narratives. Due to the issues surrounding verbless clauses (discussed in Section 2.2.5) only main and subordinate clauses are included in these results given in Table 5-5. Considerable inter-speaker variation is found in both pause durations as well as pause location percentages. However, as expected, and similar to Dalabon, the pauses located within main and subordinate clauses are fewer and shorter than those located at clause boundaries. Interestingly, the percentages of both intra and inter clause pauses in Kayardild are similar to those of Dalabon, although the durations of those pauses differ significantly between the languages.
Table 5-5 Intra and inter clause pause counts and mean durations in Kayardild

As in Dalabon, t-tests were performed on the different pause types for each narrative to determine whether the intra and inter clause pause types belong to statistically significant different groups. The results given in Table 5-6 support the hypothesis that pauses found at clause boundaries are longer than those found within a clause. Results are highly significant for all of the narratives except for the PG1 narrative.

Table 5-6 T-test results of inter and intra pauses in Kayardild

Table 5-7 summarises pause measurements for the different clauses types in Dalabon. The pause counts and durations are given for pauses found within, as well as for those pauses found preceding and following a clause. These last two pause types show a high degree of overlap, as many pauses both precede and follow a clause. These figures reveal that, as found overall for the combined clause types, pauses found within all clause types have significantly lower means than those pauses found to precede or follow all clause types. Note the very low number of intra-clause pauses in subordinate
clauses (n=10) and verbless clauses (n=5) despite the numbers of subordinate clauses (n=48) and verbless clauses (n=20) (See Table 5-20 and Table 6-1 for details). Overall, main clauses show the shortest durations of pause within clauses, while verbless clauses show the longest. In regards to clause boundaries, main and subordinate clauses show the longest durations while verbless clauses show the shortest.

<table>
<thead>
<tr>
<th></th>
<th>Intra clause count</th>
<th>Intra clause mean</th>
<th>Pre main clause count</th>
<th>Pre main clause mean</th>
<th>Post main clause count</th>
<th>Post main clause mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Main</td>
<td>36</td>
<td>575</td>
<td>74</td>
<td>1448</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Sub</td>
<td>3</td>
<td>1089</td>
<td>9</td>
<td>1566</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Verbless</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>1122</td>
<td>1</td>
</tr>
<tr>
<td>MT</td>
<td>Main</td>
<td>100</td>
<td>894</td>
<td>226</td>
<td>1593</td>
<td>234</td>
</tr>
<tr>
<td></td>
<td>Sub</td>
<td>5</td>
<td>869</td>
<td>19</td>
<td>1523</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Verbless</td>
<td>2</td>
<td>1323</td>
<td>5</td>
<td>1164</td>
<td>4</td>
</tr>
<tr>
<td>JC</td>
<td>Main</td>
<td>34</td>
<td>739</td>
<td>74</td>
<td>1154</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>Sub</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1221</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Verbless</td>
<td>3</td>
<td>624</td>
<td>4</td>
<td>993</td>
<td>3</td>
</tr>
<tr>
<td>JW</td>
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<td>115</td>
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<td>635</td>
<td>5</td>
<td>1766</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Verbless</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dalabon</td>
<td>Main</td>
<td>204</td>
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<td>489</td>
<td>1446</td>
<td>511</td>
</tr>
<tr>
<td></td>
<td>Sub</td>
<td>10</td>
<td>864</td>
<td>36</td>
<td>1519</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Verbless</td>
<td>5</td>
<td>974</td>
<td>14</td>
<td>1093</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 5-7 Clause pause information in Dalabon

In order to test whether the differences between these groups for main clause are statistically significant, t-tests were conducted. The t-test results in Table 5-8 reveal the differences between the intra main clause pauses in Dalabon and the preceding and following pauses are statistically significant, confirming that these belong to separate groups. Due to the small sample sizes of the subordinate and verbless clause pauses, t-tests were not run to avoid unreliable results.
Table 5-8 T-tests of main intra and pre and post clause pauses in Dalabon

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Pre</td>
<td>-9.594</td>
<td>105.523</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-9.9092</td>
<td>104.299</td>
</tr>
<tr>
<td>MT</td>
<td>Pre</td>
<td>-8.1745</td>
<td>166.619</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-8.497</td>
<td>190.36</td>
</tr>
<tr>
<td>JC</td>
<td>Pre</td>
<td>-3.5151</td>
<td>67.189</td>
</tr>
<tr>
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<td>Post</td>
<td>-3.2194</td>
<td>57.999</td>
</tr>
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<td>Pre</td>
<td>-9.1088</td>
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<td>Post</td>
<td>-9.4094</td>
<td>109.688</td>
</tr>
</tbody>
</table>

In order to test whether the differences found above are also found within each of the clause types in Kayardild, pause measurements were separated according to clause type. Table 5-9 gives pause measurements for the main and subordinate clauses in Kayardild. As above, verbless clauses were not included due to the issues surrounding their identification (discussed in Section 2.2.5). These results confirm that the intra main clause pauses are significantly shorter, at 819ms, than those found at a main clause boundary, at 1778 and 1730 ms, although both intra and inter clause pauses are extremely long. As no pauses were found within a subordinate clause in Kayardild, the first two columns remain blank. This is an interesting result, although it must be noted that Kayardild displays a very low number of subordinate clauses at n=9, accounting for just 2.4% of all clause types (See Table 5-21 for further details).
A t-test was conducted to test whether the pauses found within main clauses belong to separate groups statistically to those pauses found preceding and following a main clause. Table 5-10 reveals that overwhelmingly (the exception being PG1), the intra main clause pauses belong to different groups to the pre and post main clauses.
The findings presented here demonstrate that, as predicted, both Dalabon and Kayardild have longer and more frequent pauses at clause boundaries compared to pauses located within clauses. Despite this similarity, a closer examination of pause durations in Dalabon and Kayardild reveal statistically significant differences between the languages, with pause durations generally shorter in Dalabon than in Kayardild in both inter- and intra-clause positions. Overall, however, pause durations presented above for Dalabon and especially Kayardild may be extremely long.

### 5.1.2 Pause percentages

In order to outline the overall pause patterning and the relationship between pause and speech time between languages as well as between the different clause types, the overall amount of time made up by pausing in the narratives is examined. The pause percentages for both Dalabon and Kayardild are given in Table 5-11 and reveal the overall percentage of time that comprises pausing in each of the narratives. In addition to the overall pausing percentage, the pausing percentage within the different clause types was investigated. As a large percentage of pauses are located at clause boundaries (See Table 5-3, Table 5-7, above for Dalabon and Table 5-5, Table 5-9, above for Kayardild), the pausing percentages for each of the clause types are

<table>
<thead>
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<th></th>
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<th>df</th>
<th>p-value</th>
</tr>
</thead>
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<td></td>
<td>Post</td>
<td>-4.1331</td>
<td>176.456</td>
</tr>
<tr>
<td>DN</td>
<td>Pre</td>
<td>-4.729</td>
<td>14.356</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-4.5423</td>
<td>17.931</td>
</tr>
<tr>
<td>PG1</td>
<td>Pre</td>
<td>-3.8928</td>
<td>23.064</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-2.8271</td>
<td>20.431</td>
</tr>
<tr>
<td>PG2</td>
<td>Pre</td>
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<td>88.88</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-4.9414</td>
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<td>Pre</td>
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<td>34.895</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>-4.8677</td>
<td>44.9</td>
</tr>
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</table>

Table 5-10 T-tests of main intra and pre and post clause pauses in Kayardild
significantly lower than for the overall narratives. Results show that Kayardild narratives comprise a significantly higher overall proportion of pausing (at 50.9%) than Dalabon (at 38.7%).

Pause percentages for the different clause types reveal some language specific patterns. Dalabon main clauses generally comprise a lower percentage of pause time (at 12.1%) than Kayardild (at 22.4%). Interestingly, the DN narrative reveals an extremely low pause percentage within main clauses (at 3.8%). This is due to the finding that clauses in the DN narrative are almost always realised as an IP exactly (i.e. both right and left IP and clause boundaries align) and as such, pauses are rarely found within a clause. Significantly, Kayardild subordinate clauses do not contain any pause time (as seen in Table 5-9 above), in contrast to Dalabon subordinate clauses where pause time comprises 10.8% overall.

<table>
<thead>
<tr>
<th></th>
<th>Pause percentage</th>
<th>Main</th>
<th>Subordinate</th>
<th>Verbless</th>
</tr>
</thead>
<tbody>
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<td>AB</td>
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</tr>
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<td>MT</td>
<td>38.8</td>
<td>12.6</td>
<td>9.6</td>
<td>18.0</td>
</tr>
<tr>
<td>JC</td>
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<td>13.3</td>
<td>0.0</td>
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</tr>
<tr>
<td>JW</td>
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<td>13.9</td>
<td>0.0</td>
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</tr>
<tr>
<td>PG1</td>
<td>31.3</td>
<td>15.7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PG2</td>
<td>48.3</td>
<td>19.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>RK</td>
<td>40.0</td>
<td>21.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kayardild</td>
<td>50.9</td>
<td>22.4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5-11 Pause percentages in Dalabon and Kayardild

In regards to pause patterning, results reveal that Kayardild makes use of a higher overall percentage of pausing time than Dalabon, which may in part be due to the overall longer durations of pauses found in Kayardild (with 819ms within a clause and 1543ms at a clause boundary) than in Dalabon (with 735ms within a clause and
1147ms at a clause boundary). A further contributing factor to the significant differences in pausing results between the languages may be that the narrative style of Kayardild encourages a longer time spent pausing.

5.1.3 Speaking tempo

As pausing contributes to the perception of tempo (for an overview see e.g. Fletcher, 2010), it was deemed important to investigate for any correspondences in pausing (both length and percentages) and speaking tempo in the two languages. As discussed in Section 1.1.1.2, the study of speaking tempo has been analysed through two different approaches; speaking rate (speech rate), which measures syllables per second in speech including the pause time, and articulation rate, which is the number of syllables per second of speech excluding pause time. Researchers have claimed that any observable variation in speech rate is due to the differences in pause time, and that articulation rate is a more constant measure (Goldman-Eisler, 1968). Articulation rates as well as speech rates were examined in a pilot study of the Dalabon and Kayardild data (Ross, 2009). In order to examine speaking tempo trends for the two languages, syllable counts were extracted for seven of the narratives used in the current study. These are MT and AB in Dalabon, and all of the Kayardild narratives. The speaking and articulation rates for Dalabon and Kayardild are shown in Table 5-12.

<table>
<thead>
<tr>
<th></th>
<th>Speaking rate</th>
<th>Articulation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
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<td>5.10</td>
</tr>
<tr>
<td>MT</td>
<td>3.08</td>
<td>5.15</td>
</tr>
<tr>
<td>Dalabon</td>
<td>3.09</td>
<td>5.14</td>
</tr>
<tr>
<td>AD</td>
<td>2.06</td>
<td>5.11</td>
</tr>
<tr>
<td>DN</td>
<td>3.13</td>
<td>5.49</td>
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<tr>
<td>RK</td>
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<td>5.53</td>
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<tr>
<td>PG2</td>
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<tr>
<td>PG1</td>
<td>3.17</td>
<td>5.41</td>
</tr>
<tr>
<td>Kayardild</td>
<td>2.33</td>
<td>5.21</td>
</tr>
</tbody>
</table>

Table 5-12 Speaking and articulation rates in Dalabon and Kayardild (adapted from Ross, 2009)
As the pause results in Table 5-11 above show, there are some significant differences between pausing percentages for the two languages, with Dalabon pause time at 38.7% and Kayardild at 50.9%. The lower pause percentage evident in Dalabon explains the high speaking rate for Dalabon (ranging from 3.08 to 3.10 syllables per second), as speakers use less pause time than in Kayardild (ranging from 2.06 to 3.17 syllables per second). As such, articulation times are more representative of the speed of speech. Interestingly, the figures presented above reveal a narrow spread across languages and speakers with articulation rates ranging from 5.10 to 5.15 syllables per second in Dalabon, and 5.05 to 5.53 syllables per second in Kayardild. Typically, however, studies examining tempo report high levels of inter-speaker variability (Fletcher, 2010).

Speaking tempo results reflect the pausing percentages of Dalabon and Kayardild with evident differences in speaking rates between Dalabon (at 3.09 syllables per second) and Kayardild (at 2.33 syllables per second). The notable difference in speaking rate is due to the higher amount of pausing time found in Kayardild. Similar articulation rates are displayed by both Dalabon (at 5.14 syllables per second) and Kayardild (at 5.21 syllables per second).

Although the results presented in this section reveal a degree of inter-speaker variability, as is expected in a corpus of spontaneous monologues, clear trends emerge both within and between Dalabon and Kayardild reflecting the hypotheses stated in Section 1.3.

### 5.2 Intonation and the clause

This section will examine the intonational phrasing found in connection with the clause in Dalabon and Kayardild. The alignment of IP boundaries with clause boundaries, as well as the types of IP boundaries found at clause boundaries will be examined in both Dalabon and Kayardild in Section 5.2.1 followed by a comparison of the different IP boundaries found in connection with the different clause types in Dalabon and Kayardild in Section 5.2.2. As previously stated, it is hypothesised that clause boundaries will commonly align with IP boundaries, as previous research has found
this to be the case in a range of languages as typologically diverse as Wardaman (Croft, 2007; Merlan, 1994), English (Chafe, 1980; Croft, 1995; Merlan, 1994), Mandarin (Tao, 1996), Japanese (Matsumoto, 2000, 2003), Korean (Park, 2002) and Portuguese (Frota & Vigário, 2007).

It is further hypothesised that clause boundaries will display a higher proportion of final low boundary tones than IP boundaries found within clauses. As discussed in Section 1.2 this is due to the finding that final lowering\(^7\) is typically found in connection with finality, while final high boundary tones are typically found in connection with high plateau or rising tunes, which in turn may indicate continuation with more to come on the same topic (e.g. Brown, et al., 1980; Gussenhoven, 2002: 51; Pierrehumbert & Hirschberg, 1990).

These claims will be explored in both Dalabon and Kayardild in Section 5.2.2 by examining whether a higher proportion of low right edge boundary tones are found clause finally than elsewhere within a clause (as this position in the clause is presumed to be a stronger marker of finality of utterance than elsewhere), and whether a higher proportion of high right edge boundary tones are found within a clause than clause finally (as incomplete or continuing utterances are more likely to be found within a clause than at its end). Admittedly, by studying the intonational boundary tones alone, information concerning the intonational tune may be lost; final low boundary tones do not exclusively signal whether the tune ends with final lowering of the pitch range. Although the approach taken here does not capture all information concerning the

\(^7\) Final lowering refers to the extra local suppression of pitch range at the rightmost edge of a unit, and as such final lowering is always marked by a final low boundary tone (L%). It is important to note, however, that a final low boundary tone (L%) does not necessarily imply the presence of final lowering – i.e. extra local suppression of the pitch range may not be present.
intonational contours of an IP, it does, however, allow for an adequate examination of final boundary tones corresponding to clause position while providing a quantitative analysis of the corpus.

5.2.1 The clausal IP

Table 5-13 gives the percentages for all the right and left edge clause boundaries which align with an IP boundary in Dalabon – i.e. these results display how the right edges of IPs and clauses align and how the left edges of IPs and clauses align. The percentages given reveal a high degree of clause boundary alignment with IP boundaries, with the left edges of clauses showing a slightly higher alignment percentage than the right edges of clauses. These results further reveal slight inter-speaker differences. As expected, the left edges of clauses align with an IP boundary between 81.4% (AB) and 90.5% (JW) of all instances, with an overall average of 86.1% of alignment. Right clause edges align with IP boundaries between 75.2% (MT) and 84.5% (JW) of all instances with an overall average of 78.5%. These results reveal that the beginnings of clauses are slightly more likely to align with an IP boundary than the end of a clause. The Dalabon results are in line with the hypothesis that clause boundaries are likely to align with prosodic cues of IP boundaries.

<table>
<thead>
<tr>
<th></th>
<th>Left align</th>
<th>Right align</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>81.4</td>
<td>76.1</td>
</tr>
<tr>
<td>MT</td>
<td>85.4</td>
<td>75.2</td>
</tr>
<tr>
<td>JC</td>
<td>87.9</td>
<td>84.3</td>
</tr>
<tr>
<td>JW</td>
<td>90.5</td>
<td>84.5</td>
</tr>
<tr>
<td>Dalabon</td>
<td>86.1</td>
<td>78.5</td>
</tr>
</tbody>
</table>

Table 5-13 Percentages of clause boundaries which align with IP boundaries in Dalabon

Table 5-14 shows the percentages for all the right and left edge clause boundaries which align with an IP boundary in Kayardild. As is the case in Dalabon, the percentages reveal a high degree of clause boundary alignment with IP boundaries, again with the left edges of clauses showing a higher alignment percentage than the
right edges of clauses. Small inter-speaker differences are found. Left clause edges align with an IP boundary between 80.9% (RK) and 91.7% (AD) of all instances, with an overall average of 88.3% of alignment. Right clause edges align with IP boundaries between 71.9% (PG1) and 80.9% (PG2) of all instances, with an overall average of 74.5%. The Kayardild results are in line with the aforementioned hypothesis that clause boundaries are likely to align with prosodic cues of IP boundaries. These results confirm that clause edges are very likely to align with IP boundaries in both Dalabon and Kayardild, as expected, with the beginning of a clause more likely to align with an IP boundary than the end of a clause.

<table>
<thead>
<tr>
<th></th>
<th>Left align</th>
<th>Right align</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>91.7</td>
<td>72.3</td>
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<tr>
<td>DN</td>
<td>84.2</td>
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<td>71.9</td>
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<td>PG2</td>
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</tr>
<tr>
<td>RK</td>
<td>80.9</td>
<td>76.0</td>
</tr>
<tr>
<td><strong>Kayardild</strong></td>
<td><strong>88.3</strong></td>
<td><strong>74.5</strong></td>
</tr>
</tbody>
</table>

Table 5-14 Percentages of clause boundaries which align with IP boundaries in Kayardild

As the clause and the IP have shown a strong correspondence cross-linguistically, it is hypothesised that the clause and the IP will likewise show a strong correspondence in both Dalabon and Kayardild. A range of typologically diverse languages have been examined which include Australian languages (e.g. Wardaman), European languages (e.g. English), polysynthetic languages (e.g. Dolakhae Newar), agglutinating languages (e.g. Japanese) and analytic languages (e.g. Mandarin). Throughout this section the term clausal IP will be used to refer to those instances where a single clause corresponds to a single IP – that is where a clause is realised as an IP exactly with both right and left clause and IP boundaries aligning. Studies which investigate how clauses correspond to IPs are fewer than those investigating how IPs correspond to the clause. The difference between these two is that the former looks at clauses and how they correspond to IPs, whereas the latter looks at IPs and how they correspond to clauses.
Table 5-15 gives counts and percentages of all clausal IPs found across all of the Dalabon narratives as well as for the combined results of Dalabon. Clausal IPs only are included – i.e. where a clause is uttered over two or more IPs, it is not included in this count. Likewise, instances where a whole clause and part of another clause are uttered in the same IP are also not included here. The fourth column shows clausal IP percentages of all clauses and clause types, while the fifth column shows the clausal IP percentages of all IPs. The clausal IP percentages of all clauses range from 38.5 to 52% with an overall average of 43.9%. The clausal IP percentages of all IPs range from 30.1 to 40.5% with an overall average of 33.4%.

<table>
<thead>
<tr>
<th></th>
<th>Clausal IP counts</th>
<th>IP counts</th>
<th>Clause counts</th>
<th>Percentage of clauses which are clausal IPs</th>
<th>Percentage of IPs which are clausal IPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>52</td>
<td>173</td>
<td>135</td>
<td>38.5</td>
<td>30.1</td>
</tr>
<tr>
<td>MT</td>
<td>154</td>
<td>507</td>
<td>381</td>
<td>40.4</td>
<td>30.4</td>
</tr>
<tr>
<td>JC</td>
<td>61</td>
<td>159</td>
<td>120</td>
<td>50.8</td>
<td>38.4</td>
</tr>
<tr>
<td>JW</td>
<td>77</td>
<td>190</td>
<td>148</td>
<td>52.0</td>
<td>40.5</td>
</tr>
<tr>
<td>Dalabon</td>
<td>344</td>
<td>1029</td>
<td>784</td>
<td>43.9</td>
<td>33.4</td>
</tr>
</tbody>
</table>

Table 5-15 Clause and IP correspondences in Dalabon

Some inter-speaker variability is found in the Dalabon narratives with the AB and MT narratives showing lower percentages of clausal IPs while the JC and JW narratives showing the highest percentages. The percentage differences between the female speakers AB and MT, on the one hand, and the male speakers JC and JW, on the other, may be attributed to genre differences, with the former personal narratives, and the latter mythical narratives. Higher clausal IP counts have been found in narratives than in conversational speech (e.g. Iwasaki, 1996). In a study of mainly narratives in English 70 to 75% of IPs were found to be clauses (Chafe, 1987), while in a later study of conversational speech 60% of substantive IPs were clauses (Chafe, 1994). In Iwasaki’s study of narratives and conversation in Thai (1996), 65.7% of the conversational data IPs are clausal, while 82% of IPs in the narratives are clausal. These differences may be attributed to the effects that genre may have on the grammatical content of IPs. It
remains to be seen whether personal narratives favour lower clausal IP counts than mythical narratives. Further investigation into these genre differences should ideally examine a larger corpus with more speakers, in order to ascertain the effects of genre in this area.

The lower clausal IP correspondence for the AB and MT narratives may also be due to the higher amount of NPs found in their narratives than in the JC and JW narratives (see Figure 5-28 for further details), as NPs are often given their own IP thereby lowering the clause IP correspondence. For further details regarding the distribution of NPs and the correspondence with IPs see Section 6.1.

Gender differences may also be a contributing factor influencing the discrepancy between clausal IP percentages for the female speakers AB and MT, and the male speakers JC and JW. Further investigation in this area should examine a larger corpus with more speakers to identify any effects that gender may have on the interaction between grammatical structure and prosodic structure.

The low clausal IP percentages found in Dalabon compared to other languages is a result of the degree of intonation boundaries found within a clause – i.e. the number of IPs in a clause. Often clauses consist of more than a single grammatical word, as shown in Table 5-22 in Section 5.5, which reveals that a clause on average comprises 2.7 grammatical words. Grammatical words often receive their own intonation contour as in the example given in 5-1) and illustrated in Figure 5-3 (the pitch trace for the initial word *wanjing* ‘one’ has erroneously been halved, as discussed in Section 3.3.5.3, and should be disregarded), and may further be separated by a pause as in the example given in 5-2) and illustrated in Figure 5-4.

5-1)  

\[
\begin{array}{cccc}
\text{wanjing} & yibûn & \text{yang} & \text{ka-h-wonan} / \text{wanjingh} \\
\text{one} & 3 & \text{language} & \text{3SG-R-hearPRS} & \text{one}
\end{array}
\]

‘One boy can understand language.’ (AB 2:53)
Despite the ability to encode grammatical arguments such as subject and object on the verb, Dalabon speakers often use overt nominals to emphasise, clarify and elaborate on what is being spoken of in a narrative, to be discussed in more detail in Section 5.6 and Section 6.1. As shown in Figure 5-28 a high percentage of NPs is found in Dalabon clauses at over 40%. These overt nominals then often receive their own intonation contours and may be further separated with a pause within a clause. Thus the low clausal IP percentages of Dalabon can be largely explained by the widespread use of overt NPs. The use of intonation then, may serve a discourse function such as to highlight NPs in the discourse, as well as a cognitive loading function assisting with processing for speaker and listener. In Dalabon the clause IP correspondence is found in just under half of all clauses.
Counts and percentages of all clausal IPs found across all of the narratives as well as for the combined results of Kayardild are shown in Table 5-16. The fourth column shows clausal IP percentages of all clauses and clause types, while the fifth column shows the clausal IP percentages of all IPs. The clausal IP percentages of all clauses show significant inter-speaker variation with results ranging from 25 to 64% with an overall average of 44.6%. The percentages of IPs which comprise clausal IPs again show significant inter-speaker variation with results ranging from 13.3 to 48.5% with an overall average of 28.8%.

<table>
<thead>
<tr>
<th></th>
<th>Clause IP counts</th>
<th>IP counts</th>
<th>Clause counts</th>
<th>Percentage of clauses which are clausal IPs</th>
<th>Percentage of IPs which are clausal IPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>80</td>
<td>274</td>
<td>165</td>
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<td>DN</td>
<td>16</td>
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<td>38.1</td>
</tr>
<tr>
<td>PG1</td>
<td>16</td>
<td>33</td>
<td>25</td>
<td>64.0</td>
<td>48.5</td>
</tr>
<tr>
<td>PG2</td>
<td>47</td>
<td>155</td>
<td>106</td>
<td>44.3</td>
<td>30.3</td>
</tr>
<tr>
<td>RK</td>
<td>12</td>
<td>90</td>
<td>48</td>
<td>25.0</td>
<td>13.3</td>
</tr>
<tr>
<td>Kayardild</td>
<td>171</td>
<td>594</td>
<td>383</td>
<td>44.6</td>
<td>28.8</td>
</tr>
</tbody>
</table>

Table 5-16 Clause and IP correspondences in Kayardild

The Kayardild results show some overall similarities with Dalabon between clausal IP percentages; clausal IPs comprise 43.9% of all Dalabon clauses and 44.6% of all Kayardild clauses, and 33.4% of all Dalabon IPs and 28.8% of all Kayardild IPs. However, although the overall language results given here are similar to those of Dalabon, the Kayardild results reveal significant differences between speakers, while in Dalabon the inter-speaker variation is significantly less. The slightly lower Kayardild percentages for clausal IPs may be due to the large proportion of verbless clauses found in Kayardild which comprise a large number of IPs (see Section 5.2.3 for further details).

5.2.2 IP boundary tones and the clause

In this section the IP boundary tones found within and at clause boundaries will be examined. As discussed in Section 1.2.4, final lowering of pitch is typically found in
connection with finality, while final high tones indicate continuation of a topic (e.g. Brown, et al., 1980; Gussenhoven, 2002: 51; Pierrehumbert & Hirschberg, 1990). These claims will be explored in both Dalabon and Kayardild by examining whether a higher proportion of low right edge boundary tones are found clause finally than elsewhere within a clause (as this position in the clause is presumed to be a stronger marker of finality of utterance than elsewhere), and whether a higher proportion of high right edge boundary tones are found within a clause than clause finally (as incomplete or continuing utterances are more likely to be found within a clause than at its end). It is hypothesised that clause-final position will show a higher degree of final low boundary tones, while clause-medial position will show a higher degree of final high boundary tones. As mentioned above, final L% boundary tones do not exclusively signal final lowering, and as such these results must be viewed with a degree of caution.

An overview of the IP boundary tones found in Dalabon is given in percentages in Table 5-17. The boundary tones are divided into three categories depending on whether they occur in any position, at clause boundaries, or whether they occur within clauses. This table reveals that overall in Dalabon the neutral boundary tone (%) is most commonly found at the left edge of IPs (88%), and the low boundary tone (L%) is most commonly found at the right edge of IPs (60.9%). Some inter-speaker differences are found, particularly in regards to the left edge boundary tones where AB uses a higher amount of high boundary tones (16.6%) than other speakers (ranging from 3.5 to 9.8%). The overall Dalabon results reveal that neutral left edge boundary tones, and low right edge boundary tones are the most commonly found. This result is expected as these boundary tones are found in connection with the typical hat pattern which is the most commonly found tune type in Dalabon. These figures reveal similarities across the narratives in the types of IP boundary tones which align with clauses. At the left edges of clauses, the default neutral boundary tone is overwhelmingly found across all narratives at 88.4% overall, ranging from 72.4% (AB) to 94.6% (MT). At the right edge of clauses, and as predicted, the most commonly occurring IP boundary type is the final low boundary tone at 67.2% overall, ranging from 62.7% (MT and JC) to 75% (JW). This is in line with the hypothesis that IPs located in clause final position will
display a high degree of final low boundary tones, and potentially final lowering, as final low boundary tones are typically found in connection with finality. As found above in Table 5-17, some inter-speaker differences are evident, particularly in regards to the left edge boundary tones of AB, who again uses a higher amount of high boundary tones (15.2%) at clause boundaries than other speakers (ranging from 3.8 to 6.7%). In regard to the IP boundaries found within clauses in Dalabon results again reveal some inter-speaker variation. Neutral boundary tones dominate (87.3%) the left edges of IPs and at the right edges low boundary tones dominate (51.8%). The higher percentage of final low boundary tones (L%) found at clause boundaries than within clauses, as well as the higher percentage of final high boundary tones (H%) found within clauses than at clause boundaries is in line with the hypothesis stated above.
<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>%</th>
<th>%L</th>
<th>%H</th>
<th>L%</th>
<th>H%</th>
<th>^H%</th>
<th>LH%</th>
<th>HL%</th>
<th>~%</th>
</tr>
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<tbody>
<tr>
<td><strong>AB</strong></td>
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<td>61.7</td>
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<td>1.1</td>
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<tr>
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<td>18.4</td>
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<td>0.0</td>
<td>7.7</td>
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<td>All locations</td>
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<td>1.9</td>
<td>3.5</td>
<td>57.3</td>
<td>21.5</td>
<td>6.8</td>
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<tr>
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<td>3.8</td>
<td>62.7</td>
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<td>8.3</td>
<td>2.3</td>
<td>1.7</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within clauses</td>
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<td>3.1</td>
<td>50.4</td>
<td>18.8</td>
<td>5.0</td>
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<td>23.3</td>
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<td></td>
</tr>
<tr>
<td><strong>JC</strong></td>
<td>All locations</td>
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<td>4.0</td>
<td>9.8</td>
<td>59.5</td>
<td>19.7</td>
<td>12.7</td>
<td>0.6</td>
<td>4.0</td>
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<td>5.9</td>
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<td>1.0</td>
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<td>Within clauses</td>
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<td>15.5</td>
<td>54.9</td>
<td>18.3</td>
<td>14.1</td>
<td>1.4</td>
<td>4.2</td>
<td>7.0</td>
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<td></td>
</tr>
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<td><strong>JW</strong></td>
<td>All locations</td>
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<td>71.1</td>
<td>10.2</td>
<td>6.6</td>
<td>6.6</td>
<td>0.5</td>
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<td></td>
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<td>10.3</td>
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<tr>
<td>Within clauses</td>
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<td>9.5</td>
<td>7.9</td>
<td>62.3</td>
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<tr>
<td><strong>Dalabon</strong></td>
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<td>4.7</td>
<td>7.3</td>
<td>60.9</td>
<td>20.3</td>
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<td>1.6</td>
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<tr>
<td>Clause boundaries</td>
<td>88.4</td>
<td>5.0</td>
<td>6.5</td>
<td>67.2</td>
<td>19.5</td>
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<td>2.9</td>
<td>1.9</td>
<td>0.8</td>
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<tr>
<td>Within clauses</td>
<td>87.3</td>
<td>4.2</td>
<td>8.5</td>
<td>51.8</td>
<td>21.6</td>
<td>6.7</td>
<td>1.8</td>
<td>1.1</td>
<td>17.1</td>
<td></td>
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</tr>
</tbody>
</table>

Table 5.1-7 IP boundaries in Dalabon

The findings given above in Table 5.1-7 confirm predictions regarding the differences between the IP boundaries found in clause-final position and the IP boundaries found in clause-medial position. A comparison of the boundary tones found within a clause and at a clause boundary reveal that left edge high boundary tones are slightly more commonly found within a clause (8.5%) than at a clause boundary (6.5%). As predicted, low right edge boundary tones are more commonly found at a clause boundary (67.2%) than within a clause (51.8%), and high right edge boundary tones are more commonly found within a clause (21.6%) than at a clause boundary (19.5%). Disfluencies are largely only found within clauses (17.1%), and not at a clause.
boundary (0.8%). These findings confirm the hypotheses stated in Section 1.3 that final low boundary tones will occur more often clause-finally, while final high boundary tones will occur more often in clause-medial position.

An overview of the spread of all IP boundaries found in Kayardild is given in percentages in Table 5-18. This table reveals that overall the neutral boundary tone is most commonly found at the left edge of IPs (68.7%), and the low boundary tone is most commonly found at the right edge of IPs (56.8%). Significant inter-speaker differences are found, particularly in regards to the left edge boundary tones where PG1 uses a higher amount of low boundary tones (48.6%) than other speakers (ranging from 7.8 to 24%). PG1 further uses a smaller proportion of neutral left edge boundary tones at 34.3% than other speakers ranging from 50% (DN) to 74.8% (AD). Results show that at the left edges of clauses, the default neutral boundary tone is found across all narratives at 65.9% overall, ranging from 31.8% (PG1) to 73.5% (AD). As predicted, the most commonly occurring IP boundary at the right edge of clauses is the final low boundary tone at 58.6% overall, ranging from 39.1% (PG1) to 75% (DN). This is in line with the hypothesis that IPs located in clause final position will display a high degree of L% boundary tones, and potentially also final lowering, as L% boundary tones are typically found in connection with finality. Considerable inter-speaker differences are found in the IP boundary types which align with clauses, particularly in regards to the left edge boundary tones of PG1, who again uses a higher amount of low boundary tones (45.5%), at clause boundaries than other speakers, as well as RK at 34.2%. The IP boundaries found within clauses again reveal some inter-speaker variation. Neutral boundary tones dominate (71.5%) the left edges of IPs and low boundary tones dominate (55.2%) at the right edges.
The results in Table 5-18 reveal predicted differences between the IP boundaries found in clause-final position and the IP boundaries found in clause-medial position. A comparison of the boundary tones found within a clause and at a clause boundary reveal that left edge neutral boundary tones are more commonly found within a clause (71.5%) than at a clause boundary (65.9%). As predicted, low right edge boundary
tones are slightly more commonly found at a clause boundary (58.6%) than within a clause (55.2%). Counter to expectations, however, high right edge boundary tones are slightly more commonly found at a clause boundary (22.6%) than within a clause (18.9%) in Kayardild (though the opposite holds for Dalabon). As expected, speech disfluencies occur more often clause-medially (8.6%) than clause-finally (1.6%). These findings confirm the hypotheses that final low boundary tones will occur more often clause-finally, but do not confirm the hypothesis that final high boundary tones will occur more often in clause-medial position.

In order to examine whether clause type has an effect on the types of IP boundaries found, the following Table 5-19 outlines the IP boundaries for each of the clause types in both Dalabon and Kayardild. Results reveal that subordinate clauses display the highest proportions of high left edge boundary tones in both Dalabon (11.9%) and Kayardild (33.3%). Interestingly, subordinate clauses in Kayardild do not align with low boundary tones at the left edge or high boundary tones at the right edge. Verbless clauses in Dalabon display a higher proportion of final low boundary tones (80%) than main (68.3%) and subordinate (48.6%) clauses. L% boundary tones are commonly found in connection with main clauses (68.3%) in Dalabon, while subordinate clauses are more commonly aligned with final high (24.3%) or sustained high (18.9%) boundary tones. In contrast, subordinate clauses in Kayardild display a higher proportion of final low boundary tones (75%) than main (55.6%) and verbless (72%) clauses, and main clauses display a higher proportion of final high (25.3%) boundary tones than subordinate or verbless clauses.
Table 5-19 IP boundaries found at clause boundaries in Dalabon and Kayardild

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
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</tr>
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<tbody>
<tr>
<td>Dalabon</td>
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<tr>
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<td>%L</td>
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<tr>
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<tr>
<td>Subordinate</td>
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<tr>
<td>Verbless</td>
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<tr>
<td>Kayardild</td>
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<td></td>
</tr>
<tr>
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<td>%L</td>
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<tr>
<td></td>
<td>65.8</td>
<td>13.7</td>
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<tr>
<td>Subordinate</td>
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<td>0.0</td>
</tr>
<tr>
<td>Verbless</td>
<td>66.7</td>
<td>7.4</td>
</tr>
</tbody>
</table>

The Dalabon and Kayardild results presented so far are in keeping with cross-linguistic findings that finality is signalled by higher instances of final low boundary tones while continuation is signalled by higher instances of final high or rising boundary tones. Both Dalabon and Kayardild results show evidence in favour of the claim that finality is typically signalled by final falling pitch contours, and the Dalabon findings support the claim that incompleteness is typically signalled by final high pitch contours. Studies of Australian languages also show a connection between IP patterns and perceived finality. In Sharpe’s study of Alawa (1972), the basic intonational patterns found belong to seven categories which are discussed according to their position in an utterance. Three of these are found in utterance final position, one is found in phrase final position, two are found phrase medially, and the final is found in connection with quoted speech. Likewise in Kunwinjku (Carroll, 1996) IPs are characterised as final and non-final, though it must be stated that this statement is based on a simple impressionistic analysis of intonation where no detail is given regarding non-peripheral pitch movements within the unit.

5.2.3 Clause type frequencies

An overview of the clause type frequencies will be provided in this section for Dalabon and Kayardild. Table 5-20 shows the frequencies of three clause types in Dalabon; main, subordinate and verbless, as discussed in Section 3.3.2. As expected, the main clause is the most frequently occurring clause type at over 90%. Subordinate clauses
are relatively uncommon in the Dalabon corpus, accounting for just above six percent of all clause types, while verbless clauses account for just below three percent.

<table>
<thead>
<tr>
<th>Clause Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main (n=716)</td>
<td>91.3</td>
</tr>
<tr>
<td>Subordinate (n=48)</td>
<td>6.1</td>
</tr>
<tr>
<td>Verbless (n=20)</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Table 5-20 Clause type frequencies in Dalabon

The results presented above reveal that Dalabon speakers largely make use of main clauses, despite having several types of subordination strategies available, as discussed in detail in Section 3.3.2. Subordinate clauses account for just over six percent of all clause types. A previous study of subordinate clauses in Dalabon supports these findings, revealing a very low frequency of subordinate clauses with less than five percent across the three texts examined (Evans, 2006). Subordination is likewise rare in the closely related Bininj Gun-wok where intonation, in addition to grammatical subordination strategies, may be used to assist in the grouping together of verbs (Evans, 2003a: 628-632) These results demonstrate that although Dalabon has a range of syntactic strategies to indicate subordination status, they are infrequently used in this corpus. In addition to the use of syntactic structures to signal clausal relationships, it may be possible that Dalabon makes use of prosody to mark the cohesion of events. The use of prosody to mark cohesion of events will be examined in Section 6.2, where it will be demonstrated that prosody may also be used as a means of signalling temporal co-occurrence between events.

The frequencies of the three clause types in Kayardild are shown in Table 5-21. As expected, main clauses are the most frequently occurring clause types at over 80%. Subordinate clauses are relatively uncommon in the Kayardild corpus, accounting for fewer than three percent of all clause types, while verbless clauses account for a relatively high 14%.
There are some striking differences, as well as similarities found between the clause type frequencies found in Dalabon shown in Table 5-20 and Kayardild shown above in Table 5-21. Both languages contain a high percentage of main clauses with Dalabon at 91% and Kayardild at 83%. Such a result is expected given that the corpus comprises narrative discourse. Kayardild displays a high amount of verbless clauses at just above 14%, while Dalabon displays fewer than three percent of verbless clauses. Both Dalabon and Kayardild display low percentages of subordinate clauses with Dalabon at just over six percent and Kayardild at below three percent. The clause type distributions of Dalabon and Kayardild may be relevant to the types and distributions of the intonational tunes found in the languages. The clause type distributions may further contribute to the prosodic phrasing of certain clause structures, such as the prosodic integration of both main and subordinate clauses (i.e. where a single IP comprises both a main and a subordinate clause), which will be examined in Section 6.2.

### 5.3 Prosodic phrasing of Dalabon clauses

This section will examine the prosodic phrasing of clauses in Dalabon qualitatively illustrated with examples from the corpus. IP boundaries and pauses are typically found at clause boundaries, either in connection with main, subordinate or verbless clauses, as well as in connection with the paraphrasing or repetition of clauses. Within the clause, IP boundaries and pauses are often found in connection with NPs, which are typically overt subjects and objects or adverbials. The prosodic phrasing of NPs will be examined in detail in Section 6.1. A qualitative description of the prosodic phrasing of the different clause types is given in Section 5.3.1 for main clauses, Section 5.3.2 for subordinate clauses and Section 5.3.3 for verbless clauses. In Section 5.3.4 the prosodic phrasing found in connection with the repetition or paraphrasing of clauses
will be examined and reveal a degree of pitch compression found on the repeated or paraphrased clause.

5.3.1 Main clause boundaries

IP boundaries are typically found at main clause boundaries in Dalabon. An example is given in 5-3) and illustrated in Figure 5-5 where a single IPU comprises two IPs, and where the IP boundary is found between the two clauses.

5-3)  bah nga-lng-wurrhwurrng-m-inj / nga-h-wurdurd-mad-inj ...
and 1SG-SEQ-old-VBZ-PI  1SG-R-child-appear-PI
‘When I was older, I had children.’ (MT 1:47)

Figure 5-5 Pitch traces of two main clauses (MT 1:47)

More often, however, main clauses are separated not only by an IP boundary, but also by an additional pause. In 5-4) the two clauses, both including overt subject NPs nahnga ‘my mother’ and place adverbials kanihdja ‘there’, are separated by a pause, as shown in Figure 5-6.

5-4)  nah-ngan  kanihdja  ka-lng-moyh-rakka-ng ...
mother-my   there   3SG-SEQ-sick-fall-PP

nah-ngan   ka-lng-kurnh-wudjm-inj ...
mother-my  3SG-SEQ-country-die-PI
‘My mother got sick there. My mother passed away in that country.’ (MT 13:38)
The examples given above show the typical alignment of IP boundaries and pauses with main clause boundaries in the Dalabon corpus. The following section will examine the alignment of prosodic boundaries with subordinate clauses.

### 5.3.2 Subordinate clause boundaries

Subordinate clause boundaries appear to be a possible, but not typical, location for IP boundaries and pauses in Dalabon. As outlined in Chapter 3, subordinate clauses are given in bold script in the examples.

In 5-5) the subordinate clause is separated from the main clause by a final low boundary tone, as illustrated in Figure 5-8. The subordinate status of the clause is signalled by the subordinate form of the pronominal prefix ngaye-. The subordinate clause likewise displays a final low boundary tone, which is typically found in utterance-final position.

5-5) *bulu-korroh-no*  *nunh* ...

father-youngest-POSS  this

*mak  ka-Ing-yawoyh-boni  kanihdja  kul /

not  3SG-SEQ-again-goIRR  there  school

*nunh  ngaye-dudjm-inj* ...

this  1SUB-take.back-Pl

‘Her youngest father (now), he didn’t go to school there (at Katherine High School) that time I took him back (to Weemol).’ (MT18:38)
Three clauses are given in 5-6), each given their own line, where the first and final are subordinate clauses as indicated by the subordinate pronominal prefix forms *yale*- and *bale*- found on the verbs. In this example illustrated in Figure 5-9 the first subordinate clause is separated from the main clause by a final high boundary tone, however, the final subordinate clause shares an IP with the main clause, which ends with a final low boundary tone.

5-6)  

<table>
<thead>
<tr>
<th>Nawoydo</th>
<th>Nûnh</th>
<th>Yale-bon /</th>
</tr>
</thead>
<tbody>
<tr>
<td>dingo</td>
<td>that</td>
<td>1PLSUB-goPRS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>yila-h-wonan-inj</th>
<th>Nûka</th>
<th>Nûka</th>
</tr>
</thead>
</table>

| 1PL-R-hear-PI | Nûka | Nûka |

<table>
<thead>
<tr>
<th>Bale-dowhm-inj ...</th>
</tr>
</thead>
</table>

‘That dingo, as we were going along, we heard it everywhere there as they howled.’

(AB 6:19)
In 5-7) a main clause is shown in the second IP in Figure 5-10 and a subordinate clause is shown in the final IP in Figure 5-11 (note the pitch halving on the first part of the subordinate clause due to creaky voice). The subordinate clause illustrates the use of the purposive suffix -kûn as a subordination strategy. Here both clauses receive their own IP and are further separated by a pause.

5-7)  

ngale ... nga-h-yong-iyan  djarra ...

yeah  1SG-R-lie-FUT  here

kunborrk ... nga-h-m-iyan-kûn ...
kunborrk.dance  1SG-R-get-FUT-PURP

‘Hey, I’ll sleep the night there, so I can get the corroboree music.’ (JW 2:27)
As demonstrated in the examples presented above, clause boundaries, both main and subordinate, typically align with IP boundaries as well as pauses. Occasionally, however, two or more clauses occur together under a single intonational contour. Examples of this will be briefly illustrated and discussed in detail in Section 6.2.

### 5.3.3 Verbless clauses

In the Dalabon corpus verbless clauses generally receive their own IP and are bounded by pauses. Verbless clauses lack verbal predicates and do not take any TAM markers as given in 5-8) and illustrated in Figure 5-12. Here the initial IP contains the verbless predicate which begins with the pronominal prefixes *nga-h-dja-lng-* and describes an attribute of the speaker.

5-8) kardû * nga-h-dja-lng-old ... nga-h-dja-lng-m~ ... burrm-inj
    maybe 1SG-R-just-SEQ-old 1SG-R-just-SEQ-old-PP

‘Even though I’m just getting old now.’ (AB 4:15)
The ascriptive verbless clause in 5-9) consists of a verbless predicate comprising the verb prefixes *ka-h* as well as the nominals *kurnh* ‘land’ and *djokko* ‘tight’. TAM marking is again absent. Pauses both precede and follow the clause given in Figure 5-13. The clause has final syllable lengthening as observed impressionistically, and displays a final falling pitch contour.

5-9) *nidjarra ka-h-kurnh-djokko* ...

*here 3SG-R-land-tight*

‘It’s crowded here.’ (MT 9:24)

![Figure 5-13 Pitch trace of a verbless clause (MT 9:24)](image)

**5.3.4 Clause repetition and paraphrasing**

Repetition and paraphrasing of clauses was commonly found in the corpus, where it serves a range of rhetorical functions. Repetition is commonly found in narratives in Australian languages (e.g. Heath, 1984; McGregor, 2006; McKay, 2008), as part of the performance element of the unfolding narrative. Most commonly, repetition or paraphrasing serves to highlight certain events, as well as to add emphasis and drama to a narrative, while paraphrasing may further serve to elaborate or clarify. Clauses were both found to be repeated or paraphrased and extra material was often added to the repeated or paraphrased clause.

This phenomenon was noted by Heath (1984: 599-600) in his study of Nunggubuyu, where he used the term ‘echo’ to refer to repetition and ‘rephrasing’ to refer to paraphrasing. He further distinguishes three types of echoes: 1) the filler echo which gives the speaker time to plan the upcoming utterance, 2) the clarifying echo which is
used to ensure that the listener understands or to add another morpheme or word, and finally 3) the lead-in echo which functions as a framer for the upcoming utterance. The lead-in echoes commonly display narrative high monotone intonational patterns, which are not as commonly found in the clarifying or filler echoes. The narrative high monotone is characterised by a high steady pitch with little pitch variation between syllables, as well as equal durations of syllables. The high monotone intonation described by Heath closely resembles the list intonation (1984: 602). This is a pattern observed in a range of languages such as Bininj Gun-wok where a high level contour ending in a high boundary tone signals various kinds of incompleteness in declarative utterances (Bishop, 2003: 76).

McGregor finds that repetition often serves a highlighting purpose in Warrwa narratives, where the repetition of an event draws attention to that event (McGregor, 2006: 401). Similarly, in Mushin’s study of Garrwa, the repetition of the same event using the same predicate, and possibly followed by further elaboration of that event seems to serve a rhetorical or stylistic purpose (Mushin, 2008: 106). Evans talks of linked repetitions in his grammar of Bininj Gun-wok (Evans, 2003a: 553). Carroll talks about tail to head linkage found in Kunwinjku (Carroll, 1996: 93-94), where the word that ends one tone unit (IP) starts the next. This occurs more frequently across IP boundaries but is also found to occur across IPU boundaries (Carroll, 1996: 93).

In his study of Rembarrnga (2008) McKay describes backgrounding repetition, which is where an inflected verb with or without additional material is repeated to introduce an upcoming sentence, where the repeated verb is found in the same IP as the following clause. Focusing repetition, which prosodically contrasts with backgrounding repetition, as repetitions of clauses are given their own IP is also found in Rembarrnga (McKay, 2008: 11).

Repetition and paraphrasing of constituents is a common feature of spoken discourse and is found in a range of unrelated languages such as Central Alaskan Yupik (e.g. Woodbury, 1985) and English (e.g. Curl, Local, & Walker, 2006). In Central Alaskan
Yupik the repetition of constituents, as well as their prosodic phrasing have been found to serve rhetorical functions in narratives (Woodbury, 1985). Woodbury finds that unexpected prosodic continuity signals cohesion of otherwise separate syntactic entities, while unexpected prosodic breaks signal disjunction in otherwise unitary syntactic constituents (1985: 174). In a study of English conversational speech, certain instances of clausal self-repetition are analysed as a speaker’s way of closing down a sequence of talk (Curl, et al., 2006). These clausal repetitions are characterised by being two distinct IPs, each with a falling pitch contour. Furthermore, the repeated clause is typically lower in overall pitch than the initial clause, and the pitch range of the repetition is typically compressed relative to the initial clause. In addition, the repeated clause is typically of a shorter duration than the initial clause.

In the Dalabon corpus, the boundaries of repeated or paraphrased clauses tend to be marked by both IP boundaries and pause. These instances of pauses and IP boundaries found in the following examples can be seen as rhetorical devices used to add drama and emphasis to a narrative. Often the initial and repeated or paraphrased clauses show a compressed pitch range realised with a level pitch contour, in contrast to for example English (Curl, et al., 2006) where the repeated clause displays falling pitch. The repetition of clauses in conjunction with the use of a compressed pitch range with mid high or high level pitch contours may be tied in with the performative aspect of oral narratives in Dalabon.

The following example in 5-10) illustrates the repetition of a clause with a pause and IP boundary separating the clauses. Figure 5-14 shows that the initial IP displays a falling contour at the rightmost edge, while the repetition given in Figure 5-15 displays a compressed pitch range with a mid level plateau contour at the rightmost edge. The repetition of the clause lends weight to the statement and emphasises what to the narrator is a very emotional event.

5-10) ngey mahkih kurnh-ngan nga-h-bawo-ng ...
   1SG  because   country-my  1SG-R-leave-PP
I left my country, I left my own country.’ (AB 1:28)

Two almost identical clauses are given in 5-11) where the only difference is the clause initial NPs. Here the repetition of the clauses serves a rhetorical function adding drama to the narrative. All four IPs illustrated in Figure 5-16 and Figure 5-17 end in final high plateau boundary tones, which may indicate the repetition or listing of the clauses, or it may indicate incompleteness of the utterance. The three final IPs display slight lengthening of the final syllable, as observed impressionistically.

5-11) kadjah ...  kadjah-yih  bula-h-berdm-inj  njelng ...
           paperbark   paperbark-ERG    3PL>3-R-cover-PI for.us
makorlkorl marlaworr-no-yih ... bula-h-berdm-inj njelng ...
bush.grape leaves-POSS-ERG 3PL>3-R-cover-PI for.us

‘They covered (them) with paper bark for us, they covered (them) with bush grape leaves for us.’ (MT 10:0)

Figure 5-16 Pitch trace of a main clause (MT 10:0)

Figure 5-17 Pitch trace of a repeated clause (MT 10:0)

These repeated and paraphrased clauses typically occur in connection with IP boundaries and pauses, where prosodic breaks serve the rhetorical purpose of adding emphasis and drama to the narrative. The IPs often display compressed pitch ranges realised as mid high or high plateau contours (and to a lesser extent falling contours) which may serve performance functions in the oral narratives, in conjunction with the repetition itself.

5.4 Prosodic phrasing of Kayardild clauses

The prosodic phrasing of clauses in Kayardild will be examined in this section qualitatively illustrated by examples from the corpus. A qualitative description of the prosodic phrasing of the clause types is given in Section 5.4.1 for main clauses, Section
5.4.2 for subordinate clauses and Section 5.4.3 for verbless clauses. In Section 5.4.4 the prosodic phrasing found in connection with the repetition or paraphrasing of clauses will be examined. Unlike in Dalabon, repetition or paraphrasing of clauses in Kayardild is relatively uncommon. Pitch compression is not found in connection with the repeated or paraphrased clause, as is the case in Dalabon.

5.4.1 Main clause boundaries

As in Dalabon, IP boundaries are found at the boundaries of the majority of main clauses (with exceptions to this outlined in Section 6.2). The following two main clauses given in 5-12) both receive their own IPs which end with final falling boundary tones. Due to poor sound recording the pitch trace for this example cannot be shown.

5-12) nga-da  *duljanii-ja* ...

1SG-NOM  pine.for.country-ACT

marri-ju  kang-kuru  *dangka-kuru  Bentinck Island* ...

hear-POT  language-MPROP  person-MPROP  Bentinck Island

‘I miss my country. I’m going to listen to the language and people of Bentinck Island.’

(PG2 10:46)

In 5-13) two main clauses are separated by a pause as shown in Figure 5-18. Both IPs end with final high plateau intonational contours typically found in connection with continuation, though no observable final syllable lengthening is found. The speaker proceeds to elaborate on the women that were taken to church.

5-13) kunawuna ...  *kurrka-a-j  juuja-maru-th* ...

child:NOM  take-M-ACT  church-VDAT-ACT

maku-wa  *kurrka-a-j* ...

woman-NOM  take-M-ACT

‘Children are taken to the church. The women are taken.’ (PG2 4:31)
5.4.2 Subordinate clause boundaries

Subordinate clause boundaries also appear to be a typical location for IP boundaries in the Kayardild corpus, supporting Evans’ finding that subordination is signalled by intonation (1995a: 488). Although Evans states that finite subordinate clauses may be positioned before, after, or, less commonly, embedded within the matrix clause (1995a: 488), no instances of embedded finite subordinate clauses were found in the Kayardild corpus.

In the following 5-14) the subordinate clause found in the final IP is signalled by the use of the complementizing oblique cases found on the words yalulu ‘light’ and kinaa ‘tell’. The subordinate clause is separated from the main clause by an IP boundary and a pause. The initial clause illustrated in Figure 5-19 displays a high plateau pitch contour with a slight fall at the rightmost edge. The subordinate clause illustrated in Figure 5-21 begins at a very low point in the speaker’s range and continues to fall ending with a final low boundary tone.
‘On Sweers Island, where there’s a cliff, that’s where he remained, forever and ever, as his light indicated.’ (AD 20:33)
In 5-15) the complementizing oblique case shows the subordinate status of the final three verbs *wuu* ‘give’ *wambaji* ‘become fine’ and *biri* ‘become calm’. Here the four subordinate clauses are separated from the matrix clause through IP boundaries, shown in Figure 5-22 and Figure 5-23. The three initial IPs end with final high plateau boundary tones, while the final IP ends with final lowering and a final low boundary tone signalling finality. Pitch resets are not found in connection with the IPs, and boundaries are marked by juncture alone.

5-15) \( warrmara-wu / \)  \( warrmara-ya \)  \( kamburi-ju / \)  
\( \text{wind-MPROP} \)  \( \text{wind-MLOC} \)  \( \text{say-POT} \)

‘To say to the wind:’

\( wuu-juu-ntha \)  \( wuran-kuu-ntha \)  \( wambaji-ru-thuu-nth... \)
\( \text{give-POT-COBL} \)  \( \text{food-MPROP-COBL} \)  \( \text{fine-FAC-POT-COBL} \)

\( biri-\text{-lu-thuu-nth} \ ...
\( \text{calm.weather-FAC-POT-COBL} \)

‘that it should give (us) food, that it should make it fine and calm.’ (DN 1:5)
As shown above, clause boundaries typically align with IP boundaries in the Kayardild corpus and this seems to be a possibility with both main and subordinate clauses. This finding is in accordance with the hypothesis that major syntactic boundaries be marked by prosody, as found in a range of languages. In Ngiyambaa, for example, intonation boundaries and pauses are found between main and subordinate clauses (Donaldson, 1980: 44), and almost all dependent constructions are separated from the main clause by a pause and with a falling intonational contour (Donaldson, 1980: 279). Conversely, however, main and subordinate clauses occasionally occur under a single intonational contour in Kayardild, as is also found in Dalabon. These examples of multi-verb IPs will be examined in detail in Section 6.2.5.

5.4.3 Verbless clauses

A relatively large amount of verbless clauses were found in the Kayardild corpus accounting for approximately 14% as shown in Table 5-21. Nominal constituents in verbless clauses receive nominative case marking, which is the default case marking.
and often lack tense and modality marking. They are typically found in their own IPs, as is also found in Dalabon. Kayardild verbless clauses show a considerably higher pausing percentage than the other clause types (see Table 5-11 for further details of pausing percentages) which is reflected in the constituents of a verbless clause generally being surrounded by pause. As discussed in Section 2.2.5 assigning verbless clause boundaries is problematic, due to the inherent difficulties in defining these constituents. As a result of this, a large degree of variation in IP contours and prosodic phrasing is found in the verbless clauses in Kayardild, as shown in the following examples.

A verbless clause encoding possession is given in 5-16) and illustrated in Figure 5-24. The clause comprises three nominals, and makes up a single IP which ends with a final downstepped high plateau. No final lengthening of syllables is observable in this example.

5-16) dan-da  ngijin-da  dulk ...
this-NOM  my-NOM  country:NOM

‘This (is) my country.’ (PG2 1:4)

Figure 5-24 Pitch trace of a verbless clause (PG2 1:4)

In 5-17) a verbless clause of two nominal constituents encoding location comprises a single IP shown in Figure 5-25 ending on a final high rising boundary tone (transcribed with a ^H%).
The following example comprises three nominals all bearing verbal case. As mentioned in Section 2.2.4, verbal case suffixes act to convert morphological nouns to morphological verbs by marking tense, aspect and mood. Verbal case suffixing is a relatively uncommon phenomenon. Here the nominals act as predicates as they lack a matrix predicate. The first IP ends on a falling tone, while the two final IPs end with high rising boundary tones. This may indicate continuation as the speaker proceeds to discuss her searching. Due to poor recording quality the pitch trace of this example cannot be shown.

The intonation contours found in Kayardild verbless clauses include each of the contour patterns described and illustrated in Section 4.2. In this respect verbless clauses pattern the same as regular verbal clauses. Furthermore verbless clauses in Kayardild display a large degree of pausing between constituents within clauses. Longer pauses surrounding verbless clauses may be used by a speaker as a way to clearly mark it as a verbless clause, thereby avoiding that the listener interpret the nominals as belonging to the previous or following clause.
5.4.4 Repetition and paraphrasing

Paraphrasing and repetition is less commonly found in the Kayardild corpus than in the Dalabon corpus, though where it occurs, IP boundaries are most commonly found at clause boundaries. The prosodic marking of these examples may be a rhetorical device to add drama to the narrative as found in Dalabon.

The following 5-19) illustrates the paraphrasing of a clause where the clause boundaries are marked by an IP boundary. Here both IPs end with final falling boundary tones. The second IP begins with a clear pitch reset. The pitch trace of the final word shown in Figure 5-26 is lacking due to extreme creaky voice typical of this speaker in IP final position.

5-19) manarr-a burri-ja niwan-d /
torch-NOM appear-ACT his-NOM
yalulu burri-ja niwan-d ...
light:NOM appear-ACT his-NOM
‘The light of his torch appeared.’ (AD 18:33)

Later in the same narrative, the paraphrased clauses are repeated, again with an IP boundary found separating the clauses, given in 5-20) and illustrated in Figure 5-27. The second IP shows a slight pitch reset. The initial IP displays a falling pitch contour to a mid level, while the final IP displays an overall suppression of pitch range. The pitch
trace is missing from the final half of the final IP due to perturbation caused by creaky voice.

5-20) manharr-à burri-j yalulu-wa / burri-ja niwan-d ...
torch-NOM appear-ACT light-NOM appear-ACT his-NOM

‘The light of his torch appeared.’ (AD 18:49)

5.5 The clause and its constituents

The following sections provide a grammatical overview of the clause in Dalabon and Kayardild. The overall makeup of the clause in terms of lexical categories is provided in Section 5.5.1. In Section 5.5.2 the number of words, morphemes ad IP boundaries found per clause will be examined in order to test for any correlations between grammatical complexity and intonational phrasing.

5.5.1 Constituent types

In order to establish the make-up of a clause in terms of its constituents, an overview of the main constituent distributions across all narratives in Dalabon and Kayardild was conducted. As outlined in Section 3.3.3, the categories include noun phrases (NP), verbs (V), Adverbial phrases (AdvP), conjunctions (C), particles (P), and ‘Other’, which includes categories such as interjections and idiophones (see Table 3-3). Figure 5-28 shows the figures for Dalabon. The results shown in Figure 5-28 reveal some slight variation between speakers. Generally, however, verbs and NPs dominate across all narratives, with NPs slightly more commonly found than verbs. In total, NPs make up...
40.8% of all constituents in Dalabon (ranging from 34.7 to 50.5% between narratives). Verbs make up approximately the same at 39.7% (ranging from 33.2 to 45.3% between narratives). Adverbial phrase constitute 5.3%, conjunctions 2.4%, particles 4.7%, while the ‘other’ category makes up 7.1%.

This division favouring a large percentage of verbs reflects the typology of Dalabon where a verb may constitute a clause due to the rich encoding possibilities found on the verb where argument NPs are optional. Overt specified NPs then are not necessarily needed, except in those instances where they are included for pragmatic reasons such as to introduce, highlight or clarify referents. Despite this, however, Dalabon clauses contain a relatively high proportion of NPs at approximately 40%. However, in comparison with Kayardild, where NPs comprise almost 70% of all constituents (see Figure 5-29), Dalabon NPs do not make up a particularly high percentage.

![Figure 5-28 Constituent distributions in Dalabon](image)

An overview of constituent distributions across all narratives in Kayardild is shown in Figure 5-29 with results revealing some slight variation between speakers. Generally, however, NPs dominate across all narratives making up 68.8% of all constituents (ranging from 59 to 73.2% between narratives), while 25.5% of constituents are verbs
(ranging from 19.3 to 39.3%). Conjunctions make up 1.3%, particles 1.7%, while the category of ‘other’ makes up 2.7%.

The results shown in Figure 5-29 for Kayardild and in Figure 5-28 for Dalabon reveal some significant differences between the constituents used in the two languages. Whereas in Dalabon a similar amount of verbs and NPs at approximately 40% each are found, in Kayardild NPs dominate the constituent distribution at almost 70%, with approximately 25% verbs. These results are in line with the typology of Kayardild, which predicts that a larger number of NPs be used than in Dalabon. This is presumably due to the fact that nominal referents are not encoded on the verb in Kayardild as they are in Dalabon and as a result a clause is more likely to include (more) NPs.

5.5.2 Constituent counts

Studies have found that the more grammatically complex a constituent (e.g. Cooper & Paccia-Cooper, 1980; Croft, 1995, 2001; F. Ferreira, 1991; Grosjean, et al., 1979; Strangert, 1991, 1997) (e.g. the higher the number of grammatical words in a clause), the more likely it is to be prosodically divided. This hypothesis will be tested in both Dalabon and Kayardild. Croft for example in his study of English narratives finds a
strong positive correlation between the number of full NPs in a clause and the number of IPs that clause will comprise of (1995: 859).

Table 5-22 gives an overview of the average number of words, morphemes and IP boundaries found per clause in Dalabon. These results are divided into all clause types separately. These counts were taken for the different clause types separately in order to investigate the overall complexity and length of clauses in terms of morpheme and word counts, and identify any grammatical and prosodic differences between the clause types. The results show that Dalabon clauses comprise few words at 2.7 and a significantly higher number of morphemes at 6.7. On average a Dalabon clause corresponds to 2.6 IP boundaries (interestingly this is found in all of the Dalabon narratives). Note that IP boundary counts do not correspond to IPs, as a single IP necessarily comprises two IP boundaries; the initial left edge boundary tone and the final right edge boundary tones – in other words, the boundaries found at its peripheral edges. Similarly low word-to-clause ratios are found in Bininj Gun-wok, where an IP on average comprises between 1.5 and 2.1 words and where clauses largely map onto IPs. An examination of two Manyallaluk Mayali narratives showed a clause and IP correspondence in 86 and 91% of clauses (Bishop, 2003: 56).
Despite the fact that Dalabon is a highly synthetic language and that a clause may comprise just a single verbal word, as shown in 5-21), the average number of words per clause is 2.7.

5-21)  *ka-h-yang-dulubo-ng* ...

3SG-R-language-shoot-PP

‘He went right through the language (Made me understand language, ceremony).’ (AB 4:7)
Often Dalabon clauses comprise several nominals or other material as shown in 5-22), 5-23) and 5-24). While examples 5-22) and 5-23) contain exactly one IP, the two clauses in 5-24) each contain two IPs.

5-22)  
djomi /kan-idja/ yarra-h-ni-nginj ...  
saw.mill there 1DU-R-be-PI  
‘We stayed there at the sawmill.’ (MT 14:50)

5-23)  
makmak /bi-yongkih/ ka-bo-ni ...  
not far 3SG-go-IRR  
‘He didn’t go far away.’ (JC 3:18)

5-24)  
kunborrk /ka-h-ln-g-mey...  
dance.style 3-R-SEQ-getPP  
ka-h-mey /kunborrk ...  
3-R-getPP dance.style  
‘So then he got kunborrk. He got kunborrk.’ (JW 3:44)

Main clauses generally comprise 2.7 words, 6.7 morphemes and 2.6 IP boundaries. These patterns are shown in the main clauses given in examples 5-21), 5-22), 5-23) and 5-24) above.

Subordinate clauses comprise on average 2.8 words, but fewer morphemes at 5.9 than the main clauses, as shown above in Table 5-22. The difference in morpheme counts may be due to the finding that verbs found in subordinate clauses generally comprise fewer morphemes than verbs found in main clauses. Furthermore subordinate clauses have slightly fewer IP boundaries than main clauses at 2.3, with a wide range of interspeaker variation ranging from 1.8 to 2.8 IP boundaries. These differences may reflect grammatical differences found in main versus subordinate clauses, where subordinate clauses show considerable variation between speakers in terms of morpheme, word and IP counts, while main clauses tend to be constant across speakers.
An example of a subordinate clause is given in 5-25) where the first IP comprises the subordinate clause and is recognisable due to the subordinate form of the pronominal prefix yale-. A main clause is found in the final IP.

5-25) yale-bo-ng wulungmunguyh wurdur-yan ...  
1PLSUB-go-PP for.ever children-my

yala-h-ni-nginj ...
1PL-R-stay-PI

‘From there which we left forever, my father and all of us had stayed there.’ (AB 1:2)

A further example of a subordinate clause is given in 5-26) where the subordinate clause is found in the final IP. Here the subordination is signalled by the use of the verb final temporal case suffix -kûno.

5-26) ka-h-yo ... ka-h-yu-rr-inj ...
3SG-R-liePP 3-R-lay-RR-PI

mudda ka-h-yinhin-inj-kûno ...
sun 3SG-R-do-PI-TEMP

‘He slept there, he stretched himself out, when the sun was about like that.’ (JW 2:37)

Verbless clauses similarly comprise 2.7 words and 6.7 morphemes. Examples of verbless clauses are given in 5-27) and 5-28). Note that the pronominal prefix in 5-28) and the following adjectival constituent are separated by an IP boundary.

5-27) nidjarra ka-h-kurnh-djokko ...
here 3SG-R-land-tight

‘It’s crowded here.’ (MT 9:24)

5-28) bah wurdur-kun nga-h/ njonjnjoo ...
but child-GEN 1SG-R little

‘When I was a child...’ (AB 4:0)

The results given in Table 5-22 for Dalabon reveal just slight differences between constituent and IP frequencies for the different clause types, indicating just minimal
differences between the clause types. Main clauses, as well as verbless clauses tend to show more constant results between speakers, while subordinate clauses show the greatest inter-speaker variation. Word counts range from 2.3 to 3.3, morpheme counts range from 5 to 7.1, and IP boundary counts range from 1.8 to 2.8. The finding that clauses comprise few words and a significantly higher amount of morphemes is expected for Dalabon.

The low numbers of words per clause in Dalabon, ranging from 2.3 to 3.3, is significantly lower than is found in a range of other languages. In a study of conversational German, for example, a clause comprises an average of 6.8 words ranging from one to 21 words (Schuetze-Coburn, 1994:264). A study of Kalam reports that clauses comprise on average 4.16 words, and as Kalam is a verb-serialisation language, a clause on average contains 2 verbs (Givón, 2002: 166). A study of English narratives spoken by middle-school children reports that clauses contain between 6.41 and 7.55 words on average (Klecan-Aker, 1984: 210). These differences reflect the degree of synthesis found in these languages, with German and English being moderately synthetic languages, Kalam using a lot of verb serialisation and Dalabon being highly polysynthetic.

The Dalabon results confirm the prediction that a clause will comprise few words and a higher amount of morphemes due to the highly polysynthetic typology of Dalabon with its rich encoding possibilities on the verb. In Dalabon, verbs account for approximately 40% of all constituents, as shown in Figure 5-28, and verbs carry a large amount of morphological encoding, as discussed in Section 2.1. These factors combine to produce the high number of morphemes found per clause. The average number of morphemes per grammatical word in Dalabon varies somewhat between the narratives from 1.8 to 2.8. Overall a grammatical word consists of 2.5 morphemes. The variation found between the grammatical complexity of words reflects the percentage of NPs found in the narratives (see Figure 5-28 above), with NP percentages in an inverse relationship to the morphological complexity of grammatical words. This is due to the fact that NPs in Dalabon generally do not take affixes. The MT and AB narratives
display high percentages of NPs and low morpheme per word counts, while the opposite holds for the narratives of JC and JW.

Correlations of the Dalabon measurements given above were calculated and are given in Table 5-23. Results reveal that the strongest correlations are found between the morpheme and word counts of clauses in Dalabon, suggesting that, as would be expected, the more words found in a clause the more morphemes.

<table>
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Table 5-23 Pearson’s $r$ correlations between morpheme, word, and IP boundary frequencies within clauses

Overall, correlations between morpheme and IP counts, as well as word and IP counts were weak, apart from the verbless clauses of both MT and JC which show strong correlations between all three categories. Verbless clauses further show the lowest word and IP boundary averages.
The weak correlations generally found between IP counts and both morphemes and words suggest that the number of IP boundaries found in a clause does not depend on the number of words or morphemes found in a clause. The weak correlations reported above may be due to the low numbers of words and morphemes found in IPs in the corpus, as discussed in detail in Section 4.3 where results reveal that IPs on average consist of 2.3 words and 3.2 morphemes (see Table 4-3), as well as the length of IPs which measure 1032ms in duration (see Table 5-26).

An overview of the average number of words, morphemes and IP boundaries found per Kayardild clause is given in Table 5-24. As in the case with Dalabon, word, morpheme, and IP boundary counts were taken for all the different clause types separately. The results presented below in Table 5-24 reveal a high degree of variation between the morpheme, word and IP boundary counts between the clause types, and this variation is reflected in the durations of the respective clause types. Overall Kayardild clauses comprise few words at 3.2 and a higher amount of morphemes at 6.8. On average a Kayardild clause contains 2.9 IP boundaries. As predicted, a Kayardild clause contains a higher number of words than a Dalabon clause which on average comprises 2.7 words (see Table 5-22). On average a grammatical word in Kayardild comprises approximately 2.1 morphemes. In contrast, Dalabon words comprise slightly more morphemes per word at 2.5 (see Table 5-22) and show significant variation between narratives reflective of the types of constituents used. The consistency found in the Kayardild narratives reflects the consistency of the constituent distributions across the narratives, in addition to the consistent suffixing patterns found on both nominals and verbs.
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Table 5-24 Morpheme, word and IP count averages per clause in Kayardild

Examples of some typical Kayardild clauses are given in 5-29) and 5-30). In 5-29) both a main and subordinate clause are given. The initial IP is the main clause comprising two words, while the subordinate clause in the second IP comprises three words.
A main clause comprising four words and a single IP is given in 5-30).

Main clauses in Kayardild generally comprise 3.1 words and 6.7 morphemes. A main clause on average contains 2.7 intonation boundaries. Compare the Kayardild findings given here with those of Dalabon, where a main clause comprises 2.7 words, 6.7 morphemes, and 2.6 IP boundaries, as shown in Table 5-22. Surprisingly then, the morpheme and lexeme counts show no significant difference between the languages, which were expected given the typological differences. The examples given in 5-29) and 5-30) illustrate the Kayardild findings showing main clauses which comprise between two and four words.

A major difference between the clause types is found in relation to the grammatical length of subordinate versus main clauses. Subordinate clauses commonly comprise fewer words with 2 and fewer morphemes with 4.7 than main clauses at 3.1 and 6.7 respectively. A subordinate clause likewise comprises fewer IP boundaries at 2 than main clauses at 2.7. In contrast to main clauses, the low IP boundary counts signal that subordinate clauses do not always get an IP boundary at both its edges (as an IP displays exactly two IP boundaries). Kayardild subordinate clauses then are significantly shorter constructions than main clauses. A subordinate clause, as evident by the complementizing oblique case endings, is shown in the final IP in 5-31). This example of a subordinate clause comprises three words, which is somewhat higher than the overall average.
'On Sweers Island, where there’s a cliff, that’s where he remained, forever and ever, as his light indicated to the people.’ (AD 20:33)

Table 5-24 reveals that verbless clauses differ significantly from main and subordinate clauses comprising 4.8 words, 9.2 morphemes and a very high 5.2 IP boundaries. These high figures show a relationship between verbless clauses comprising a high number of words (and resulting high morpheme numbers) as well as a high number of IP boundaries. In Section 5.1 results reveal that verbless clauses tend to have a significantly higher amount of pauses than main and subordinate clauses, and that these further tend to be of a longer duration. As discussed in Section 3.3.2, these findings may relate to the difficulties in defining verbless clauses and correctly assigning their boundaries, as can be illustrated in 5-33), which may be alternatively analysed as comprising multiple syntactically independent constituents rather than a single verbless clause. The range of variation in the length of verbless clauses is illustrated in the examples of verbless clauses given in 5-32) and 5-33). In 5-32) the verbless clause comprises two words, while 5-33) shows a verbless clause of five words.

5-32) ngo-da  jirrkar ...

1SG-NOM  north:NOM

‘I (was) in the north.’ (PG2 10:38)

5-33) dathin-maan-da  dangka-a  ni ...

there-ORIG-NOM  person-NOM  3:NOM
In order to test the hypothesis that the more grammatically complex a constituent the more likely it is to be prosodically divided, the results above were correlated. As in Dalabon, this was done in order to test whether the higher complexity of a grammatical constituent in terms of morpheme and word counts, correlates with more intonational boundaries. The above results of morpheme, word and IP boundary counts were tested for correlations with the results given in Table 5-25. The correlations show mixed results in Kayardild. A strong positive correlation is found between the morpheme and word counts for all speakers for main clauses, revealing that, as would be expected, the more words found in a clause, the more morphemes there are found. Somewhat weaker correlations are found between the morpheme and IP boundary counts, as well as the word and IP boundary counts, with some considerable variation found between speakers. Weaker correlations are found between morphemes and IPs and words and IPs for speakers AD, DN and to a lesser extent PG2, while strong correlations are found for words and IPs for speakers PG1 and RK. Generally then these results indicate that the number of IP boundaries in a clause is not dependent on the number of words found in a clause, thereby rejecting the hypothesis that the higher number of words in clause, the more likely it is to be broken up into more IPs. The somewhat weak correlation generally found in both Dalabon and Kayardild then may be due to the finding that IPs in both of these languages already comprise a small number of words and morphemes (as discussed in Chapter 4) making the need for prosodic chunking of syntactic constituents redundant for both speaker planning and listener comprehension purposes.
The Kayardild results given in Table 5-25 reflect the Dalabon results given in Table 5-23 in that both languages show the highest correlations between the number of words and the number of morphemes found in a clause, while somewhat weaker correlations were generally found between the number of words or morphemes and the number of IP boundaries found in a clause. These results indicate that regardless of the number of morphemes or words found in a clause the number of IP boundaries varies, revealing that an increase in words or morphemes does not necessitate an increase in IP boundaries. This finding questions whether IP boundaries in this particular corpus are used by a speaker as a device to ‘chunk’ speech for cognitive purposes, such as the planning of the remainder of an utterance or to allow the listener more time to process the spoken material. Instead these findings suggest that IP boundaries are used to demarcate various kinds of boundaries to the listener (e.g. Butcher, 1981; F. Ferreira, 1993; Goldman-Eisler, 1968; Himmelmann & Ladd, 2008; O’Connell & Kowal, 2008), such as discourse boundaries, which may similarly cognitively aid a speaker and listener. The size of IPs in terms of word and morpheme numbers examined in Chapter 4 reveal that Kayardild IPs are significantly smaller in terms of both morpheme and word counts than studies of other languages have shown. A Kayardild IP comprises 2.3
words and 3.9 morphemes (see Table 4-4) and measures 1020ms in duration (see Table 4-6). This small IP size in the Kayardild corpus may reflect the discourse genre of the narratives, as discourse genre has been found to affect the prosodic chunking of constituents (e.g. Chafe, 1987; Chafe, 1994; Goldman-Eisler, 1968; Iwasaki, 1996). As Kayardild IPs are already of a small size, the overall need for intonational boundaries to be used to lessen the grammatical complexity of grammatical units is diminished. Instead prosodic phrasing may be largely used for discourse purposes of marking discourse prominence and signalling semantic cohesion.

5.5.3 Clause durations

Durational differences between clause types were taken to ascertain any durational differences indicative of the length as well as the pausing patterns of the different clause types. Some studies investigating the relationship between the clause and the IP have looked at clause duration as a possible factor affecting the correspondence (Savy & Voghera, 2010). In this study of Italian spontaneous speech clause duration was not found to be a significant factor in the intonational phrasing of clauses. In this chapter, results are presented for Dalabon first, followed by Kayardild.

Durations in ms for the three clause types as well as the combined clauses of Dalabon are given in Table 5-26. Overall the differences in duration for the three types of clause are minimal within each narrative. Speaker differences can be seen, however, with minimum measurements ranging between 1412 and 1831 ms for JW and maximum measurements recorded for MT ranging between 1821 and 2096 ms. Lower durations are reported in a study of Kalam where clauses measure on average 927ms in duration (Givón, 2002: 166). The durational differences between clauses may be caused by differences in pausing patterns.
A one-way ANOVA was performed to ascertain whether there were any durational differences between the clause types. This was investigated to test for any durational differences resulting from complexity and length differences that may be apparent in the clause types. The results given in Table 5-27 reveal no significant differences found between the durations of the clause types with p>0.05, where the level of significance is given at 0.05 or 5%.

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Table 5-27 One-way ANOVA results for the durations of the different clause types in Dalabon

Durational differences between the Dalabon clause types were not found, revealing that duration measured in ms does not differ between the clause types. This result reflects findings that the different clause types have similar word and morpheme counts, as confirmed by Table 5-22. These findings should, however, also be treated with some degree of caution, as a degree of variability between speakers may be present. This degree of variability may be due to the data consisting of unconstrained discourse.
As for Kayardild, durations in ms for the three clause types as well as for the combined clauses are given in Table 5-28. Unlike the results for Dalabon given in Table 5-26, the Kayardild results show significant differences in duration between the clause types ranging from 1304ms for subordinate clauses to 3978ms for verbless clauses. As discussed above in Section 3.1, a certain degree of variability may be present in the narratives due to the unconstrained nature of the discourse (which more variability evident in the Kayardild narratives than the Dalabon narratives), although previous investigations of Kayardild reveal that these narratives show similar speech and articulation rates.

<table>
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<td>2089</td>
<td>1304</td>
<td>3978</td>
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</tbody>
</table>

Table 5-28 Kayardild clause durations in ms

The durational differences between the clause types in Dalabon and Kayardild reveal some differences with the overall trend that all clause types in Dalabon tend to be shorter than their counterparts in Kayardild. On average a Dalabon clause measures 1749ms while a Kayardild clause measures 2226ms. This large difference overall may be due to the finding that verbless clauses in Kayardild measure 3978ms, while in Dalabon they measure 1785ms. Likewise subordinate clauses, though rare, are shorter in Kayardild at 1304ms than Dalabon at 1665ms. Generally, however, main clauses, which comprise the majority of clause types, are longer in Kayardild at 2089ms than Dalabon at 1763ms. Two sources contributing to this difference is the higher number of words found in Kayardild clauses at 3.2 (see Table 5-24) than Dalabon clauses at 2.7 (see Table 5-22), as well as the higher number of pauses and the longer duration of the pauses found within clauses in Kayardild than in Dalabon.
A one-way ANOVA was performed to ascertain whether there were any durational differences between the clause types. This was investigated to test for any durational differences resulting from complexity and length differences that may be apparent in the clause types. The results given in Table 5-29 reveal only some significant statistical differences between the durations of the clause types for the speakers AD and DN only.

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Table 5-29 One-way ANOVA results for the durations of the different clause types in Kayardild

Some durational differences between the clause types were found, revealing that length in ms differs between the clause types in some of the narratives. This result may reflect differences in syntactic structures as well as prosodic patterning between the different clause types. Typically verbless clauses are comprised of more words and morphemes than both main and subordinate clauses (see Table 5-24), resulting in longer durations for verbless clauses. Furthermore, verbless clauses typically contain a significantly larger percentage of pauses (at 37.4%) than both main (at 22.4%) and subordinate clauses (at 0%) (see Table 5-1), which likewise results in longer durations.

5.6 Word order

As discussed in Section 1.2.4, the word order of many Australian languages is widely found to be very flexible (e.g. Austin & Bresnan, 1996; Blake, 1983; Hale, 1992)
reflecting pragmatic features of discourse. Clause-initial position is often connected to ‘topic’, ‘focus’, ‘prominence’ or ‘left-dislocation’, while the clause-final position is connected to ‘afterthought’, ‘antitopic’ or ‘right-dislocation’ (e.g. B. Baker & Mushin, 2008; Bowe, 1990; Donaldson, 1980; Evans, 1995a; Heath, 1984; Mushin, 2005; Simpson & Mushin, 2008).

This connection between word order and pragmatic features of discourse in Australian languages is likewise found in Dalabon, where utterance initial non-verbal constituents are typically marked for discourse prominence, while verb-initial utterances are generally discourse prominence neutral – i.e. where a NP begins an utterance it typically acts to introduce, clarify or contrast a referent (see also Cutfield, in prep.). Utterance final nominals are often employed to emphasise or elaborate on a referent which has previously been established.

As word order is essentially free in both Dalabon and Kayardild, the ordering of words within a clause reflects pragmatic features of discourse, making the study of the interaction between prosody and ordering of constituents significant. The word order of clauses is relevant to the current study as the locations of prosodic breaks within the clause are investigated. Word order results indicate that both Dalabon (see Table 5-30) and Kayardild (see Table 5-31) favour overt nominal arguments to precede the verb, a result which reflects the pragmatic discourse tendencies described above of fronting new information in the clause. As discourse tendencies, such as the fronting of discourse prominent referents, interact with prosody, the following investigation will examine the correlation between prosodic phrasing and pragmatic principles in the two languages.

The percentages given in Table 5-30 show the overall word order of clauses in Dalabon for main, subordinate and verbless clause types, as well as for transitive, semi-transitive and intransitive clauses taken together. Just under 60% of all Dalabon clauses do not contain any core argument NPs. This result is to be expected as core arguments are largely encoded on the verb in Dalabon. The second most common
pattern is the clause containing an object followed by a verb. The third most common pattern is a subject followed by a verb. Clauses containing both an overt subject and object are rare at just under seven percent. Overall then the majority of clauses contain either no core arguments at all (58.8%) or where core arguments are present, they largely occur in pre-verbal position (28.1%) rather than post-verbal position (6.5%). Rarely does a clause contain both a subject and an object NP (6.6%).

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<td>-</td>
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<td>0.4</td>
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Table 5-30 Word order percentages in Dalabon

The tendency shown in Table 5-30 for core argument NPs in Dalabon to precede rather than follow the verb is reflected in a number of studies of Australian languages, where clause-initial position is often connected to discourse prominence, as discussed in Section 1.2.4.1. This has been found in the closely related Bininj Gun-wok (Evans, 2003a: 549), as well as in studies of Warlpiri, Jiwarli, Nyangumarta and Garrwa (Mushin, 2006; Simpson & Mushin, 2008), Ngiyambaa (Donaldson, 1980: 236), Jiwarli (Austin, 2001) and Warlpiri (Simpson, 2007: 408).

The figures in Table 5-30 reveal that a large percentage of Dalabon clauses (58.8%) do not contain core argument NPs. This finding is predicted as almost all core arguments in Dalabon are encoded on the verb. Furthermore ellipsis is a common feature of Dalabon as well as Australian languages generally. High degrees of NP ellipsis has been found in a study of Pitjantjatjara (Bowe, 1990) where a very high amount of clauses at 67% contain a verb only and no core argument NPs. Likewise in a study of Bardi (Bowern, 2008), 47.4% of clauses contain no NP arguments. Similarly, in Swartz’s study of oral Warlpiri narratives 47% of clauses were verb only (1991). In Jiwarli NP ellipsis is a frequent occurrence, with clauses commonly containing just a verb, or a verb and
just one argument nominal (Austin, 2001). In Bininj Gun-wok the most common clause pattern, with 54%, is for clauses to lack an overt nominal, instead relying on pronominal prefixes on the verb (Evans, 2003a). Likewise Garde (2008) states that ellipsis in Bininj Gun-wok conversation is very common. NP arguments are commonly elided in Ngiyambaa discourse (Donaldson, 1980). These findings suggest that the very presence of NP arguments indicate that their status is marked in the discourse (e.g. Bowern, 2008; Mushin, 2005; Swartz, 1988).

In Australian languages, NPs located at the periphery of their clause (either clause-initial or clause-final) are often given their own IP and are separated from the clause by both IP boundaries and pauses (e.g. Croft, 2007; Heath, 1984; Mithun, 1987). These NPs may difficult to identify as belonging to a preceding or following clause (e.g. Croft, 2007; Heath, 1984) and may even be considered to be syntactically independent constituents. These prosodically dislocated nominals will be examined in detail in Section 6.1 in Dalabon and Kayardild.

The Kayardild figures given in Table 5-31 show the overall word order percentages of clauses for main, subordinate and verbless clause types, as well as for transitive, semi-transitive and intransitive clauses taken together. Word order is free in Kayardild with a high degree of argument ellipsis found, however, certain trends are evident in the most commonly occurring word order. A high proportion of clauses show ellipsis of all core argument NPs (40.1%), although not as many as in Dalabon. The second most commonly found pattern is a subject followed by a verb (22.8%).
The figures in Table 5-31 reveal that a relatively large percentage of Kayardild clauses (40.1%) do not contain core argument NPs. This finding is to be expected as ellipsis is a common feature of Kayardild, as well as Dalabon, and suggests that the very presence of NP arguments indicate that their status is marked in the discourse (e.g. Bowern, 2008; Mushin, 2005; Swartz, 1988).

Comparing the Kayardild figures shown in Table 5-31 with those of Dalabon shown in Table 5-30, it becomes clear that Dalabon clauses contain a higher number of verb only clauses (58.8%) than Kayardild (40.1%). Conversely, Dalabon clauses contain lower instances of core argument NPs (41.2%) than Kayardild (59.9%). Despite the high level of ellipsis of argument NPs in Kayardild, this finding is expected as core arguments are typically encoded on Dalabon verbal words. The second most common word order found in the Kayardild corpus is SV with 22.8%, followed by the OV and VS patterns with both at 9.9%. In contrast, the second most common word order in the Dalabon corpus is OV at 14.3% followed by the SV word order at 13.8%. Overall then, both Dalabon and Kayardild tend to favour core argument NPs preceding the verb. As discussed in Section 1.2.4, this tendency reflects the trend to place discourse salient information early in the clause rather than later. The high level of argument NP ellipsis found in Dalabon and Kayardild further confirms this hypothesis, as the specification of a NP argument is in itself a discourse salient factor.

The findings presented here for Kayardild largely reflect those of Evans’ previous study (1995a). The figures given in Table 5-32 are from Evans (1995a: 92) and are based on

Table 5-31 Word order percentages in Kayardild

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the word order counts of sentences taken from seven narrative texts. Sentences have been divided into transitive, semi-transitive and intransitive groupings, making direct comparisons between these results and those given in Table 5-31 above problematic. The common trends, however, are high occurrences of argument ellipsis, as well as the tendency for arguments, both subjects and objects, to precede the verb.

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Table 5-32 Word order percentages of sentences in Kayardild (adapted from Evans, 1995a: 92)

As shown in Table 5-32 most transitive sentences (77.9%) show some ellipsis of arguments. Objects occur more frequently before verbs (39.5%) than after verbs (27.8%). Likewise subjects occur more commonly before the verb (23.3%) than after the verb (8.7%). In intransitive sentences subjects also tend to occur before the verb (50.7%) than after the verb (8.9%). In semi-transitive sentences the indirect object most commonly occurs before the verb (60%) rather than after the verb (40%). The word order frequencies given here reveal that arguments tend to occur before the verb in Kayardild. New information or discourse participants tend to be fronted in Kayardild (Evans, 1995a: 93).

The most common word order patterns of the clause described above for Dalabon and Kayardild will in the following section be described in regard to their most typically found intonational patterns.

5.7 Word order and intonational tune

In this section the common tune types associated with the various word order patterns will be outlined and illustrated visually with pitch traces for Dalabon followed by Kayardild.
In Dalabon, the clause type consisting of a verb and optional adjuncts is typically realised as a single IP, where the IPs display each of the contour patterns, as described in Section 4.1. These are contours with global declination, contours with global rises, and plateau contours which are globally flat.

Adjuncts most often precede the verb where they may receive their own IP. Post-verbal adjuncts most typically do not share an IP with the verb. A typical example of a clause comprising a predicate and two adjuncts is given in 5-34) and illustrated in Figure 5-30. Here the clause is realised as a single IP which ends in a final falling contour.

5-34) **djarrah-djihbi nga-h-ni saltwater** ...

this.way-north 1SG-R-sitPRS saltwater

‘I’m staying on the coast.’ (AB 1:21)

![Figure 5-30 Final falling contour (AB 1:21)](image)

A further example of a clause which does not contain any core argument NPs is given in 5-35) and shown in Figure 5-31. This clause displays a single intonational contour which ends with a final low rise.

5-35) **didjan yala-h-yelūng-bo-ng** ...

there 1PL-R-SEQ-go-PP

‘We left there (from our country).’ (AB 1:0)
In contrast to 5-34) and 5-35) above, clauses containing adjuncts and no core argument NPs may comprise several IPs as given in 5-36) illustrated in Figure 5-32. This, however, is a far less commonly found pattern. Alternatively, the prosodic dislocation found in connection with the initial adjuncts yalûng kahn ‘then, that’ may be an instance of hesitation as final lengthening impressionistically is absent in both cases.

5-36) yalûng ... kahn / kanh kuno ka-lûng-dudjm-inj ...

then that that that.time.now 3SG-SEQ-return-PP

‘Then he (Naworneng) went back.’ (JC 5:45)

Where core argument NPs, both subjects and objects, precede the verb they often share an IP with the verb. These IPs display all of the pitch contour patterns described in Section 4.1. Where pre-verbal argument NPs are prosodically separated from the verb they often have impressionistically observable lengthening on the final syllable
and may display a high plateau, a final rising or a final falling pitch contour, though they typically display a final high or rising tune indicating that there is more to come.

An example of an object NP preceding its predicate is given in 5-37) and shown in Figure 5-33. Here the NP *borndok* ‘woomera’ shares an IP with the predicate. The IP ends with a high rising contour. The final fall visible in the pitch trace is not auditorily perceivable and is due to IP final laryngealisation.

5-37) *borndok*   *ka-h-yelng-djedm-inj* ...

woomera   3SG-R-SEQ-make.new.one-PP

‘He made a new woomera now.’ (JC 4:11)

![Figure 5-33 High rising contour (JC 4:11)]

5-38) shows two clauses containing object NPs which are each realised as their own IP, as illustrated in Figure 5-34. In the initial clause the object NP *bokko* ‘hooked spear’ follows the predicate, and in the second clause the object NP precedes the predicate. The initial clause displays the more uncommon pattern of a post-verbal NP sharing an IP with its predicate. Both IPs display a final high plateau contour.

5-38) *ka-h-rla-marnbo-ng*   *bokko* ...   *bokko*   *ka-h-rla-marnbo-ng* ...

3SG-R-spear-make-PP   hook.spear   hook.spear   3SG-R-spear-make-PP

‘He made a hooked spear, he made a hooked spear.’ (JC 4:35)
Likewise in 5-39, which consists of two clauses, the object NPs *manjhuyawno* ‘every little creature’ and *rongkûrrh* ‘quiet snake’ share IPs with their predicates, which they precede. Both IPs display high plateau contours, shown in Figure 5-35. These NPs serve to emphasise the referents in the discourse.

5-39) *manjh-yayaw-no ka-h-bu-ninj ... rongkûrrh ka-h-buyhwo-ninj ...*

*every.little.creature 3SG-R-kill-PI quiet.snake 3SG-R-show-PI*

‘Every little thing that he killed, such as a quiet snake, he would show me.’ (AB 6:10)

Somewhat less commonly found, pre-verbal core argument NPs are given their own IPs separated from their predicates, as illustrated in 5-40) and 5-41). These examples involve disjunction and conjunction constructions which are typically found in connection with prosodic breaks (Ladd, 1986; Nespor & Vogel, 1986; Stavropoulou, 2002).
The example in 5-40) and illustrated in Figure 5-36 shows three IPs. The NPs buliki ‘bullock’ and dongki ‘donkey’ both end with a high plateau and impressionistically display clear lengthening of the final syllable, which is typical of listing intonation. The predicate ends with a slight audible final falling contour, although the pitch trace is lacking due to IP final creaky voice. As in 5-39) above, the dislocated NPs here act to introduce the referents to the discourse as new and focussed information.

5-40) djamdam buliki / djamdam dongki / yûla-h-wonan ... sometime bullock sometime donkey 1PL-R-hearPRS

‘sometimes we would hear a bullock, sometimes a donkey.’ (AB 6:31)

Figure 5-36 Final falling contour (AB 6:31)

In 5-41) the pre-verbal NPs are separated from the predicate with IP boundaries, shown in Figure 5-37. The first IP ends with final syllable lengthening and a rising pitch contour. The final IPs both display final falling contours. The dislocated NPs act to emphasise the referents thereby creating suspense in the narrative.

5-41) borndok-no / danj-no/ ka-h-yidja-nin ... woomera-3POSS spear-3POSS 3>3lo-R-have-PI

‘He had his woomera and spear with him.’ (JC 1:21)
Typically, post-verbal NP arguments or adjuncts do not share an IP with their predicates, and are commonly separated by pause from their predicate.

An example of a core NP argument following its predicate is given in 5-42) where the NP *kanh mimih* ‘that Mimih’ is separated from its predicate by pause, as shown in Figure 5-38. Here the NP ends with a final rising contour, presumably to indicate the incompleteness of the utterance, as the speaker continues to introduce a further character to the story.

5-42) wanjing-kûn  ka-h-bo-ng ...  kanh  mimih ...
   one-GEN  3SG-R-go-PP  that  mimih

   ‘Once there was a Mimih (a type of rock spirit).’ (JC 1:3)

In 5-43) the post-verbal NP *wawurdngan* ‘my brother’ is separated from its predicate by pause illustrated in Figure 5-39. The initial IP ends with a falling pitch contour, while the final IP ends with a low rising contour. Here the NP acts to clarify the referent.
The intonation contours and IP boundary locations found in connection with the different word orders in Dalabon display certain patterns. Typically, clauses which do not contain any core argument NPs are realised as an IP with the typical intonation contours of Dalabon outlined in Section 4.1 unless they contain adjuncts. Pre-verbal adjuncts may receive their own IP, but are also found belonging to the same IP as the verb, whereas post-verbal adjuncts tend to never share an IP with the verb. Both pre-verbal and post-verbal adjuncts may display all three main contours; the rising level and falling pitch contours, though typically the falling pitch contour is found.

Pre-verbal subject and object NPs in Dalabon often share an IP with the verb, where the IP displays each of the pitch contour patterns described in Section 4.1. Pre-verbal argument NPs which are prosodically separated from the verb often impressionistically display lengthening on the final syllable and typically display a high plateau, a final rising or a final falling pitch contour.

Post-verbal NP arguments or adjuncts in Dalabon typically do not share an IP with their predicate, and are commonly separated by pause from their predicate. This is due to the finding that verbs are most often found in IP final position (and similarly reflects the word order of Dalabon where verbs tend to be clause final – shown in Table 5-30). In those instances where further material follows the verb in the same IP, the
constituents tend to be adjuncts denoting location, such as *nidjarra* and *djarra* ‘here’, and *kanihdja* ‘there’. This may indicate that material following verbs that receive their own IP is prosodically marked, which may serve the pragmatic purpose of highlighting post-verbal material.

The following will outline and illustrate the common tune types associated with the various word order patterns in Kayardild. Despite the grammatical differences between Kayardild and Dalabon outlined in Chapter 1 and Chapter 2, many similarities between the word order intonational phrasing of Kayardild and Dalabon are found. Post-verbal adjuncts and arguments are often prosodically separated from their predicates by both IP boundaries and pause in Kayardild, as in Dalabon. Unlike in Dalabon, the clause type in Kayardild consisting of a verb and optional adjuncts is typically realised as more than a single IP, displaying each of the contour patterns described in Section 4.2. Adjuncts both precede and follow the verb where they both may receive their own IP. As in Dalabon, post-verbal adjuncts generally do not share an IP with the verb.

Clauses containing adjuncts and no core argument NPs, as given in 5-44), often contain several IPs, as shown in Figure 5-40, which is comprised of three IPs. The initial IP displays a high level contour (transcribed with a H% boundary tone) and some lengthening of the final syllable indicating continuation, while the two final IPs display falling pitch contours at the rightmost edge (transcribed with L% boundary tones) possibly indicating finality. The final NP *jirrkaa riya* ‘in the northeast’ may possibly act to correct the location expressed by the initial NP.

5-44) *jirrka-kuru* / *burri-ju* ... *jirrka-a* ri-ya ...
    north-MPROP  emerge-POT  north-NOM  east-NOM

    ‘In the north it will appear, in the northeast.’ (PG2 1:43)
In contrast to 5-44) above, an example of a clause comprising a predicate and an adjunct is given in 5-45). Here the clause is realised as a single IP given in Figure 5-41 which displays a high plateau contour with a slight fall at the rightmost edge on the final syllable.

5-45)  
\[
\text{ri-lija-tha=ya Murphywa-th} \ldots
\]

east-TURNTO-ACT= veer-ACT

‘You turn to the east, and round the corner.’ (PG2 1:47)

Where core argument NPs, both subjects and objects, precede the verb they each often receive their own IP, although they can also be found in the same IP as the verb. These IPs display all of the pitch contour patterns described in Section 4.2. Where pre-verbal argument NPs are prosodically separated from the verb they may display lengthening on the final syllable and typically display a high plateau, or a final falling pitch contour. These prosodic patterns were likewise observed for Dalabon.
An example of an argument NP preceding its predicate is given in the first clause in 5-46). Here the NP *muthaa thungal wirand* ‘a lot of food’ is intonationally separated from the predicate. The four initial IPs shown in Figure 5-42 display high plateau contours, while the final IP displays a final falling contour. The final comprises a post-verbal argument NP again separated from its predicate.

5-46)  

\[ \text{mutha-} \quad \text{thungal-} \quad \text{wuran-} \quad \text{ngalama-th} \]  
many-NOM  
thing-NOM  
food-NOM  
get-ACT  

\[ \text{kira-th} \quad \text{wuran-d} \]  
gather-ACT  
food-NOM  

‘There was lots of stuff there, plenty of food, we went shopping and bought.’  
(AD13:21)

![Figure 5-42 Two clauses with pre- and post-verbal arguments (AD 13:21)](image)

An example of a core NP argument following its predicate is given in 5-47) and illustrated in Figure 5-43 where the NP *dangkawalad* ‘a lot of people’ is separated from its predicate by pause. Here the predicate ends with a mid-high falling contour (!H%), and the NP ends with a final falling contour terminating with a L% boundary tone.

5-47)  

\[ \text{kurrka-th} \quad \text{dangka-walad} \]  
take-ACT  
person-lot:NOM  

‘(We) brought a lot of people.’  
(AD 11:15)
5-48) comprises two predicates and displays both word orders. Figure 5-44 shows that the initial clause displays the subject NP bithinda ‘man’ in the same IP as the predicate. In the second clause given in Figure 5-45 the post-verbal NPs comprise the object ngakuluwanju kangku ‘our language’ and the subject NP ngakuluwanda kunawalad ‘our children’. The post-verbal subject NP is separated from its predicate by pause. The initial IP displays a high plateau contour, the second IP displays a final falling contour, and the final IP displays a high-falling contour.

5-48) bithiin-da marri-ju ...
    man-NOM   hear-POT

    marri-ju ngakuluwan-ju kang-ku ...
    hear-POT   our-MPROP   language-MPROP

    ngakuluwan-da kunawalad ...
    our-NOM    child-LOT

‘The young men have to listen too; they have to listen to (understand) our language; so do our children.’ (AD 12:0)
In contrast to the examples given in 5-46) and 5-48) above, in 5-49) below the pre-verbal NP *wuranjani ja muthajani ja* ‘lots of food’ shares an IP with the predicate. The first IP shown in Figure 5-46 displays a high plateau pitch which signals continuation while the final IP displays a slight audible fall at the rightmost edge signalling completion. Again due to creaky voice the pitch trace of the final IP is unclear.

5-49) *wuran-jani-ja*  *mutha-jani-ja*  *warra-j* /  *jani-jani-j* ...

food-VPURP-ACT  lots-VPURP-ACT  go-ACT  REDUP-search-ACT

‘We looked all around for lots of food.’ (AD 15:39)

As shown in 5-49) above, pre-verbal NPs may share an IP with their predicate, although this is less common than prosodically separated pre-verbal NPs.

In 5-50) an example is given where the post-verbal subject NP *ngad* ‘I’ shares an IP with its predicate. The clause in Figure 5-47 displays a high plateau pitch contour.
Typically, however, post-verbal NP arguments or adjuncts do not share an IP with their predicates, and are commonly separated by pause from their predicate.

As in Dalabon, the intonation contours and IP boundary locations found in connection with the different word orders in Kayardild display certain striking patterns. Clauses which do not contain any core argument NPs are realised as one or more IPs, which display the typical intonation contours of Kayardild outlined in Section 4.2. Adjuncts often receive their own IP regardless of whether they precede or follow the verb. This contrasts somewhat with Dalabon where pre-verbal adjuncts tend to share an IP with the predicate.

Pre-verbal subject and object NPs may be prosodically separated from the verb, where the IP displays the pitch contour patterns described in Section 4.2. Pre-verbal argument NPs which are prosodically separated from the verb may display lengthening on the final syllable (as observed impressionistically) and typically display a high plateau, or a final falling pitch contour.

In both Dalabon and Kayardild clause-initial position is not necessarily the most pragmatically marked, nor are clause-initial nominals more likely to be prosodically dislocated from the remainder of the clause. The prosodic dislocation of pre-verbal
nominals is often found in connection with performative aspects of the narrative, such as to create a sense of suspense. This is somewhat in conflict with previous studies of Australian languages which show that clause-initial position is a typical place for pragmatic highlighting generally, as discussed in Section 1.2.4.

As in Dalabon, post-verbal NP arguments or adjuncts in Kayardild typically do not share an IP with their predicates, and are commonly separated by pause from their predicate. This suggests that material following verbs is prosodically marked, serving the pragmatic purpose of highlighting post-verbal material. This feature is commonly found in Australian languages and will be discussed in detail in Section 6.1.

5.8 Discussion

Despite the major grammatical differences between Dalabon and Kayardild, the findings presented here support the hypothesis that prosodic marking is more prominent at major syntactic boundaries in both languages. Findings in both languages confirm the hypothesis that pauses are more likely to occur at stronger syntactic boundaries such as clause boundaries than at weaker syntactic boundaries found within a clause. These findings reflect previous research in other unrelated languages such as Mandarin (Yang, 2007) and English (2003; Grosjean, 1980b; Grosjean, et al., 1979). Pauses within a clause were much less common than those pauses located at a clause boundary, with almost three quarters of all pauses in both Dalabon and Kayardild located at clause boundaries (at 73.8% and 71.9% respectively). These high percentages are reflected in cross-linguistic studies. In a study of Mandarin (Yang, 2007) conversational speech boundary pauses account for 62 and 75% of all pauses, while non-boundary pauses account for just 25 to 37.6% of pauses. Similarly, a study of Swedish reveals that 57% of sentences are preceded by pauses (Hansson, 1998).

Boundary pause results in Dalabon and Kayardild are therefore in line with the cross-linguistic findings that major syntactic boundaries such as the clause are a more common location for pausing.
Furthermore the Dalabon and Kayardild results confirm the hypothesis that pauses located at major syntactic boundaries are typically longer than those found elsewhere. Again, this echoes cross-linguistic findings that boundary pauses are longer than non-boundary pauses in unrelated languages such as German (Butcher, 1981), Dutch (Sanderman & Collier, 1995), Swedish (Fant, et al., 2003; Hansson, 1998) and English (Grosjean, 1980a, 1980b; Grosjean, et al., 1979). Dalabon clause boundary pauses average 1147ms while non-boundary pauses average 735ms. Kayardild clause boundary pauses are somewhat longer, with an average of 1543ms, while non-boundary pauses average just 819ms. Results from Mandarin reflect this common difference in boundary versus non-boundary durations. Yang (2007) found that major boundary pauses average 490ms, minor boundary pauses average 330ms and non-boundary pauses measure 240ms. Although these results confirm the apparent differences between boundary versus non-boundary durations, these pause durations are significantly shorter than those found in Dalabon and Kayardild. This may reflect genre differences with longer pauses found in spontaneous narratives than in controlled laboratory speech.

The Dalabon and Kayardild results for pause location and duration presented above reflect those found cross-linguistically in a range of typologically diverse languages such as English and Mandarin, and suggest that the clause is a unit which avoids prosodic separation through pauses to a certain degree. Where pauses are found within a clause, they are of a statistically significantly shorter duration than those found at clause boundaries. Major syntactic boundaries, such as clause boundaries, are therefore more likely to attract pauses than minor syntactic boundaries, and pauses will be longer at major syntactic boundaries than at minor syntactic boundaries.

Interestingly, the results presented above for both Dalabon and especially Kayardild reveal that pause durations may be extremely long. Boundary pauses measure 1147ms in Dalabon and 1543ms in Kayardild, while non-boundary pauses measure 735ms in Dalabon and 819ms in Kayardild. Studies of other languages typically reveal much lower pause durations, as discussed in Chapter 1. In a study of Swedish read speech,
pause durations are very low with an average of 178ms found in a dialogue experiment, and with a pause average of 160ms found in a reading experiment (Strangert, 2003). A different study of Swedish read speech, however, reported significantly longer pause durations, with pauses between sentences averaging 1100ms in read prose and 530ms in radio news material (Fant, et al., 2003). These large differences are likely attributed to genre differences which may play a large role in tempo variation in speech, as has been reported in the literature (Dankovičková, 1997; J. Trouvain, 2004).

In a study Mandarin spontaneous conversational pause durations range from 277 to 462 ms depending on whether they occur at a non-boundary, minor boundary or major boundary location (Yang, 2004). A later study of Mandarin conversational speech shows that pause durations range from 240 to 490 ms (Yang, 2007). A study of English horse race commentaries reveal pause durations range from 226 to 635 ms (Jürgen Trouvain & Barry, 2000). Slightly higher pause durations are found in a large-scale study of read and spontaneous speech in five European languages (English, French, German, Italian and Spanish) which reveals that pause durations differ between the languages, ranging from 487 to 629 ms (Campione & Véronis, 2002). Similarly a study of North American English speakers of four ethnicities (African American, European American, Latino and Lumbee) shows that the average pause durations range from 544 to 593 ms with an overall average of 574 ms (Kendall, 2009). A study of experimental English speech shows pause durations ranging from 450 to 1025 ms (Krivokapić, 2007a). In a study of German read speech, pause durations range from 465 to 772 ms depending on speaking tempo (Jürgen Trouvain & Grice, 1999).

Some studies do, however, show longer pause durations similar to those of Dalabon and Kayardild. In a study of spontaneous narratives in Brazilian Portuguese, pause durations range between 728 and 980 ms (Oliveira, 2002a). In a similar study of Brazilian Portuguese, pause durations in spontaneous narratives range from 680 to 920 ms depending on their location in the narrative, with an overall average of 760ms (Oliveira, 2002b). In a study of five languages (English, Finnish, French, German and
Spanish) pause durations differ between speech genres with pauses averaging 940ms in storytelling and 530ms in interviews (Kowal, Wiese, & O'Connell, 1983). In the storytelling genre pauses were more often and longer, resulting in a higher percentage of overall pause time. Long pauses are also found in a study of oral narratives in Ahtna, an Athabascan language of south central Alaska, where findings reveal that pauses range from 1079 to 1103 ms (Berez, to appear).

Overall these findings show a general tendency for speech genre to affect pause durations with longer pauses in spontaneous narratives and shorter pauses in conversation and experimental speech. Genre may therefore be an important contributing factor into the extremely long pause durations found in the Dalabon and Kayardild narratives.

Results also show that Kayardild narratives comprise a significantly higher overall proportion of pausing (at 50.9%) than Dalabon (at 38.7%). These relatively high percentages are mirrored in a study of Kunwinjku narratives where pausing accounts for 61.1% of the total time (Carroll, 1996: 111). Many studies, however, report lower pausing percentages of total time. Studies report that total pause time makes up 15 to 30% of total time in Swedish read speech (Fant & Kruckenberg, 1989), 6 to 38% of total time in French experimental speech (Fletcher, 1988), and 16 to 35% of total speech time in German (Butcher, 1981). Total pause time in a study of five languages (English, Finnish, French, German and Spanish) show similar low pausing percentages, as well as genre differences, with pauses making up 33.3% of storytelling and 17.2% of interviews (Kowal, et al., 1983). A later study of Swedish read speech likewise reports significant genre differences; pause time makes up 10% of total time in radio news reading time compared to 25% of total novel reading time (Fant, et al., 2003). For a comprehensive survey of speaking tempo and pause percentages in a range of European languages, see Trouvain (2004: 7-8).

The speaking tempo results presented above show that speaking rates for Dalabon and Kayardild range from 2.06 to 3.17 syllables per second, which is somewhat lower than
those found for English conversation, which range from 3.5 to 4.7 syllables per second (Goldman-Eisler, 1968), French read speech ranging from 2.4 to 6.7 syllables per second (Fletcher, 1987), and German read speech which range from 3.48 to 6.27 syllables per second (Jürgen Trouvain & Grice, 1999). Speaking rates of spontaneous speech in five languages (English, Finnish, French, German and Spanish) show genre differences with storytelling speaking rates lower at 3.43 syllables per second than interviews at 4.31 syllables per second (Kowal, et al., 1983). Speaking rates in a study of English horse race commentaries range from 3.91 to 4.61 syllables per second (Jürgen Trouvain & Barry, 2000). These differences are a result of the higher overall percentage of pausing found in both Dalabon and Kayardild. The higher pausing percentages are likely linked to the discourse type used in the present study as unscripted spontaneous narratives have been found to have lower speaking tempo results than other discourse types. A study of speaking tempo rates in Kunwinjku narratives reflects the low findings for Dalabon and Kayardild with an overall average of 2.24 syllables per second (Carroll, 1996: 111). These low speaking rates reflect the high percentage of pausing time found in these Australian narratives. Pausing time in Kunwinjku accounts for 61.1% of total time (Carroll, 1996: 111), which is somewhat higher than the results given for both Dalabon (at 38.7%) and Kayardild (at 50.9%) above.

Articulation rate results, which exclude pausing time, showed that the articulation rates found for Dalabon and Kayardild (ranging from 5.05 to 5.53 syllables per second) likewise reflect findings for Kunwinjku narratives where articulation rates average 5.77 syllables per second (Carroll, 1996: 111). These findings are in accordance with those found for unrelated languages such as Czech, where articulation rates range from 4.52 to 7.28 syllables per second (Dankovičová, 1997). German articulation rates have been measured at 5.7 syllables per second (Butcher, 1981), French articulation rates have been recorded at 5.2 to 6 syllables per second (Fougeron & Jun, 1998) and 4 to 7.2 syllables per second for read speech (Fletcher, 1987), while English articulation rates have been recorded ranging from 4.6 to 5 syllables per second (Zvonik, 2004). Articulation rates in German read speech range from 4.58 to 6.93 syllables per second.
Genre differences are again found in articulation rates of spontaneous speech in five languages (English, Finnish, French, German and Spanish) where storytelling articulation rates are lower at 5.17 syllables per second than interviews at 5.26 syllables per second (Kowal, et al., 1983). Articulation rates in a study of English horse race commentaries range from 4.43 to 5.14 syllables per second (Jürgen Trouvain & Barry, 2000). With the exception of articulation rates, all results show significant inter-speaker variation.

The percentage of IPs that comprise full clauses in Dalabon (averaging 33.4%) and in Kayardild (averaging 22.8%) is considerably lower than found in a number of studies of typologically diverse languages, as discussed in Section 1.2.1.3. An overview of these results have been summarised and combined in the following Table 5-33, which further lists the speech genre of each study.
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<th>Percentage IPs which equal full clauses</th>
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<td>This study</td>
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<tr>
<td>Kayardild</td>
<td>22.8%</td>
<td>Narratives</td>
<td>This study</td>
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<td>Japanese</td>
<td>42.2%</td>
<td>Narratives, telephone conversations, face-to-face conversations</td>
<td>(Iwasaki, 1993)</td>
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<td>45.4%</td>
<td>Conversations</td>
<td>(Iwasaki &amp; Tao, 1993)</td>
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<td>68%</td>
<td>Conversations</td>
<td>(Matsumoto, 2000, 2003)</td>
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<td>English</td>
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<tr>
<td>Mandarin</td>
<td>39.8%</td>
<td>Conversations</td>
<td>(Iwasaki &amp; Tao, 1993)</td>
</tr>
<tr>
<td></td>
<td>47.9%</td>
<td>Conversations</td>
<td>(Tao, 1996)</td>
</tr>
<tr>
<td>Korean</td>
<td>29.2%</td>
<td>Telephone conversations</td>
<td>(Park, 2002)</td>
</tr>
<tr>
<td></td>
<td>55.8%</td>
<td>Conversations</td>
<td>(Kim, 1996) summarised in (Park, 2002)</td>
</tr>
<tr>
<td>Wardaman</td>
<td>50.3%</td>
<td>Narratives</td>
<td>(Croft, 2007)</td>
</tr>
<tr>
<td>German</td>
<td>27%</td>
<td>Conversations</td>
<td>(Schuetze-Coburn, 1994)</td>
</tr>
<tr>
<td>Sasak</td>
<td>51.7%</td>
<td>Conversations</td>
<td>(Wouk, 2008)</td>
</tr>
<tr>
<td>Dolakhae</td>
<td>67.1%</td>
<td>Narratives</td>
<td>(Genetti &amp; Slater, 2004)</td>
</tr>
<tr>
<td>Newar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5-33: Clausal IP percentages across languages

As shown in Table 5-33, a great deal of variation is found both within (as found in Japanese, English, Mandarin, and Korean) and across languages. The Dalabon and
Kayardild results are significantly lower than those for Wardaman, Mandarin, Japanese, Sasak, Dolakhae Newar and English. A study of German reveals similarly low clausal IP figures to Dalabon as does a study of Korean (although an earlier study of Korean gives a significantly higher proportion (Kim, 1996)). The effects of speech genre on clausal IP percentages show mixed results with higher percentages found in conversation rather than narratives in Japanese, but higher percentages found in narratives rather than conversation in English. The low clausal IP correspondences for Dalabon and Kayardild indicate that the IP rather than the clause may be a more suitable linguistic unit of analysis, as the prosodic segmentation of the clause indicates groupings intrinsic to narratives.

The percentage of all clauses that comprise a single IP in Dalabon (43.9%) and Kayardild (44.6%) is lower than found in a number of studies which have shown a higher percentage of clauses comprising a single IP. In Wardaman clauses with NP arguments are produced as a single IP in 78.9% of all instances (Croft, 2007: 849). A study of German reveals that 54% of clauses correspond to IPs, though the vast majority of clause boundaries align with intonation boundaries at 96% (Schuetze-Coburn, 1994: 269) revealing that the clause corresponding to an IP is more commonly found than the IP corresponding to a clause (Schuetze-Coburn, 1994: 270). This finding is in line with those of Dalabon and Kayardild which reveals that most clause boundaries align with IP boundaries. A significantly lower percentage of clauses that comprise a single IP, however, is found in Korean where the single clause IP comprises 29.2% of the clause-IP patterns found (Park, 2002: 648).
Percentage clauses which equal full IPs | Speech genre | Reference |
--- | --- | --- |
Dalabon | 43.9% | Narratives | This study |
Kayardild | 44.6% | Narratives | This study |
Wardaman | 78.9% | Narratives | (Croft, 2007) |
German | 54% | Conversations | (Schuetze-Coburn, 1994) |
Korean | 29.2% | Telephone conversations | (Park, 2002). |

Table 5-34 Clauses which equal IPs across languages

As hypothesised, the findings presented above confirm that clause boundaries typically align with IP boundaries in both Dalabon and Kayardild. Furthermore clause-final boundaries were shown to display slightly higher degrees of final low boundary tones than elsewhere within clauses. Conversely, final high boundary tones were found to occur more frequently in clause-medial position in Dalabon, however, counter to expectations in Kayardild final high boundary tones were found to occur more often clause-finally than clause-medially. The Dalabon and Kayardild results then are largely in line with previous research which reveals that final syntactic positions (e.g. clause-final) are more likely to align with ‘final’ intonation contours or tones, and incomplete syntactic positions (e.g. clause-medial) to align with ‘incomplete’ intonation contours or tones in languages as diverse as Dolakhae Newar (Genetti & Slater, 2004), Dutch (Swerts & Geluykens, 1994) and English (Pierrehumbert & Hirschberg, 1990).

Although the studies outlined above and in Section 1.2 reveal that clausal IPs are found to have similar figures in languages as diverse as Wardaman, English and Mandarin, supposedly revealing the universal grammatical constituency of the IP, this does not seem to hold in languages such as Dalabon and Kayardild to the same degree. The slightly lower clausal IP figures in both Dalabon and Kayardild may be a result of the high number of NPs and the tendency for these to get their own IP (this will be further discussed in Section 6.1). The weaker correspondence between the clause and the IP in Dalabon and Kayardild, as also found in Nunggubuyu, may reflect issues of using the
clause as an analytic constituent. As has been recognised in several studies of Australian languages (e.g. Heath, 1984), prosodically defined constituents may be better suited to the analysis of some Australian languages, in part due to the widespread occurrences of independent grammatical units and prosodically dislocated NPs. This finding holds for both Dalabon and Kayardild given the weaker correspondence between the IP and the clause, as a result of the high degree of prosodically dislocated NPs (to be further discussed in Section 6.1).

The findings presented in this chapter also concern the makeup of the clause in Dalabon and Kayardild. This has included the clause types and their durations, their makeup in terms of word, morpheme and IP boundary counts, the different constituent types, as well as the word order of the clause. Results reveal both similarities and some significant differences between the languages. As expected from a highly polysynthetic language where referent encoding is found on the verb, Dalabon displays a significantly higher percentage of verbs than Kayardild does. Conversely, Kayardild displays a higher percentage of NPs than Dalabon. Both Dalabon and Kayardild display high levels of core argument NP ellipsis, as well as for the tendency for core argument NPs to precede the verb rather than follow it. Prosodically, pre-verbal NPs tend to receive their own IP more in Kayardild than in Dalabon, and in both languages, it was more common for post-verbal NPs to receive their own IP. Both languages rely heavily on the use of main clauses as would be expected, however, Kayardild makes use of a higher amount of verbless clauses than Dalabon does. Overall, clause durations are significantly longer in Kayardild than Dalabon, and Kayardild clauses correspondingly comprise more words and IP boundaries than Dalabon.

This chapter has investigated among other things the relationship between the clause and prosodic phrasing and shown there to be a strong correlation between clause boundaries and prosodic marking. The following Chapter 6 will look at two areas where misalignments between the clause and the IP are typically found: 1) below the level of
the clause in connection with nominals, and 2) above the level of the clause in connection with IPs comprising multiple verbs.
Chapter 6. Prosody below and above the clause

The previous chapters have outlined the intonational patterns of Dalabon and Kayardild as well as the prosodic phrasing and grammatical makeup of the clause. These findings revealed a relatively high degree of alignment between the two units the IP and the clause, although the degree of alignment was not as high as might have been expected based on cross-linguistic grounds (see Table 5-33 and Table 5-34). This chapter will follow on from the previous analyses provided in Chapter 4 and Chapter 5 by exploring in detail specific phenomena regarding the typical misalignments found between the clause and the IP. This chapter consists of two parts; the first in Section 6.1 will look at misalignments below the level of the clause in relation to nominals, the second in Section 6.2 will look at misalignments above the level of the clause, namely in relation to multi-verb IPs.

6.1 Nominals

The following discussion will look at the prosodic behaviour of nominals, as well as their position in the clause. As both Dalabon and Kayardild show a large degree of ellipsis of nominals, the mere presence of nominal constituents may reflect discourse principles of the languages. As discussed in Section 1.2.4.1 and Section 5.6, word order patterning may reflect information packaging principles of the languages. Furthermore the prosodic behaviour of nominals may reveal how these discourse principles align with prosody. In particular the following chapters will look at nominals which are found at the periphery of clauses, given their own IP, and separated by pause from the remainder of the clause. Such nominals will be referred to as prosodically separated nominals, as discussed in Section 1.2.4.1. Section 6.1.1 will provide an overview of the functions of nominals in Dalabon and Kayardild. In Section 6.1.2 the frequencies of prosodically dislocated nominals in both Dalabon and Kayardild will be provided. In both languages the majority of prosodic boundaries found within the clause are found to separate the initial nominals (often the subject) from the verb, as well as the clause final nominals from the preceding verb. As word order plays a large role in this area, the discussion of word order (see Section 1.2.4.1 for an overview) of the clause given
in Chapter 5.6 will be referred to. A detailed examination of the prosodic behaviour of nominals will be given with accompanying examples in Section 6.1.3 for Dalabon and Section 6.1.4 for Kayardild. These chapters will illustrate the strong similarities found in prosodically dislocated nominals in Dalabon and Kayardild. In both languages, dislocated nominals in pre-verbal position serve to introduce new information to the discourse, while dislocated nominals in post-verbal position generally serve to emphasise, clarify or elaborate on an already established referent.

6.1.1 Nominal functions

A brief overview will be given here of the grammatical functions of NPs in Dalabon and Kayardild. This will inform the examination of prosody and grammar in relation to nominals in the corpus. Among other things, NP function distributions may, for example, affect the distribution of prosodically dislocated NPs in the clause, revealing a possible source of differences between Dalabon and Kayardild. The graph in Figure 6-1 gives the distribution of all NPs in the Dalabon corpus, for all clause types. Results show that core argument NPs (subjects and objects) make up just over half of all NPs in the Dalabon corpus, while the remaining NPs are mostly adverbs. Object NPs are slightly more commonly found than subjects NPs. The category ‘other’ includes NPs considered independent or difficult to identify as belonging to one clause over another, and is a minor group in Dalabon. This is a noteworthy finding as independent NPs have been found to be a common feature in many studies of Australian languages, as discussed in above in Section 1.2.4.2.
Figure 6-1 NP functions in Dalabon

Figure 6-2 gives the distribution of all NPs in the Kayardild corpus and shows some interesting similarities as well as differences compared to Dalabon. Core argument NPs (subjects and objects) make up just under half of all NPs in the Kayardild corpus, which is less than in Dalabon. This is a striking result as it would be expected that polysynthetic languages which encode subject and object information on the verb would have less subject and/or object NPs than dependent-marking languages. Further, in contrast to Dalabon, subject NPs are more common in Kayardild than object NPs. The ‘other’ category makes up a larger proportion of NPs in Kayardild than in Dalabon, which may be attributed to the inclusion of verbless clauses which contain a very high proportion of these NPs in Kayardild. In both languages the adverb category constitutes the largest group. Slight inter-speaker variation is found in both Dalabon and Kayardild.
The results reported above will be referred to in relation to the prosodic phrasing of nominals in the following chapters, as these differences may be a possible source of the variation found in the prosodic phrasing of nominals in Dalabon and Kayardild.

### 6.1.2 Frequency of prosodically dislocated nominals

A quantitative survey of the Dalabon corpus given in Table 6-1 reveals that 16.8% of all NP constituents are given their own IP separated from surrounding material by pauses, and located at the periphery of a clause (i.e. either in clause-initial or clause-final position), with the majority of these found in pre-verbal position. Dislocated nominals may be either arguments or adjuncts. Results in Table 6-1 reveal a small degree of inter-speaker variation with the percentage of prosodically dislocated nominals in Dalabon ranging from 13 to 20%. This finding is in line with a previous study of Dalabon (Cutfield, in prep.) which finds that within a sequence of words which may be characterised as a single coherent clause or sentence, some prosodic dislocation is often evident. The majority of these dislocated nominals are found in pre-verbal position in the clause at 59.3% with considerable inter-speaker variation ranging from 44.4 to 76.5%. The proportion of pre-verbal prosodically dislocated nominals found in Dalabon reflects the word order of the clause as shown in Table 5-30 above which

---

**Figure 6-2 NP functions in Kayardild**

The results reported above will be referred to in relation to the prosodic phrasing of nominals in the following chapters, as these differences may be a possible source of the variation found in the prosodic phrasing of nominals in Dalabon and Kayardild.

### 6.1.2 Frequency of prosodically dislocated nominals

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shows that where core arguments are present, they largely occur in pre-verbal position (28.1%) rather than post-verbal position (6.5%). Clauses rarely contain both a subject and an object NP (6.6%). This finding is in line with a previous study of Dalabon (Cutfield, in prep.) which finds that subjects and objects often precede rather than follow the verb.

<table>
<thead>
<tr>
<th></th>
<th>Count dislocated nominals</th>
<th>Percentage dislocated nominals</th>
<th>Percentage pre-verbal</th>
<th>Percentage post-verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>17</td>
<td>13.0</td>
<td>76.5</td>
<td>23.5</td>
</tr>
<tr>
<td>MT</td>
<td>30</td>
<td>15.7</td>
<td>53.3</td>
<td>46.7</td>
</tr>
<tr>
<td>JC</td>
<td>16</td>
<td>20.0</td>
<td>68.8</td>
<td>31.3</td>
</tr>
<tr>
<td>JW</td>
<td>18</td>
<td>19.6</td>
<td>44.4</td>
<td>55.6</td>
</tr>
<tr>
<td>Dalabon</td>
<td>83</td>
<td>16.8</td>
<td>59.3</td>
<td>40.7</td>
</tr>
</tbody>
</table>

Table 6-1 Percentage of dislocated nominals of all nominals in Dalabon

Within the clause in Kayardild, NPs often receive their own IP and are separated by pause from other material in the clause. These NPs may be subjects, objects or adverbials and may both precede and follow the verb. Table 6-2 gives the percentages of prosodically dislocated nominals out of all nominals, as well as a percentage indicating whether the prosodically separated nominals occur in pre- or post-verbal position. Prosodically dislocated nominals in verbless clauses were not included in the counts given here, due to the issues surrounding correctly identifying the constituents of these clauses. A quantitative survey of the Kayardild corpus reveals that approximately a quarter (24.8%) of all NP constituents in main and subordinate clauses are given their own IP separated from surrounding material by pauses, and located at the periphery of a clause (i.e. either in clause-initial or clause-final position), with the majority of these found in post-verbal position. The Kayardild results shown in Table 6-2 reveal a small degree of inter-speaker variation with the percentage of prosodically dislocated nominals ranging from 22.5 to 31.3%. Dislocated nominals may be either arguments or adjuncts. These results are considerably higher than those of Dalabon where 16.8% of nominals are prosodically dislocated from the clause. Post-verbal NPs (both adjuncts and arguments) are more commonly found in the Kayardild corpus.
which is in contrast to the word order most commonly found in Kayardild (argument
NPs only), which overwhelmingly favours argument NPs to precede the verb (See Table
5-31 for further details regarding word order patterning). This is because most pre-
verbal NPs are arguments and most post-verbal NPs are adjuncts. The majority of
prosodically dislocated nominals in Kayardild occur in post-verbal position at 64.8%
with some inter-speaker variability ranging from 57.1 to 78.6%. This is an interesting
result given the similarities in word order found in Dalabon (see Table 5-30) and
Kayardild (see Table 5-31) where both languages prefer arguments to precede rather
than follow the verb. Note that the dislocated nominal results include adjuncts (see
Table 6-1 and Table 6-2), while the word order results only include arguments (see
Table 5-30 and Table 5-31).

<table>
<thead>
<tr>
<th></th>
<th>Count dislocated nominals</th>
<th>Percentage dislocated nominals</th>
<th>Percentage pre-verbal</th>
<th>Percentage post-verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>45</td>
<td>22.5</td>
<td>37.8</td>
<td>62.2</td>
</tr>
<tr>
<td>DN</td>
<td>14</td>
<td>25.5</td>
<td>21.4</td>
<td>78.6</td>
</tr>
<tr>
<td>PG1</td>
<td>10</td>
<td>31.3</td>
<td>40.0</td>
<td>60.0</td>
</tr>
<tr>
<td>PG2</td>
<td>38</td>
<td>27.1</td>
<td>31.6</td>
<td>68.4</td>
</tr>
<tr>
<td>RK</td>
<td>27</td>
<td>23.6</td>
<td>42.9</td>
<td>57.1</td>
</tr>
<tr>
<td>Kayardild</td>
<td>134</td>
<td>24.8</td>
<td>35.2</td>
<td>64.8</td>
</tr>
</tbody>
</table>

Table 6-2 Percentage of dislocated nominals of all nominals in Kayardild

The higher percentages of prosodically dislocated nominals in Kayardild than in
Dalabon are noteworthy, given that the pause patterning found within clauses and at
clause boundaries in Dalabon and Kayardild show very similar patterns (see Section 5.1
for pause results). Dalabon intra-clause pauses account for 26.2% of all pauses, while
inter-clause pauses account for 73.8% of all clauses (see Table 5-3 for further details).
Similarly, Kayardild intra-clause pauses make up 28.1% of all pauses, while inter-clause
pauses account for 71.9% (see Table 5-5 for further details).

The findings above for Kayardild contrast somewhat with the Dalabon results in that
prosodically dislocated nominals generally occur in post-verbal position in Kayardild at
64.8%, while the percentage is lower for Dalabon at 40.7%. It is noteworthy that the vast majority of dislocated nominals appear in post-verbal position in the clause in Kayardild, despite the fact that the word order of the clause in Kayardild overwhelmingly favours arguments to either precede the verb or to be ellipsed in almost three quarters of all clauses (see Table 5-31 for word order percentages in Kayardild). Pre-verbal argument NPs in Kayardild then typically share an IP with their verb, which is less commonly found in Dalabon.

6.1.3 Dalabon

The following chapter sections will examine aspects of prosodically dislocated nominals in Dalabon as they occur in pre-verbal and post-verbal position. Generally pre-verbal nominals (arguments and adjuncts) share an IP with the verb, while post-verbal nominals (arguments and adjuncts) tend to get their own IP.

6.1.3.1 Pre-verbal dislocated nominals

The following examples from Dalabon illustrate instances in the corpus where pre-verbal subject, object and adverbial NPs are separated from associated clauses by intonation boundaries and pause. These examples will illustrate that pre-verbal prosodically dislocated NPs in Dalabon serve to introduce a new topic or new information to the discourse, as well as to provide contrast.

In the following examples 6-1) and 6-2), the pre-verbal subject NPs receive their own intonational contours and are separated from the remaining clause with a pause. In 6-1) the prosodic dislocation, illustrated in Figure 6-3, as well as the very high initial pitch target and the final pitch lowering of the NP *djalmakkan* ‘eagle’ acts to prosodically highlight the prominence of the NP in the discourse. Here the NP introduces the referent to the discourse.

6-1) *djalmakkan* ... *ka-h-bon-inj* ... *ka-h-kûrl-djakm-inj* ...

  eagle 3SG-R-travel-PI 3SG-R-animal.noise-?-PI

  ‘The black eagle travelled along talking, kûrl! (kûrl is the cry of the eagle).’ (AB 1:39)
In 6-2) the prosodically dislocated NP *wawurdngan* ‘my brother’ identifies the referent of the discourse. The NP is prosodically highlighted as it displays a final low rising pitch contour, shown in Figure 6-4, which is rarely found in the corpus. The second clause here is an example of quoted speech which typically shows different prosodic features (e.g. Fletcher, 2005; Pierrehumbert & Hirschberg, 1990), to be discussed in Section 6.2.4.1.

6-2) *wawurd-ngan* ... *ka-h-bo-ng* ngale / *nga-h-bon-iyan* ...

brother-my 3SG-R-go-PP yeah 1SG-R-go-FUT

‘My brother went, “yeah, I’ll go.”’ (JW 1:53)

In 6-3) the overt subject NPs *nahngan* ‘my mother’ and *kardakngan* ‘my uncle’ are separated from the clause with pauses and both NPs display a final mid plateau and lengthened final syllables which indicates the listing of subjects, and is typical listing intonation, as shown in the pitch trace given in Figure 6-5. Note the third overt subject NP *bulungan* ‘my father’ is uttered under the same intonation contour as the verbal
word which ends with a mid high plateau contour. This indicates continuation as the speaker continues to explain what her parents told her. There is no apparent final lengthening of syllables in the final IP, as observed impressionistically.

6-3)  
\[ \text{nah-ngan / kardak-ngan / bulu-ngan / bula-h-yinmowon-inj ...} \]

mother-my uncle-my father-my 3PL>3-R-say-PI

‘My mother, my uncle, my father, they used to tell me.’ (MT 3:14)

Figure 6-5 Pitch trace of pre-verbal prosodically dislocated NPs (MT 3:14)

In 6-4) the pre-verbal NPs introduce the referents to the discourse. Figure 6-6 shows that the initial NP is uttered in its own IP with a heavily lengthened final syllable and sustained high intonational contour typical of listing intonation (e.g. Fletcher, 2007) as it is implied that there is more to come. As discussed in Section 4.1, this particular tune type is referred to as the ‘stylized’ sustained high contour by Bishop and Fletcher (2005). In addition to Dalabon (Evans, et al., 2008; Fletcher & Evans, 2002; Ross, 2003), the sustained high contour is commonly observed in many Australian languages such as Nunggubuyu (Heath, 1984), Alawa and Mara (Sharpe, 1972) and Iwaidja (Birch, 2002).

6-4)  
\[ \text{TexCamfoo-ngong ... ka-h-dja-Murray ...} \]

Tex Camfoo-many 3-R-just-Murray

\[ \text{Murray-ngong kanihdja bala-h-dja-ni-nj ...} \]

Murry-many there 3PL-R-just-live-PI

‘Tex Camfoo’s family, and the Murrays, they were still there.’ (MT 17:8)
In 6-5) the initial IP shown in Figure 6-8 comprises the overt subject *kernenjhbi* ‘what’s-his-name’. This prosodically dislocated NP acts to repair a broken topic chain by attempting to clarify the referent. This IP displays a typical hat pattern and ends with a considerable drop in pitch to a very low point in the speaker’s range. The expanded pitch range of the final IP acts as a potential discourse prominence-highlighting strategy. Further to this, a long pause separates the prosodically dislocated NP from the verb serving the pragmatic purpose of highlighting discourse prominence, and adding drama to the narrative.

6-5)  *kernenjhbi* ...  *ka-dja-ing-yurdmi-nj* ...

what’s-his-name  3SG-just-SEQ-run.away-PP

‘That feller now (Naworneng) he just ran away.’ (JC 3:13)
The above examples illustrate instances in the corpus of prosodically dislocated nominals found in pre-verbal position in the clause. The prosodic behaviour of these nominals is used to signal discourse prominence, where the NPs typically introduce or re-introduce a referent to the discourse. These NPs display prominent pitch marking as well as being followed by very long pauses.

### 6.1.3.2 Post-verbal dislocated nominals

The following examples in Dalabon show where post-verbal subject, object and adverbial NPs are separated from associated clauses through intonation boundaries and pause. The examples illustrate that post-verbal prosodically dislocated NPs in Dalabon serve to elaborate, highlight or clarify referents. This contrasts with pre-verbal prosodically dislocated NPs that function to introduce a new topic or new information to the discourse, to provide contrast, as well as add to the narrative performance.

Post-verbal prosodically separated nominals may be objects as in 6-6) or subjects as in 6-8). In 6-6) the overt objects are listed following the verbal word, as shown in Figure 6-9 and Figure 6-10. Each overt object NP ngurrurdu ‘emu’, djabbo ‘quoll’ and bakkadji ‘tree rat’ is uttered in its own IP with a heavily lengthened final syllable and a final falling pitch contour.

6-6) bulu-ngan ka-h-buyhwon-inj ... ngurrurdu ... djabbo ... bakkadji ... father-my 3SG-R-show-PI emu quoll tree.rat

‘My father used to show me emus, quolls, black-footed tree rats.’ (AB 5:32)
In 6-7) the post-verbal NPs clarify the referents being referred to. The NPs all display high plateau pitch contours illustrated in Figure 6-11 and Figure 6-12, but no significant final lengthening of syllables is found impressionistically.

6-7)  

<table>
<thead>
<tr>
<th>munguyhdjam</th>
<th>ka-h-buhywon-inj</th>
<th>rongkûrr</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>everything</td>
<td>3-R-show-PI</td>
<td>quiet.snake</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>yawurral</th>
<th>dadburrangkurl</th>
<th>ngurrurdu</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cheeky.snake</td>
<td>King.brown</td>
<td>emu</td>
<td></td>
</tr>
</tbody>
</table>

‘He used to show me everything, quiet snakes, cheeky snakes, King Browns, emus.’ (AB 5:39)
6-8) shows an IPU comprising two IPs, displayed in Figure 6-13, with an IP boundary preceding the repetition of the overt subject NP *wanjing* `one` which gets its own accent. The repetition of the final NP may serve to emphasise an already mentioned referent. Clear declination is found throughout the first IP, where perturbation found on the nominal *wanjing*. The second IP displays a substantially compressed pitch range, with word-final perturbation found on *wanjing*.

6-8)  *

\[
\begin{array}{ccc}
\text{wanjing} & \text{yibūn} & \text{yang} \\
\text{one} & \text{3} & \text{language}
\end{array}
\quad
\begin{array}{ccc}
\text{ka-h-wonan} / \text{wanjingh} \\
3SG-R-hearPRS & \text{one}
\end{array}
\]

`One boy can understand language.` (AB 2:53)
In Dalabon, nominals with adverbial functions, typically denoting a location, often receive their own IP and are further surrounded by pauses. In 6-9) the initial IP displayed in Figure 6-14 shows a final falling pitch contour which may signal completeness. The final IP, the prosodically dislocated nominal adverbial shows pitch reset and a final falling contour. The final nominal *budjkah* ‘in the bush’ follows a lengthy pause and serves to clarify the location which is being referred to.

6-9)  
\begin{center}  
ge-h-dja-lng-n-inj \hspace{1cm} nidjarra ... \hspace{1cm} budj-kah ...
\end{center}  
\begin{center}  
we.two-R-just-SEQ-stay-PI \hspace{1cm} here \hspace{1cm} bush-LOC
\end{center}  

‘The two of us stayed here in the bush.’ (MT 18:45)

In 6-10) the final dislocated NP, which is a repetition of the location mentioned in the first IP, receives its own intonational contour given in Figure 6-15. As in 6-9) the nominal adverbial provides emphasis of the location being referred to. Both IPs display final falling pitch contours.
6-10) show nahda Darwin yala-h-in-bó-ng... Darwin kanh...
show this Darwin 1PL-R-SEQ-go-PP Darwin that

‘We went off to the Darwin Show, there in Darwin.’ (JW 7:12)

Figure 6-15 Prosodic dislocation of NP (JW 7:12)

The post-verbal NP in 6-11 shown in Figure 6-16 follows a pause and ends with a final rising pitch contour. As this is the first mention of mimih ‘a type of rock spirit’ in the narrative, the rising pitch may indicate that there is more to come regarding the referent. This example is atypical in that the first mention of a referent is found in post-verbal position. New information to the discourse is typically found in pre-verbal position, as shown above in Section 6.1.3.1.

6-11) wanjing-kūn ka-h-bo-ng... kanh mimih...
one-GEN 3SG-R-go-PP that mimih

‘Once there was a Mimih (a type of rock spirit),’ (JC 1:3)
As seen in the examples above, prosodic juncture is typically found in connection with post-verbal nominals which serve to clarify, emphasise or elaborate on an already introduced referent. These adverbials often display final falling pitch contours. The preceding string, typically ending with a verb, likewise displays final falling contours which generally signals finality. The finality of the preceding string may indicate that these post-verbal prosodically dislocated nominals are afterthought-like comments to the discourse, as has been commonly found in Australian languages.

### 6.1.4 Kayardild

The following chapter sections will examine aspects of prosodically dislocated nominals in Kayardild as they occur in pre-verbal and post-verbal position. Pre-verbal nominals (arguments and adjuncts) share an IP with their verb more often than not, while post-verbal nominals (arguments and adjuncts) typically do not share an IP with their verb.

#### 6.1.4.1 Pre-verbal dislocated nominals

The following Kayardild examples show pre-verbal subject, object and adverbial NPs which are separated from associated clauses through intonation boundaries and pause. Prosodically dislocated NPs in pre-verbal position in Kayardild, as in Dalabon, serve to introduce a new topic or new information to the discourse, provide contrast, or add drama or emphasis to the narrative.
In 6-12) the pre-verbal NP *dathina nyinyaaki* ‘that tree frog’ is separated from the verb by a long pause measuring almost three seconds in duration. Shown in Figure 6-17 the initial NP displays a final falling pitch contour, while the IP containing the verb shown in Figure 6-18 displays an elevated pitch range again with a final falling contour at the rightmost edge, however, due to poor recording quality the pitch trace for this example is lacking in places. This example consists of quoted speech within the narrative, where a local is explaining the Nyinyaaki to another character and where the NP acts to introduce the referent to the discourse.

6-12) *dathin-a nyinyaaki* ...

\[
\begin{array}{ll}
\text{that-NOM} & \text{tree.frog:NOM} \\
\end{array}
\]

\[
\begin{array}{llllllllllll}
\text{daru-ya} & \text{wirdi-j} & \ldots & \text{daru-ya} & \ldots & \text{jambarn-d} & \ldots \\
\text{hole-MLOC} & \text{live-ACT} & \text{hole-MLOC} & \text{hollow.tree-NOM} \\
\end{array}
\]

‘That tree frog (Nyinyaaki) lives in a hole, in a hole in a hollow tree.’ (AD 23:6)
In 6-13) the pre-verbal NP *bathinkuru dawurladawuru dangkawu* ‘the spirits of the newly dead’ is separated from the verb by a long pause measuring approximately one second in duration. The clause-initial NP is the first mention of the referent in the narrative and therefore introduces the referent to the narrative while adding drama to the narrative performance. Both IPs display final falling pitch contours ending with low boundary tones.

6-13) *bath-in-kuru*  
*west-FROM-PROP*  
*dawurl-dawur-u*  
*newly.dead-PROP*  
*dangka-wu*  
*person-PROP*  

*rabi-ja*  
*get.up-ACT*  

*ngaka-th*  
*wait-ACT*  

‘(He) gets up and waits for the spirits of people newly dead.’ (RK 1:39)

Both pre- and post-verbal dislocated nominals are shown in 6-14) and Figure 6-20. The two initial IPs corresponding to *muthaa thungal* ‘many things’ and *wurand* ‘food’ each display a final high pitch contour signalling that there is more to come. These prosodically dislocated nominals serve to introduce the referents to the discourse. The prosodically dislocated post-verbal *wurand* ‘food’ ends with a final falling contour signalling finality. The repetition of *wurand* ‘food’ confirms that post-verbal nominals may act to emphasise a referent.

6-14) *mutha-a*  
*many-NOM*  
*thungal-d*  
*thing-NOM*  
*wuran-d*  
*food-NOM*  
*ngalama-th*  
*get-ACT*
‘There was lots of stuff there, plenty of food, we went shopping and bought.’ (AD 13:21)

Figure 6-20 Two clauses with pre- and post-verbal dislocated NPs (AD 13:21)

6.1.4.2 Post-verbal dislocated nominals

The following Kayardild examples show post-verbal subject, object and adverbial NPs which are separated from associated clauses through intonation boundaries and pause. Post-verbal prosodically dislocated NPs in Kayardild, as in Dalabon, serve to elaborate, highlight or clarify referents, and these contrast with the pre-verbal prosodically dislocated NPs which introduce new material to the discourse, provide contrast or add drama or suspense to the narrative. Pre-verbal and post-verbal dislocated NPs then serve distinct discourse functions in both Dalabon and Kayardild.

In the following 6-15), the final three post-verbal subject nominals are separated from the verb by pauses, as illustrated in Figure 6-21 and Figure 6-22. Subjects receive nominative case, which is also the ‘elsewhere’ case used in, for example, verbless clauses. Here the nominals refer to the subject of the clause, thereby getting the nominative case suffix and making it difficult to determine the status of the nominals as belonging either to the clause or to their own verbless clause. As discussed above in Section 5.4.3, nominal constituents acting as verbless clauses are commonly found in the Kayardild corpus. In some examples the nominals are clearly not a part of the
clause as the case marking does not match that of the object to which they refer. The post-verbal NPs *ngijinda banji* 'my brother-in-law' and *jirrku-rung-ban-dangkaa* 'from the north' serve to repeat and clarify the identity of the referent in the discourse. The penultimate IP ends with a mid falling contour, while the final IP ends in a low falling contour, signalling completeness of utterance.

6-15)  

\[ \text{ni-ya} \quad \text{yuulaa-n-da} / \quad \text{kinaa-j} \ldots \]

| 3SG-NOM | be.afraid-NOM | declare.self-ACT |

\[ \text{ngijin-da} \quad \text{banji} \ldots \quad \text{jirrku-rung-ban-dangka-a} \ldots \]

| my-NOM | sib.in.law:NOM | north-ALL-ORIG-person-NOM |

‘He said he was scared, my brother-in-law, a man from the north.’ (PG2 8:31)

Figure 6-21 Pitch trace of a main clause (PG2 8:31)

Figure 6-22 Pitch trace of a dislocated NP (PG2 8:31)

A post-verbal object which is separated from its verb by a pause is given in the following clause in 6-16) shown in Figure 6-23. Here pauses are found separating the final three nominals *kangku ngakuluwanju kayardilu* ‘our language Kayardild’ which together make up the object NP, as shown through the modal case suffixes found on

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the nominals. The prosodic dislocation in this example elaborates and adds emphasis to the post-verbal *ngakuluwanju kayardilu* ‘our Kayardild’. Each IP in this example ends with a final falling pitch contour. The final IP *kayardilu* ‘Kayardild’ is strongly prosodically marked, as it is separated by a long pause and begins and ends at a very low point in the speaker’s range.

6-16) kuna-walad-a marri-ju kang-ku ...
    child-LOT-NOM listen-POT language-MPROP

    ngakuluwan-ju ... kayardil-u ...
    our.PL.INC-MPROP Kayardild-MPROP

‘So kids can learn and listen to our language, Kayardild.’ (AD 11:26)

6-17) comprises a post-verbal prosodically dislocated nominal. Here the NP *birdiki dulki* ‘dangerous country’ shown in Figure 6-24 provides elaboration and emphasis and follows an IP boundary as well as a long pause. The prosodic marking of this constituent is employed to add emphasis to just how dangerous the country indeed is. The repetition of *dulki* ‘country’ is likewise used for emphasis. In this example, there are two clauses, each containing a verb, however, the exact boundary of the clause is somewhat difficult to identify as the nominal *dathinki* ‘there’ may belong to either the first clause or the second.

6-17) bala-tha niwan-ji dulk-i ...
    kill-ACT 3SG.POSS-MLOC country-MLOC

Figure 6-23 Pitch trace of a dislocated nominal (AD 11:26)

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‘(People) kill in her country, dangerous country, there, people should leave it.’ (PG2 8:8)

6-18) shows a clause where a pause separates the final three post-verbal nominal adverbials from the remainder of the clause. The NP *rilungku* *bardakakuru* *malakuru* ‘to the east over the sea’ serves to elaborate on or clarify the location which is being referred to. The initial IP ends with a final high plateau contour typical of narrative intonation and may indicate the intended continuation of the utterance. The final IP ends with a falling pitch contour which signals finality.
ri-lung-kuru       bardaka-kuru       mala-kuru ...
est-ALL-MPROP    across-MPROP     sea-MPROP

‘(I’m) going to go to the south, across the sea, to the east, over the sea.’ (PG2 10:2)

Figure 6-26 Pitch trace of a main clause (PG2 10:2)

Figure 6-27 Pitch trace of a prosodically dislocated NP (PG2 10:2)

In the following 6-19) the nominal adverbials, which serve as elaboration, appear post-verbally and are separated from the verb by pauses. The IPs given in Figure 6-28 display a high plateau contours, while the two final IPs given in Figure 6-29 display falling pitch contours: the first IP shows a shallow fall from a high to a mid pitch level, while the final IP shows clear final lowering. The pitch of the final IP is overall very low in the speaker’s range and functions to signal the completion of the utterance.

6-19) kayardil-kamburi-j ... ngimi-waan-da      jungarra-waan-d ...
Kayardild-speak-ACT  night-ORIG-NOM      big-ORIG-NOM
I’m speaking Kayardild, during the middle of the night, during the day, and during the night.’ (PG2 6:37)

In 6-20) an IP boundary and pause are found separating the final NP *muthaa dulk* ‘lots of places’ from the verb *warra* ‘go’. Here the post-verbal NP elaborates on the location being referred to. Due to poor recording quality the pitch trace for this example cannot be shown.

6-20) *warra-a dulk-a warra-j ... mutha-a dulk ...*

far-NOM place-NOM go-ACT many-NOM place:NOM

‘(We) went to a distant place, lots of places.’ (AD 11:11)

In 6-21) the adverbial NP *thuu kungarrowu* ‘there at Kungarr’ clarifies the location which is being referred to. The NP appears in post-verbal position and is separated
from the clause by two pauses. The NPs *thuu* ‘there’ and *Kungarrawu* ‘Kungarr’ illustrated in Figure 6-30 show final falling pitch.

6-21) **dathin-ku** **dii-a-thuu** **Kungarra-wu**

*there-MPROP* *sit-ACT* *there:NOM* *Kungarr(place)-MPROP*

‘He sat down there, at Kungarr.’ (AD 20:8)

![Pitch trace of a dislocated NP](image)

**Figure 6-30** Pitch trace of a dislocated NP (AD 20:8)

### 6.1.4.3 Verbal case

As discussed in Chapter 2, the verbal case found in Kayardild converts morphological nouns into morphological verbs by marking tense, aspect and mood. Although this converts the nominals into verbs for morphological purposes, they remain syntactic nominals as argued by Evans (1995a), and therefore still constitute NPs. Interestingly, nominal constituents displaying the verbal case pattern prosodically to regular nominals and are often found to align with IP boundaries. Typically nominals which take the verbal case occur in post-verbal position and are separated by IP boundaries and pauses. They generally end with a falling pitch contour. These nominals bearing verbal case then show the same prosodic patterns as regular nominals.

In 6-22) the verb is found clause finally, and is separated by an IP boundary from the two preceding constituents which both display verbal case. Here the first IP ends with a mid level plateau signalling incompleteness, and the following IP begins with a pitch reset. In this example the two first words *dathin* ‘there’ and *Warduri* both receive verbal case and make up a single IP while the verb *kurdalaaj* ‘spear’ also receives its own IP.
6-22) dathin-mula-a-ja / Warduri-wula-a-j / kurdala-a-j ...
there-VABL-M-ACT Warduri(place)-VABL-M-ACT spear-M-ACT

‘He went from there, at Warduri, getting speared at.’ (AD 18:25)

---

The following clause in 6-23) includes the two final nominals *dulk* ‘country’ and *mungkiji* ‘own’, which both carry verbal case. The final nominals carrying verbal case may be seen as elaborations or clarifications of the location being referred to, and in this way show the same patterns in terms of both prosody and discourse functions as regular nominals. These nominals are separated from the remainder of the clause by an IP boundary and a pause. Both IPs end in falling pitch contours.

6-23) nga-da thaa-thu rar-ung-ku ...
1SG-NOM return-POT south-ALL-MPROP

dulk-iiwa-thu mungkiji-wa-thu ...
country-VALL-POT own-VALL-POT

‘I want to return to my own country (to Bentinck Island).’ (DN 1:33)
In 6-24) a pause separates the two initial nominals displaying verbal case from the remainder of the clause. Here the nominals are found clause initially, occurring in pre-verbal position, where they act to introduce the referent to the discourse. Both IPs end with falling pitch contours.

6-24) dulk-iiwa-thu mungkiji-wa-thu ... jirrka-an-da thaa-thu ...  
country-VALL-POT own-VALL-POT north-FROM-NOM return-POT  
‘(I) will return from the north to (my) own country.’ (DN 2:42)

The clause given in 6-25) comprises two IPs which are separated by pause. The first IP consists of the verb, while the second consists of a nominal which receives the verbal case. Both IPs end with a high plateau contour indicating the incompleteness of the utterance. This clause is part of a description of people going to church, looking for people they know at church and talking to those they meet. The narrator then continues to talk about some of those people specifically.

6-25) rikarrkali-j ... dangka-janii-j ...  
cry-ACT person-VPURP-ACT  
‘(People) cry, people search for people.’ (PG2 4:44)
The examples given in 6-26) and 6-27) provide counter-examples to those above, as a nominal displaying verbal case is found in the same IP as the verb of the clause. In 6-26) the initial IP, shown in Figure 6-35, consists of the nominal displaying verbal case and the verb and ends with a high plateau, while the second and third IPs, shown in Figure 6-36, consist of quoted speech. The nominal bearing verbal case may share an IP with the verb to indicate the tight relationship present. The first quoted speech IP asks a question which is answered in the final quoted speech IP. Here the initial IP shows a large pitch range beginning with a high pitch target and ending with a very low pitch target, while the second IP shows a very low compressed pitch range ending with a final falling pitch contour.

6-26) nguku-jani-ja  kamburi-j ...  
   water-VPURP-ACT    say-ACT

   jina-a       nguku ...  dan-da      nguku ...
   where-NOM    water:NOM   this-NOM    water:NOM

   ‘(Looking) from water (they) say “Where is there water? Here there’s water”’ (PG2 2:4)
The IP shown in 6-27) includes a main verb as well as two nominals bearing verbal case. The IP ends with a final falling contour. The pitch trace for this example cannot be shown due to poor recording quality.

6-27) **dawurldawur-u** **jani-j**

   newly.dead-PROP search-ACT

   *dathin-janii-ja bath-in-janii-j ...*

   there-VPURP-ACT west-FROM-VPURP-ACT

   ‘(He) looks for the ghosts of the new dead, coming from there in the west.’ (RK 2:13)

As shown in the examples above, nominal constituents which take the verbal case are generally prosodically separated within its clause, as seen in 6-22) to 6-25), but may also occur in the same prosodic phrase as the verb, as seen in 6-26) and 6-27). Despite the status of nominal constituents bearing verbal case as morphological verbs, these pattern both syntactically and prosodically as regular nominals.
6.1.4.4 Kayardild nominal pause results

As Kayardild nominals show a complex case-marking system, as described above in Section 2.2.4, it was investigated whether nominals with case marking reflecting higher syntactic embedding versus lower syntactic embedding correlated with pause duration. As discussed in Section 2.2.4 case marking of nominals in Kayardild is highly complex, where a case may refer to up to four different levels of syntactic relationships from the noun itself and up to the main clause. In cases where multiple syntactic levels are marked the result is case stacking, as shown in 6-28) where the nominal *dangka* 'man' bears four case suffixes *-karra, -nguni, -naa, and -ntha*.

6-28) maku-ntha yalawu-jarra-ntha yakuri-naa-ntha
   woman-OBL catch-PST-OBL fish-MABL-OBL

   *dangka-karra-nguni-naa-ntha* mijil-nguni-naa-nth.
   man-GEN-INSTR-MABL-COBL net-INSTR-MABL-COBL

‘The woman must have caught fish with the man's net.’ (Dench & Evans, 1988: 34-35)

In regards to pauses found in connection with nominals, the Kayardild data shows that, generally approximately three quarters of all pauses are found at clause boundaries (as discussed in Section 5.1), and that pauses are therefore not commonly found within a clause. Where pauses are located within a clause, they separate the pre-verbal subject nominal from its predicate, or more commonly separate a post-verbal nominal, argument and adjunct, from its predicate.

Pause durations preceding nominals with embedded case marking are given in Table 6-3 and reveal that the average pause duration preceding a nominal with case marking signalling higher levels of syntactic embedding is 1114.6ms. This pause duration is slightly higher than the average pause duration found within a clause (819ms) and considerably lower than pause durations found at clause boundaries (1543ms). However, as the durational differences are so slight and as these instances are so few, no statistical correlations can be made. For these reasons, this result does not confirm the hypothesis that pauses preceding more complex units are longer. Similar
correlations cannot be made for Dalabon as nominals generally do not receive case marking.

<table>
<thead>
<tr>
<th></th>
<th>Pause duration (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre nominal pause marking higher syntactic unit</td>
<td>1114.6</td>
</tr>
<tr>
<td>Intra clause pause</td>
<td>819</td>
</tr>
<tr>
<td>Inter clause pause</td>
<td>1543</td>
</tr>
</tbody>
</table>

Table 6-3 Kayardild pause duration preceding complex nominal constituents

This finding is quite significant given that it does not support the idea that the typology of Kayardild makes it more complicated to produce complex nominal constituents without the need for longer pauses.

There is therefore no evidence to suggest that it is the extensive case marking in Kayardild has an effect on the pausing patterns found in the language. This finding therefore does not support that hypothesis that longer pauses are needed for processing purposes related to constituents associated with complex case marking.

6.1.5 Discussion

The prosodic behaviour of nominals in the Dalabon and Kayardild corpus shows remarkable similarities between the languages. IP boundaries and pauses are found to separate NPs from the verb, both where they precede and where they follow the verb. Prosodic dislocation in connection with other prosodic factors such as elevated or reduced pitch range, syllable lengthening, and final lowering act to convey information packaging and focus by signalling to the listener the discourse prominence of the marked constituents. Pre-verbal nominals act to introduce or clarify the referent, to reintroduce an already mentioned referent to the discourse, as well as to add drama, emphasis or suspense to the narrative performance. Where NPs follow the verb, they act as an afterthought, as emphasis, elaboration or as clarification of the referent. One striking difference between the Dalabon and Kayardild corpus is in the proportion of these prosodically dislocated nominals which precede and follow the verb. Kayardild
prefers post-verbal prosodically dislocated nominals (which may be either adjuncts or arguments), while Dalabon prefers pre-verbal prosodically dislocated nominals, despite both languages showing a preference for arguments to precede rather than follow the verb.

The percentage of prosodically dislocated nominals in Dalabon at 16.8% and Kayardild at 24.8% is similar to those found in a study of English at 14% and Wardaman at 21% (Croft, 2007). In this analysis the prosodically dislocated NPs are divided into three categories: grammatically independent, conjoined or in apposition to immediately preceding NPs, and arguments of verbs in neighbouring IPs. Grammatically independent lone NPs are more commonly found in Wardaman (5.2%) than English (1.8%). The difficulties assigning roles to these NPs become apparent in Wardaman where 20% of all prosodically dislocated NPs are grammatically ambiguous, and of the grammatically ambiguous cases, approximately half are prosodically closer to one neighbouring verb than the other (2007: 33). As discussed in Section 3.3.2 grammatical ambiguity of nominal constituents was generally not an issue in the Dalabon and Kayardild corpora, as context, case-marking, and pause durations, provided sufficient information regarding the assignment of nominals to a clause.

The crucial role of prosodic phrasing in speech comprehension has been confirmed by numerous studies. Experiments show that prosodic phrasing as well as pitch accent patterns affects the focus interpretation of an utterance. The significant interaction found between focus and phrasing indicates that prosody plays a much larger role in sentence comprehension than previously recognised (Schafer, 1997). Some languages may even require that a prosodic phrase break is found at the edge of a focused constituent such as Bengali (Hayes & Lahiri, 1991), Chichewa (Kanerva, 1990), Japanese (Nagahara, 1994) and Korean (Jun, 1993). This interaction between prosodic phrasing and discourse focus is likewise confirmed in a study of Japanese, German and English, where information structure is found to affect the f0 of the entire domains of focus and givenness (Féry & Ishihara, 2010). It is not surprising then the significant role that prosodic phrasing plays in both Dalabon and Kayardild discourse.
6.2 Multi-verb intonation phrases

A multi-verb IP is defined as a single IP which is comprised of two or more verbs. These multi-verb IPs are striking in Dalabon and Kayardild where IPs generally contain a single clause or less than a clause averaging just a few words (see Section 4.3).

The close connection found between grammatical units and IPs has been argued to be indicative of the relationship that exists between prosodic structure and grammatical structure (e.g. Croft, 2001) and studies have generally found that as grammatical structures become more complex, they become more likely to be divided over several IPs (e.g. Croft, 1995). Studies have, however, also revealed that closely related events are often uttered in a single intonational contour (e.g. Evans, 2003a). Two factors are at work here – the division of complex units and the integration of these complex units. Both the prosodic division and the prosodic integration of grammatical constituents may serve cognitive purposes: prosodic division of constructions may ease the cognitive load of an utterance, while prosodic integration of constructions may emphasise the semantic links between constructions.

As discussed in Chapter 1, constraints placed on IP size can be explained by the IP Storage Hypothesis (Croft, 1995), whereby grammatical constructions are stored or precompiled and therefore (normally) occur in a single IP. Croft argues that speakers rely heavily on these pre-fabricated grammatical units to increase their communication efficiency. On a similar note, Pawley and Syder (1983) propose that speakers rely on ‘lexicalised sentence stems’, which are formulaic or pre-fabricated sequences of units stored in the mind of the speaker. Croft states that more complex units are likely not to be stored whole, resulting in their separation over multiple IPs. This is explained as being due the size of short-term memory which is approximately six words (Croft, 1995: 873). Similarly, Chafe states there are cognitive limits to how much new information IPs can contain, and argues that typically one new idea is found per IP (Chafe, 1987, 1994). The notion that complex or large units are difficult for speakers to store or process and therefore potentially partly responsible for the prosodic phrasing of language is of key interest to the current study.
Conversely, however, studies have also shown that semantically related clauses are more likely to share a prosodic unit than semantically distant clauses in range of typologically distinct languages such as Wardaman (Merlan, 1994), Spanish (Sánchez, 2001), Korean (Park, 2002) and Bininj Gun-wok (Bishop, 2003; Evans, 2003a). A close semantic relationship involves, among other things, temporal and referential dependence between events. Based on the finding that conceptually closer clauses have a stronger tendency to share an IP than those that do not, it has been argued that the IP has a cognitive basis (e.g. Park, 2002).

As discussed in Section 1.3, it is hypothesised that prosodic constituency, in addition to being used both to segment grammatically complex units into smaller units as well as to signal discourse prominence and structure, may also be used to indicate the semantic integration of events using grammatical constituents such as the clause. It is therefore hypothesised that where IPs comprise two or more verbs in both Dalabon and Kayardild, these verbs will depict events which are closely related, as had been found in a range of languages. As discussed in Chapter 1, comparisons of prosodically defined units and grammatical structure in typologically diverse languages may reveal insights into how language is processed. The examples presented will demonstrate that multi-verb IPs show a high degree of semantic integration indicating that both Dalabon and Kayardild make use of prosody to semantically link events.

As discussed in Chapter 5, the correlation of clause boundaries to IP boundaries found in Dalabon and Kayardild reflects cross-linguistic findings, where high clause to IP correlations have been found in languages as typologically diverse as Wardaman (Croft, 2007), Mandarin (Tao, 1996), Japanese (Matsumoto, 2003), and Bininj Gun-wok (Bishop, 2003). However, despite the finding that clause boundaries typically align with IP boundaries (see Section 5.2) and further that clauses often correspond to IPs in both Dalabon (see Table 5-15) and Kayardild (see Table 5-16), a noticeably high proportion of IPs contain two or more verbs (at 25% for Dalabon and 16.7% for Kayardild). A typical example of a multi-verb IP is given in 6-29) and illustrated in Figure 6-37. The single IP here comprises two main verbs, where the two verbs denote a simultaneous
relationship. In 6-29) the prosodic integration of verbs emphasises that the act of ‘going’ occurred whilst ‘being a child’. The IP is syntactically long, comprising four grammatical words and 11 morphemes, somewhat higher than the average numbers of an IP. Note the intervening material *nûnh nahda* ‘this way’ found between the two verbal words. This is a typical example from the Dalabon corpus of an IP corresponding to multiple verbs encoding two facets of a particular event. The IP shown in Figure 6-37 displays a globally flat pitch contour ending with a mid level pitch at the rightmost edge.

6-29)  nga-h-wurdurd-ni-nj  nûnh nahda  nga-h-bo-ng ...
1SG-R-child-be-PI  this this.way  1SG-R-go-PP
‘(when) I was a child I went that way.’ (MT 1:31)

![Figure 6-37 Multi-verb intonation phrase (MT 1:31)](image)

It is hypothesised that multi-verb IPs will show a semantic coherence with a close temporal or sequential relationship between the events depicted, as prosodic phrasing is generally used to indicate which words belong together semantically or pragmatically. These examples challenge the possible upper limits of IP complexity (as an IP containing two or more verbs and possibly other material is complex due to the number of words and morphemes it contains alone) and confirms that semantic linking may be a significant factor in prosodic phrasing and override the need to chunk a prosodic unit for cognition purposes. Multi-verb IPs most often include two or more complete clauses with arguments and adjuncts, although occasionally arguments and adjuncts are given their own IP. In the current study, a multi-verb IP does not
necessarily entail that the subjects of the predicates need be the same, although this is generally the case. It is also not a requirement that intervening material such as NPs may not be found between the verbs. Other studies have referred to similar constructions as prosodically integrated units (e.g. Bishop, 2003), however, the term multi-verb IP will be used instead in the current dissertation to clarify that the prosodic units contain two or more verbs. It will be shown that in both Dalabon and Kayardild these constructions depict tightly linked or closely related events, which in many ways resemble serialised verb constructions (SVCs) which contain two or more verbs. An important prosodic feature of SVCs is furthermore that they typically comprise a single IP (Aikhenvald & Dixon, 2006; Crowley, 2002; Englebretson, 2003; Givón, 2001).

Multi-verb IPs, or prosodically integrated clauses, have been found in Bininj Gun-wok (Bishop, 2003; Evans, 2003a), Wardaman (Merlan, 1994), and Korean (Park, 2002), where these constructions denote a single notional event and comprise a single intonation contour (see e.g. Aikhenvald & Dixon, 2006; Durie, 1997). Other languages such as Spanish (Sánchez, 2001) show similar tendencies for semantic cohesion to be signalled by prosodic phrasing. In Igbo a single IP is used for related events while an intonation break indicates separate events (Lord, 2003). Similarly, in English certain sequences of events are found to commonly occur in a single IP (Croft, 1995: 868-869). In some respects prosodically integrated clauses resemble serial verb constructions in that events depicted show a close sequential or co-temporal relationship (Durie, 1997: 290-291). These aspects will be returned to and discussed in Section 6.2.6.

Section 6.2.1 will provide an overview of the frequency of these multi-verb constructions, while Section 6.2.2 will outline the most commonly found verbs in these constructions. In Section 6.2.3 pause durations found preceding and following these constructions will be examined in order to seek out any correlations between pause duration and grammatical complexity of an IP. Examples of IPs consisting of two or more verbal words will be examined in detail in Section 6.2.4 for Dalabon and in Section 6.2.5 for Kayardild to illustrate the semantic coherence found within multi-verb constructions. These examples will be accompanied by pitch contours illustrating
that these constructions show the typical patterns found on IPs generally, as outlined in Section 4.1 for Dalabon and Section 4.2 for Kayardild. Section 6.1.5 provides a discussion and summary of these findings.

6.2.1 Frequency of multi-verb IPs

In order to investigate the frequency of multi-verb IPs, Table 6-4 shows the total counts of all clauses (main, subordinate and verbless clauses) and multi-verb IPs in Dalabon. Results show that of all 784 clauses found in the corpus, 87 instances of multi-verb IPs are found (i.e. 87 IPs in the Dalabon corpus contain two or more verbs), and that these multi-verb IPs account for 196 of all clauses. This reveals that prosodic integration is relatively common in the Dalabon corpus, as is also found in Bininj Gun-wok (Bishop, 2003), with a quarter of all clauses found to belong to multi-verb IPs. This somewhat high figure may further be attributed to two factors. In the MT narrative two instances of the prosodic integration of five clauses each are found. These clauses are spoken with a listing intonation, and depict the repetition of events. Further, it must be noted that the quoted speech marker kahyininj ‘he said’ has been included in these counts. To be discussed in more detail in Section 6.2.4.1 quoted speech in Dalabon is often signalled by the verb kahyininj ‘he said’ which is often uttered in the same IP as the quoted speech, but at a lower volume and with a substantially compressed pitch range. Of the multi-verb IPs, seven of these include the quoted speech marker kahyininj ‘he said’, which therefore contributes to the higher percentage of multi-verb IPs. Considerable inter-speaker differences are found with percentages ranging from 17.5% (JC) to 34.1% (AB).
In Kayardild, only subordinate and main clauses were included in the count of multi-verb IPs, (although there were very few examples of subordination occurring in multi-verb IPs). This was done to ensure that only clauses with verbal predicates were included as the precise status of verbless clauses in Kayardild is in question, as discussed in Section 2.2.5. The results in Table 6-5 reveal that of the 383 clauses in the Kayardild corpus, 64 clauses are found in multi-verb IPs. Overall this represents 16.7% of all clauses found in multi-verb IPs in Kayardild which is somewhat lower than the Dalabon percentage at 25%. In total 30 IPs are found to contain two or more verbs. Significant inter-speaker differences are found in Kayardild with percentages ranging from 9.1% (AD) to 35.9% (DN).

These figures reveal that multi-verb IPs are a relatively common occurrence in both the Dalabon and Kayardild corpora, despite a great deal of inter-speaker variation.
6.2.2 Typical verbs in multi-verb IPs

The following examines the most commonly found verbs in multi-verb IPs in Dalabon and Kayardild, and reveals striking similarities between the verbs used in these constructions in the languages. In many respects these verbs resemble those most commonly found in SVCs cross-linguistically including basic verbs of motion, posture, active verbs, valency-increasing and argument-adding verbs (Durie, 1997). The most typical verbs occurring in a multi-verb IPs in Dalabon are given in Table 6-6. This table lists the individual verbs involved and does not list the most common combinations. The ordering of the verbal components in multi-verb IPs is always iconic, as is reported in the literature for serial verb constructions (e.g. Durie, 1997). The most commonly occurring patterns of verb combinations in the multi-verb IPs in Dalabon typically involve the motion verbs *bon* ‘go’ and *dudjmū* ‘return’ and the stative verbs *ni* ‘be/sit/live’ and *yu* ‘lie/sleep/stay at’, in the combinations shown in the Dalabon examples given in Section 6.2.4. The verb *bon* ‘go’ the most commonly found in multi-verb IPs.

<table>
<thead>
<tr>
<th><em>bon</em> ‘go’</th>
<th><em>ni</em> ‘be/sit/live’</th>
<th><em>nan</em> ‘see/look at’</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>dudjmū</em> ‘return’</td>
<td><em>mang</em> ‘get’</td>
<td><em>bengkan</em> ‘know/remember’</td>
</tr>
<tr>
<td><em>burlhmū</em> ‘arrive’</td>
<td><em>yu</em> ‘lie/sleep/stay at’</td>
<td><em>wonan</em> ‘listen/hear’</td>
</tr>
<tr>
<td><em>dokkan</em> ‘get up’</td>
<td><em>rarrimūn</em> ‘grow up’</td>
<td><em>yenjdjung</em> ‘talk/speak’</td>
</tr>
</tbody>
</table>

Table 6-6 Commonly found verbs in multi-verb IPs in Dalabon

Similar results are found in Kunwinjku, where motion verbs have been found most commonly occurring in prosodically integrated phrases (Bishop, 2003: 396; Durie, 1997). This is in line with Givón who argues that modality verbs and manipulative verbs (which include motion verbs in Givón’s tripartite division of verbs) display the strongest bonds, while cognitive-utterance verbs display the weakest bonds. He states that ‘the stronger the semantic bond is between the two events, the more intimately is the syntactic integration of the two propositions into a single clause’ (1990: 516). Event integration is thus more likely to occur the stronger the semantic bonds are. Although modality and manipulative verbs are the most commonly found in multi-verb
IPs in Dalabon there are nevertheless a large amount of cognitive-utterance verbs present in these constructions including nan ‘see/look at’, bengkan ‘know/remember’, wonan ‘listen/hear’, and yenjdjung ‘talk/speak’, as well as the location verb ni ‘be/sit/live’. Multi-verb IPs in Dalabon then generally consist of modality and manipulative verbs but do not exclude cognitive-utterance verbs.

The most typically occurring verbs in multi-verb IPs in Kayardild are given in Table 6-7 and reveal that verbs of motion and action as well as location verbs are the most commonly found. The ordering of the verbal components in multi-verb IPs is generally iconic, but not always, as for example shown in example 6-43). Strong similarities then are found between the verbs which occur in Kayardild and Dalabon multi-verb IPs, with motion verbs the most commonly found as well as a slightly lower proportion of stative verbs. The most commonly occurring verbs in multi-verb IPs in Kayardild are motion verbs warra ‘go’ and thaa ‘return/go’ and the stative verbs wirdi ‘be/stay’ and thaldi ‘stand’, as shown in the Kayardild examples given in Section 6.2.5.

| rabi ‘get up’ | warra ‘go’ | kurdala ‘spear’ |
| thaldi ‘stand’ | wirdi ‘be/stay’ | diya ‘eat/drink’ |
| thaa ‘return/go’ | kamburi ‘speak’ | kurri ‘see/look’ |

Table 6-7 Commonly found verbs in multi-verb IPs in Kayardild

Often multi-verb IPs in Kayardild contain motion complexes. These motion complexes are constructions that have a main verb followed directly by a motion verb which expresses that the motion verb occurs simultaneously or following the main action. For example, the verb thaa means ‘return’ when used as a main verb, and when it is used in a motion complex it means ‘go and V, expecting to return’ (Evans, 1995a: 308). Likewise the verb warra ‘go’ is found in motion complexes where it means to ‘go/come along while Ving’ (Evans, 1995a: 309). This has been referred to as ‘associated motion’ in the literature for Australian languages (I. Green, 1989; R. Green, 1995; Koch & Simpson, 1995; Nordlinger, 2001; Simpson, 2001; Wilkins, 1991). The verbs kamburi ‘speak’ and kurri ‘see/look’ were also found in multi-verb IPs, similar to the Dalabon findings where multi-verb IPs often contained the verbs nan ‘see/look at’, yenjdjung
‘talk/speak’, as well as the verbs *bengkan* ‘know/remember’ and *wonan* ‘listen/hear’. In Kayardild the location verb *wirdi* ‘be/stay’ was commonly found, similar to Dalabon where the location verb *ni* ‘be/sit/live’ featured prominently in multi-verb IPs.

Multi-verb IPs were then typically found to contain motion verbs in both Dalabon and Kayardild. The findings for Dalabon shown in Table 6-6 and Kayardild shown in Table 6-7 reflect the clearest examples of serialised constructions in Bininj Gun-wok (Bishop, 2003) where the verbs *re* ‘go’ and *ni* ‘sit’ are commonly found.

The verbs found in Dalabon and Kayardild multi-verb IPs reflect in many ways the verbs commonly found in SVCs cross-linguistically (Durie, 1997) where the most common types of verbs are typically basic verbs of motion such as ‘come’, ‘go’, and ‘move’, verbs of posture such as ‘sit’, ‘stand’, and ‘lie’, active verbs such as ‘wander’ and ‘crawl’, as well as valency-increasing and argument-adding verbs such as ‘give’, ‘take’, ‘do/make’, ‘put’ (Aikhenvald, 2006; Crowley, 1987; Foley & Olson, 1985). Kaititj, for example, makes use of only motion verbs in serialising constructions, while they are the most frequently used in serialized constructions in Yimas (Foley & Olson, 1985: 41). Posture verbs are further commonly found in serialised constructions. For example in Ndje´bbana, (which shows limited serialization) the verbs ‘go’, ‘move’, and also ‘sit’, ‘stand’, and ‘lie’ are found in SVCs (Aikhenvald, 2006). In contrast to findings of SVC languages, Dalabon and Kayardild multi-verb IPs often contain stative verbs such as *ni* ‘be/sit/live’ and *yu* ‘lie/sleep/stay at’ in Dalabon and *wirdi* ‘be/stay’ and *thaldi* ‘stand’ in Kayardild, which, together with copulas and existential verbs generally tend not to occur in any type of serial verb constructions (Aikhenvald, 2006: 49).

**6.2.3 Pauses found in connection with multi-verb IPs**

To test the hypothesis of whether more complex grammatical units require more planning and comprehension time for speaker and listener, the durations of pause found preceding and following multi-verb IPs were extracted. Table 6-8 shows pause information for multi-verb IPs in Dalabon revealing that following pause durations are longer (1157ms) than those preceding (963ms). Some inter-speaker variation is found
with preceding pauses ranging from 699 to 1198 ms, and following pauses ranging from 910 to 1400 ms. Pauses are found to precede multi-verb IPs in 74.7% of instances, and to follow in 78.2% of all instances.

<table>
<thead>
<tr>
<th></th>
<th>Preceding pause duration (ms)</th>
<th>Following pause duration (ms)</th>
<th>Percentage of initial boundary corresponding to pause</th>
<th>Percentage of final boundary corresponding to pause</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>1021</td>
<td>1001</td>
<td>85.0</td>
<td>80.0</td>
</tr>
<tr>
<td>MT</td>
<td>1198</td>
<td>1400</td>
<td>70.5</td>
<td>72.7</td>
</tr>
<tr>
<td>JC</td>
<td>699</td>
<td>910</td>
<td>55.6</td>
<td>77.8</td>
</tr>
<tr>
<td>JW</td>
<td>932</td>
<td>1315</td>
<td>85.7</td>
<td>92.9</td>
</tr>
<tr>
<td>Dalabon</td>
<td>963</td>
<td>1157</td>
<td>74.7</td>
<td>78.2</td>
</tr>
</tbody>
</table>

Table 6-8 Multi-verb IP pause information in Dalabon

Table 6-9 gives pause information for Kayardild and reveals that pause durations are longer when they follow (1486ms) rather than precede (1239ms) a multi-verb IP, as found in Dalabon. A significant amount of inter-speaker variation is found in the Kayardild results, with preceding pauses ranging from 813 to 1938 ms, and following pauses ranging from 955 to 2147 ms. The majority of multi-verb IPs are preceded and followed by a pause (90% in both cases), slightly higher than in Dalabon, which may be due to the finding that pauses are more commonly found in Kayardild than Dalabon generally. The pause durations reported here show significantly longer durations in Kayardild than in Dalabon, which is in line with pausing results generally (see for example Table 5-1 for an overall comparison of Dalabon and Kayardild pause durations).
Pauses located at the boundaries of multi-verb IPs were examined in order to identify whether these complex IPs are bound by longer than average pauses, in line with the notion that more grammatically complex units require more planning and/or comprehension time. Unexpectedly, results did not confirm this to be the case in either Dalabon or Kayardild. In Dalabon, pauses surrounding multi-verb IPs are of a similar duration (963 and 1157 ms) to those found at clause boundaries (1147 ms), while in Kayardild pauses surrounding multi-verb IPs (1239 and 1486 ms) are shorter than those found at clause boundaries (1543 ms). Pauses found within clauses are significantly shorter (735 ms in Dalabon and 819 ms in Kayardild) than those found surrounding multi-verb IPs.

### 6.2.4 Multi-verb IP examples in Dalabon

This section will look at examples of multi-verb IPs in Dalabon revealing a high degree of semantic integration between verbs, as well as the potential syntactic length and complexity of these IPs. It is hypothesised that the use of prosody to delimit phrases may instead assist in understanding constituency groupings. This may in part be due to the fact that in Dalabon morphosyntactic marking of grammatical constituency relations is minimally used (despite the many subordination strategies available Dalabon makes minimal use of these at just 6.1%, as shown in Section 5.2.3) using prosody instead as a tool to signal linguistic groupings. Despite the overwhelming...
trend for Dalabon IPs to consist of few grammatical words (2.3 grammatical words) and morphemes (3.2 morphemes) (see Table 4-3 for further details), examples of IPs comprising two or more verbal words plus arguments and adjuncts were present in the corpus. Almost all grammatically complex IPs comprise two main verbs with optional nominal or adverbial phrases. Though uncommon, multi-verb IPs may furthermore have different subjects. An examination of IPs comprising several verbal words, as well as other phrasal material such as NPs, reveal a tendency for the verbal elements to form a cohesive semantic unit displaying a close temporal relationship between the events depicted. In other words, where two or more verbs belong to the same IP, they generally represent subordinate relationships or co-occurring events, but typically involve main clauses and rarely include a subordinate clause. This temporal-dependence of two verbs is crucial to the degree of integration. Givón states ‘the more co-temporal two events are, the higher is the probability that they are not independent of each other’ (1990: 520). Although note that Givón is talking about syntactic (in)dependence, while multi-verb IPs denote prosodic dependence but generally syntactic independence as both verbs are typically main verbs.

Examples 6-29) to 6-32) below all discuss events which occur simultaneously and where the grammatical subjects remain the same on both verbs. As mentioned above, intervening material is commonly found between verbs as in 6-29), 6-31) and 6-32) below. All of these examples include the motion verb bon ‘go’, as is most commonly found in multi-verb IPs. The co-temporal relationship between events is evident in all the examples of multi-verb IPs encountered, apart from those examples including quoted speech markers. In these examples, the verbs describe two co-temporal events, viewed conceptually as a single notional event. Generally the intonation contours of multi-verb IPs show overall pitch lowering (as for example shown in the following Figure 6-40, Figure 6-42 and Figure 6-43) as is found in the majority of IPs.

In 6-30), the eagle’s action of ‘going’ occurs co-temporally with its ‘screaming’. The NP argument djalmakkan ‘eagle’ receives its own IP marked by pitch prominence with an initial high boundary tone, and is further separated from the verbs by pause. As this is
the first mention of the NP to the narrative, the prosodic break serves the pragmatic purpose of highlighting the introduction of the referent to the narrative. The multi-verb IP shows a final mid level pitch contour at the rightmost edge.

6-30) \textit{djalmakkan} … \textit{ka-h-bon-inj} \textit{ka-h-kûrl-djakm-inj} …

eagle 3SG-R-go-PI 3SG-R-animal.noise-?-PI

‘The black eagle travelled along talking, “kûrl”!’ (AB 1:39)

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6-38.png}
\caption{Multi-verb intonation phrase (AB 1:39)}
\end{figure}

The single IP in 6-31) illustrated in Figure 6-39 consists of two main verbs which denote two inseparable facets of the same notional event of ‘returning’ by ‘going’. At three grammatical words and nine morphemes, this IP is syntactically longer than average. Note the intervening NP \textit{walûngkad} ‘south’ between the two verbal words. The IP displays a globally flat pitch contour ending with a high boundary tone at the rightmost edge.

6-31) \textit{yala-h-dudjm-inj} \textit{walûngkad} \textit{yala-h-bo-ng} …

1PL-R-return-PP south 1PL-R-go-PP

‘We went back there south again.’ (AB 1:14)
Figure 6-39 Multi-verb intonation phrase (AB 1:14)

The prosodic integration of the verbs in 6-32) groups the act of ‘getting up’ and ‘going’ as two facets of the same event. Here the final verbal word contains the sequential morpheme -\textit{lng} translatable with ‘then’ which emphasises the tight sequential relationship between the events. The sequential morpheme is commonly found in verbal words generally as well as in multi-verb IP constructions. The IP given in Figure 6-40 shows a steep fall in pitch at the rightmost edge.

6-32) $\text{ka-h-dokka-ng na ka-h-lng-bo-ng ...}$
3SG-R-get.up-PP now 3SG-R-SEQ-go-PP

‘He got up and then he went.’ (JW 2:3)

Figure 6-40 Multi-verb intonation phrase (JW 2:3)

In the multi-verb IP in 6-33) the sequential marker -\textit{lng}/-\textit{yelûng} is found in both verbal words. The sub-events occur in a sequential relationship, as ‘running away’ precedes ‘leaving’, and the use of the sequential marker -\textit{lng} acts to highlight the sequential temporal relationship between the events. The IP shown in Figure 6-41 displays the typical hat pattern with clear final lowering in the final word.
6-33) ka-lng-yurdmi-nj bulu ka-h-yelûng-berrû-bawo-ng ...
3SG-SEQ-run-PP them 3SG-R-SEQ-many-leave-PP
‘He ran away then and left them all.’ (JC:4)

Interestingly, the sequential marker -lng is found on the initial verb in the multi-verb IP given in 6-34). This IP, shown in Figure 6-42, is comprised of three grammatical words and 13 morphemes again highlighting the possible syntactic complexity of IPs in Dalabon. The IP shows the typical hat pattern.

6-34) ka-h-dja-yelûng-dudjm-inj bulu ka-h-yang-wona-wona-ninj ...
3SG-R-just-SEQ-return-PP them 3SG-R-speech-REDUP-listen-PP
‘He just came back then and listened to them talking.’ (JC:20)

6-35) and 6-36) below provide strong evidence of a correlation between prosodic phrasing and the semantic integration of events. Both of these examples include the motion verbs bon ‘go’ and mang ‘get’, which are commonly found in these constructions. 6-35) shows a typical occurrence of two verbal words uttered under a
single intonation contour, where the two verbs denote a single notional event. What is interesting here is not only the extreme length of the IP which consists of five words and 12 morphemes, but also that the initial nominal phrase *radjin* ‘rations’ in this example is the overt object specified by the second verb *mang* ‘get’. This provides evidence that the speaker has planned the utterance to include both verbs as well as arguments of the verbs. This example then further supports the SVC analysis as the construction appears to be mono-clausal in structure. Additionally the IP given in 6-35) provides evidence of the potential grammatical complexity of IPs comprising five grammatical words, two of which are verbs, and 12 morphemes. The IP shows a typical declination pattern with a fall through the final word at the rightmost edge.

6-35) *radjin* yala-h-bon-inj yila-h-mang-inj kanihdja kandin-kah /
    rations 1PL-R-go-PI 1PL>3-R-get-PI there canteen-LOC

‘We would go and get rations there at the canteen.’ (MT 11:16)

Likewise in 6-36), the overt object *radjin* ‘rations’, which is an argument of the verb *mang* ‘get’, occurs at the beginning of the IP, despite the verb occurring toward the end of the IP shown in Figure 6-44. The IP comprises four grammatical words and ten morphemes. This example is further evidence that speakers may plan complex utterances consisting of multiple verbs. The IP is globally flat with a final rise at the rightmost edge.
6-36) *radjin yala-h-bon-inj yila-h-mang-inj bulangkid* ...

translations 1PL-R-go-PI 1PL>3-R-get-PI blankets

‘We would go and get rations, blankets.’ (MT 11:22)

Figure 6-44 Multi-verb intonation phrase (MT 11:22)

6-37) below is one of the few examples of a multi-verb IP where neither of the verbs are verbs of motion. Instead these verbs denote location and states of ‘staying’ and ‘growing up’ which are highly semantically integrated in a co-temporal relationship. Note that this example includes the sequential marker -*lng* ‘then’ in both the initial and final verbal words. The IP shown in Figure 6-45 displays a globally flat contour with a very slight fall on the final syllable of the IP. This speaker (MT) generally shows a very compressed pitch range.

6-37) *wulungmunguyh yila.lng-ni-nginj yila-lng-rarrim-inj* ...

for.a.long.time 1PL-SEQ-stay-PP 1PL-SEQ-grow.up-PP

‘For a long time we stayed there and we grew up.’ (MT 7:17)

Figure 6-45 Multi-verb intonation phrase (MT 7:17)
6-38) is one of the few instances in the corpus where different grammatical subjects on
the verbs are encountered. In Bininj Gun-wok, Bishop (2003) likewise finds only a few
examples of prosodic integration where the subjects of the verbal words differ. Here
prosodic integration indicates that the verbs belong to a single notional event with a
close semantic and temporal relationship of cause and effect. This is similar to serial
verb constructions in for example Kalam where a cause effect sequence of verbs may
be expressed with different logical actors of the verbs (Pawley, 2006). Furthermore,
6-38) is another of the few examples which does not include the motion verb bon ‘go’.
The IP comprises four grammatical words and 12 morphemes. In this example the root
of the final verb yowm ‘fall’ receives considerable lengthening (as observed
impressionistically), while the preceding verbal material is spoken very quickly. The
remainder of the utterance is also spoken at a typical rate relative to that speaker.
Overall the IP shows globally falling pitch although within a highly compressed pitch
range. As mentioned above the pitch range of this speaker (MT) is typically very
compressed.

6-38) bula-h-bardm-inj nûnh njel ka-h-marnû-kolh-yowm-inj / dep-wanjkih...
3PL>3-R-chop-PP that us 3SG-R-BEN-water-fall-PP tap-like

‘They chopped it and water flowed for us like a tap.’ (MT 5:37)

Figure 6-46 Multi-verb intonation phrase (MT 5:37)

Although subordinate clauses most often occur in a separate IP to their main clause
(see Section 5.3.2 for details), examples of multi-verb IPs containing subordinate
clauses are found in the corpus as shown in 6-39). Here the initial and final clauses are
subordinate as marked by the use of subordinate pronominal forms on the verbs, yale-
and *bale*-. The final IP shows two highly semantically integrated co-temporal events, but with two different grammatical subjects. Interestingly the verbs in this prosodically integrated phrase are the perception verb *wona* ‘hear’ and *dowhm* ‘howl’. As mentioned above, Givón argues that cognitive-utterance verbs, including perception verbs, display the weakest semantic bonds, and that complements of cognition-utterance verbs tend to carry separate intonation contours (1990: 825). Similarly in Kunwinjku perception verbs and their complements are never found in prosodically integrated phrases (Bishop, 2003). It remains to be seen whether perception verbs in Dalabon generally avoid occurring in multi-verb IPs in which case this is an exception.

In this example, in addition to the use of a subordinate construction, the use of a single prosodic phrase emphasises the close semantic bonds between the sub-events. The tempo of this example is quite fast comparative to the speaker’s typical tempo, yet slows somewhat on the root of the final verb as it receives a final accent. The multi-verb IP shows a globally falling pitch contour.

6-39) \textit{nawoydo nûnh yale-bon /}
\begin{tabular}{ll}
\textit{yila-h-wonan-inj} & \textit{nûka nûka bale-dowhm-inj} \\
1PL-R-hear-PI & nûka nûka 3PLSUB-howl-PP \\
\end{tabular}

‘That dingo, as we were going along, we heard it everywhere there as they howled.’
(AB6:19)

The clear tendency in the multi-verb IPs in Dalabon is towards a close semantic relationship between the clausal constituents. All of the examples encountered depict
events which share a close co-temporal relationship, effectively denoting a single notional event. As these examples comprise several clauses, they further reveal a tendency to contain a higher number of grammatical words and morphemes than the average IP in Dalabon. An increase in speaking tempo is evident in several of the multi-verb examples. This may tie in with the finding that a correlation is often found between the length of a constituent and the relative durations of the syllables or segments in that constituent (e.g. Dankovičová, 1997) – i.e. the longer the IPs, the faster the tempo, as found in many of the multi-verb IPs.

6.2.4.1 Quoted speech

As quoted speech examples make up a proportion of the multi-verb IPs found in the corpus, examples will be given below. Although these examples are very different to the multi-verb IPs discussed above, which show a high degree of semantic relatedness of events, a discussion of their prosodic patterning will be included here. Quoted speech markers in the Dalabon corpus show distinct prosodic patterning which may help to identify quoted speech in the narrative.

Cross-linguistically, quoted speech typically shows different prosodic features (e.g. Fletcher, 2005; Pierrehumbert & Hirschberg, 1990). Studies of English, for example, reveal a connection between quoted speech and overall pitch range, intonational phrasing and loudness (Hirschberg & Grosz, 1992; Klewitz & Couper-Kuhlen, 1999). This has likewise been found in studies of Australian languages. For example, in the closely related Bininj Gun-wok a raised pitch register is found in connection with quoted speech in Bininj Gun-wok (Bishop, 2003: 367-368), where both the bottom as well as the topline of the register are raised in order to signal the beginning of the quoted speech, or in order to mimic the raised voice in the quoted speech. In Alawa (Sharpe, 1972) the intonation pattern of quoted speech may be marked by greater stress on the quoted speech, and sometimes using greater pitch variation. Sometimes a pause rather than lower intensity marks off the quotation marker. Often the quoted speech is marked by a word such as namuban ‘he said’, and this marker is often less loud than the quoted speech. Likewise in Dalabon quoted speech is also often marked
by the words *kahyin* ‘he says’ or *kahyininj* ‘he said’ which is often considerably less loud than the surrounding material. Examples are given in 6-41) and 6-42), where the quoted speech marker *kahyin* ‘he says’ and *kahyininj* ‘he said’ follows in the same IP as the quoted speech. In both these examples the quoted speech markers are less loud, particularly in 6-42), than the quoted speech as illustrated by the intensity traces given in Figure 6-49 and Figure 6-50.

6-40) *wawurd-ngan* ... *ka-h-bo-ng* *ngale* / *nga-h-bon-iyam* ...

brother-my 3SG-R-go-PP yeah 1SG-R-go-FUT

‘My brother went, “yeah, I’ll go.”’ (JW 1:53)

![Pitch trace of quoted speech (JW 1:53)](image)

6-41) *kûhrdûh* *kanihdja* / *yirra-na-rr-inj-kah* *ka-h-yin-iyam* ...

this.way there 1DUHARM.SUB-see-RR-PP-LOC 3SG-R-say-PP

‘“Yeah, it should be about here where we met up” he said.’ (JC 5:0)
Figure 6-49 Intensity and pitch traces of quoted speech (JC 5:0)

6-42) kunborrk / nga-m-iy an ka-h-yin /
dance.style 1SG-get-FUT 3SG-R-sayPRS
"I want to get kunborrk" he says.’ (JW 3:42)

Figure 6-50 Intensity and pitch traces of quoted speech (JW 3:42)

Quoted speech in Dalabon is typically signalled by quoted speech markers which almost always share an IP with the quoted speech. Quoted speech markers are
identified as being spoken less loudly than the quoted speech, which may signal to the listener the change in voice. For further details of quoted speech in Australian languages see Evans et al. (1999).

6.2.5 Multi-verb IP examples in Kayardild

This section will examine examples of multi-verb IPs in Kayardild and, as in Dalabon, will reveal a high degree of semantic integration between verbs, as well as the potential syntactic length and complexity of these IPs. Although almost all clause boundaries align with a prosodic break, and although Kayardild IPs typically consist of few grammatical words (2.3 grammatical words) and morphemes (3.6 morphemes) (see Table 4-4 for further details), examples of syntactically long and complex multi-verb IPs are found in the corpus. These multi-verb IPs are noteworthy as they comprise a significantly higher amount of grammatical words and morphemes than the average. Unlike in Dalabon, there are very few examples of multi-verb IPs in the corpus which include subordinate clauses. Also in contrast to Dalabon, verbs are generally always strung together without any intervening material found between the verbs, though some exceptions to this are found in the corpus. Multi-verb IPs in Kayardild reveal a high degree of semantic cohesion between the events depicted, as is also found in Dalabon.

The IP in 6-43) and illustrated in Figure 6-51 contains two verbs; the verb of action yaluwa ‘scoop’ and the verb of motion thaa ‘go off to’. The sub-events denoted by the verbs here are two facets of a single notional event. The IP shows a global rise to a high final boundary tone.

6-43) muri-ya-yalawu-ja-thaa-th ...

baler.shell-MLOC-scoop-ACT-go.off.to-ACT

‘Off to fill their baler shells (they) go.’ (PG2 2:20)
The following IP in Figure 6-52 corresponding to two full clauses equalling five words and 12 morphemes displays the large amount of morphological encoding that is possible in a single IP. The temporal cohesion and connection of the separate events denoted by the verbs are signalled by the prosodic phrasing. Note that the two clauses have different subjects, with *nguku* ‘water’ in the initial clause and *mala* ‘the sea’ in the final clause. The IP shows a globally flat pitch contour.

**6-44**  
ri-lung-ban-da nguku-wa jawi-ja wanjii-ja mala-a ...  
east-ALL-ORIG-NOM water-NOM run-ACT rise-ACT sea-NOM  
‘As the water runs down from in the east, the sea rises up (to meet it).’ (PG2 2:13)

In 6-45) the IP consists of five words and 19 morphemes again illustrating the extreme syntactic complexity possible in IPs in Kayardild. The verbs *kamburijarra* ‘speak’ and *ngariijarra* ‘do first’ denote sub-events of a single notional event. The multi-verb IP displays a globally falling pitch contour from a high to a mid high pitch level.
6-45) *ngaaka dangka-a kamburi-jarra ngarii-jarra yuujban-d ...*
who person-NOM speak-PST do.first-PST long.ago-NOM

‘Who talked back in the old days?’ (PG2 2:45)

![Pitch vs. Time Graph]

**Figure 6-53 Multi-verb intonation phrase (PG2 2:45)**

The following example in 6-46) provides further evidence of a multi-verbal predicate where the speaker has planned to produce the entire sequence. The example corresponds to two IPs separated by pause, where the first IP comprises the object of the final verb, while the second IP comprises two verbs. What is interesting in this example is not just the integration of the verbs under in single IP, but the separation of the semi-transitive verb *ngaka* ‘wait’ and its object nominals taking the proprietive case in the first IP. Here it seems the two verbs in the final IP are treated as a single integrated event as demonstrated through the ordering of the verbs, as the object found clause-initially is separated from its verb found clause-finally, by the verb *rabi* ‘get up’. Alternatively, the separation of the initial object NP from its verb may be analysed as being due to the tendency for new discourse participants to be fronted (Evans, 1985: 93), as this is the first mention of the ‘newly dead’ in the narrative (however, despite this fronting, the position of the initial object NP to before the first verb nevertheless shows that the multi-verb construction is being treated like a single clause). The multi-verb IP shown in Figure 6-54 displays the typical hat pattern.

6-46) *bath-in-kuru dawurldawur-u dangka-wu ...*
west-FROM-PROP newly.dead-PROP person-PROP
In Kayardild, as found in Dalabon, repeated clauses are occasionally found in a single IP as shown in 6-47), where the word order is switched in the final clause. Here the clause is repeated for emphasis. This is further one of the few examples where intervening material is found between the verbs, and may be connected to the fact that the multiple verbs found in the IP are repetitions rather than different verbs which form a semantically coherent unit. The IP shows globally falling pitch with a considerable drop at the rightmost edge – i.e. final lowering.

6-47)  

\[
\begin{align*}
\text{rabi-ju} & \quad \text{thungal-warri-ya} & \quad \text{warirra} \\
\text{stand.up-POT} & \quad \text{thing-PRIV-MLOC} & \quad \text{nothing:NOM} \\
\text{thungal-warri-ya} & \quad \text{rabi-ju} \\
\text{thing-PRIV-MLOC} & \quad \text{stand.up-POT} \\
\end{align*}
\]

‘..to stand up with nothing on, to stand up with nothing on.’ (DN 1:29)
The following example (6-48) shows the three main verbs, *thaldi* ‘stand’, *rabi* ‘get up’ and *kurri* ‘look’, in a single IP in Figure 6-56. The IP in this example comprises four grammatical words and eight morphemes, which is considerably higher than the average stated above. The three verbs *thaldi* ‘stand’, *rabi* ‘get up’ and *kurri* ‘look’ refer to three temporally close and even overlapping events, where the prosodic grouping together of these verbs indicates the simultaneous nature of the events. Note that the subject *ngada* ‘I’ appears between the second and third verbs and is one of the few examples in the Kayardild corpus where intervening material is found between the verbs. The tempo of this example shows a significantly increased speed of all but the initial word, relative to the remainder of the narrative. The intonation contour rises from a low left edge boundary tone (%L) into a high plateau and ends with a final high boundary tone (H%).

\[
\begin{align*}
6-48) & \quad thaldi-ja \quad rabi-ja \quad nga-da \quad kurri-j \\
& \quad \text{stand-ACT} \quad \text{get.up-ACT} \quad 1\text{SG-NOM} \quad \text{look-ACT} \\
& \quad \text{‘I stood up and looked.’ (DN 2:13)}
\end{align*}
\]
In the following example 6-49), two main clauses make up a single IP. Here the two verbs *kurulu* ‘kill’ and *thaa* ‘return’ denote events which are in a close temporal relationship. The two events follow on from each other, where the act of returning is a necessary prerequisite for the hunting. Again note the intervening NP *ngada* ‘I’ found between the verbs. The IP here comprises five grammatical words and 11 morphemes, which is again considerably higher than the average stated above. The tempo in this example is likewise increased, relative to the remainder of the narrative, yet shows some slowing on the final word. The intonation contour in Figure 6-57 shows a globally flat pitch with clear final lowering at the rightmost edge. This IP concludes the overall discourse segment and the steep drop in pitch is typical of discourse final segments.

6-49) *wuran-ku kurulu-thu nga-da thaa-thu jirrka-an-d*

food-MPROP kill-POT 1SG-NOM return-POT north-FROM-NOM

‘And I will return from the north to kill food.’ (DN 2:22)
In 6-50) the initial IP, comprising four grammatical words and nine morphemes, contains two verbs *kurdala* ‘spear’ and *durrwa* ‘chase’. These verbs denote facets of the same event. The multi-verb IP shown in Figure 6-58 displays a globally flat contour ending with a slight final rise. The final IP in the example shown in Figure 6-60 displays final lowering of pitch, as is typical of discourse final segments.

6-50) *kurdala*-a-ju  *durrwa*-yii-ju  *rayin*-da  
*spear-M-POT*  *chase-M-POT*  *southFROM-NOM*  *he:NOM*

*jirrka*-anda  *kurdala*-thu  *dangka*-a  *bath-ind /
*north-FROM*  *spear-POT*  *person-NOM*  *west-FROM*

*ba*-lumband ...  *rar*-umband...  *jirrkur*-umband...
*west-ORIG*  *south-ORIG*  *north-ORIG*

‘He was being speared at and chased from the south and from the north, people coming from the west tried to spear him, westerners, southerners, northerners.’ (AD 19:37)

Figure 6-58 Multi-verb intonation phrase (AD 19:37)

Figure 6-59 Intonation contour of a clause (AD 19:37)
As illustrated by the examples above, multi-verb IPs in Kayardild show a tendency for the clausal constituents to be in a close semantic relationship, with all of the examples in the corpus depicting events which share a close co-temporal relationship. The Kayardild findings mirror those for Dalabon, where multi-verb IPs effectively denote a single notional event. Semantically, these examples are similar to the prosodically integrated clauses found in Dalabon as well as Bininj Gun-wok (Bishop, 2003), Wardaman (Merlan, 1994), and Korean (Park, 2002). These instances furthermore resemble serial verb constructions semantically and prosodically as they almost always represent a single notional event, and comprise a single intonation contour (see e.g. Aikhenvald & Dixon, 2006; Durie, 1997). Prosodic constituency therefore can be seen to co-occur with the semantic integration of constructions which describe what is conceptualised as a single event.

### 6.2.6 Discussion

The examples given in the above sections show striking similarities between the prosodic phrasing of complex grammatical units in both Dalabon and Kayardild. Both languages, despite favouring few grammatical words per IP, do allow very grammatically complex IPs comprising typically two or three clauses. Despite the possibility of using subordinate structures in Dalabon and Kayardild, highly semantically integrated prosodic units largely use main clauses. Givón states that the sharp binary distinction between subordination and coordination is a gross oversimplification (1990: 826), and it seems that prosodic integration, in addition to the use of grammatical subordinate constructions, are used to emphasise the semantic links.
between events in both of these languages. On closer examination these instances reveal that prosodically integrated phrases form highly integrated semantic units, typically denoting two facets of a single conceptual event occurring simultaneously. These examples of multi-verb IPs support the view that Dalabon and Kayardild use prosody as a delimitative device to signal higher clausal relationships of syntactic units, and may furthermore override the need to segment complex grammatical units. Multi-verb IPs then, in addition to the use of grammatical subordinate constructions, are used to emphasise the semantic links between events in Dalabon and Kayardild, supporting the view that these languages use prosody as a delimitative device to signal higher clausal relationships of syntactic units.

As mentioned previously, other Australian languages use a similar strategy, for example in Bininj Gun-wok the possibility of prosodically integrating two verbs has been documented (Bishop, 2003; Evans, 2003a). In Bishop’s study of Bininj Gun-wok, a sequence of verbal words may occur in a prosodically integrated phrase (though largely verbal words and related material have a separate prosodic phrase) when the two verbs are closely semantically integrated. All examples of prosodic integration of verbs depict ‘tightly coordinated actions which effectively form a single event, though none are complement constructions’ (Bishop, 2003:396). In most of these examples, one of the verbs is a verb of motion. The integration of the verbs is explained as occurring because the verbs refer to two facets of the same event within the discourse context. These instances involve the description of sub-events of a main event, where the narrator chooses to prosodically integrate the sub-events as a way of signalling to the listener the temporal co-occurrence of the two events (Bishop, 2003: 398). In Bininj Gun-wok (Bishop, 2003), intervening nominal phrases or adverbial phrases is not often found between the verbs. This is similar to multi-verb IPs in Kayardild which generally do not allow intervening material between the verb sequences, but contrasts with Dalabon findings where intervening material is commonly found between verbs.

In Evans’ study of Bininj Gun-wok, a sequence of tightly linked fully inflected verbs is referred to as a serialised construction (2003a). These share a single intonation
contour, are highly semantically integrated and have no intervening material between verbs (Evans, 2003a: 659). Serialised constructions have a meaning which is more specific than the meanings of the individual verbs and their ordering. Evans notes the difficulty in distinguishing a true serialised construction from a simple sequence of verbs. The clearest examples of serialised constructions in Bininj Gun-wok involve the verbs re ‘go’ and ni ‘sit’ which both follow the verb that they modify adding aspectual meaning to that verb. Multi-verb IPs in Dalabon and Kayardild reflect this in that the verbs most commonly found in these constructions include the equivalent of ‘go’ and ‘be/sit’. Evans further identifies multi-verb IP constructions which are normally chained verb sequences. These sequences are strung together and receive listing intonation (Evans, 2003a: 633). Multi-verb IPs in Dalabon and Kayardild generally do not receive listing intonation in the corpus analysed here, however, those uttered by the speaker MT often display a compressed pitch range.

Other unrelated languages show similar tendencies for semantic cohesion to be signalled by prosodic phrasing. A study of Spanish (Sánchez, 2001) reveals that semantic integration, in addition to information packaging and morphosyntactic encoding, plays a role in prosodic phrasing. Completely and partially semantically integrated constructions occur prosodically integrated most of the time, as do complement constructions with a more integrated morphosyntax. The introduction of new information, however, always results in constructions being realised over several IPs, and tends to override semantic integration (Sánchez, 2001). Similarly in Igbo a single IP is used for related events and an intonation break indicates separate events (Lord, 2003). Likewise, in English certain sequences of events are found to commonly occur in a single IP (Croft, 1995: 868-869). The main type of these constructions is the motion-action sequence such as ‘he goes and takes the hat to the kid’. It must be noted, however, that the occurrence of two or more clauses under a single intonational contour is not common in all languages. For example, an IP in Jaminjung will rarely correspond to more than one clause (Schultzze-Berndt, 2000: 107).
In some respects serial verb constructions resemble multi-verb IPs in the close sequential or co-temporal relationship found between the events depicted by the verbs. Serial verb constructions are often best translated into a non-serializing language using a single mono-verbal clause as serial verbs have been observed to ‘together act like a single verb’ (Durie, 1997: 290-291). Further, as discussed above, the most commonly found verbs in serial verb constructions are basic motion verbs, posture verbs and valency-increasing and argument-adding verbs, as found in the multi-verb IPs in both Dalabon and Kayardild. In contrast to serial verb constructions, however, in both Dalabon and Kayardild the verbs of multi-verb constructions may have different subjects. Generally it is considered a condition that the components of an SVC share the same subject, however, in a few SVC languages different underlying subjects may be attested (Aikhenvald, 2006: 40).

Multi-verb IPs further resemble the prosodic sentences found in Jaminjung (Simard, 2010), which are based on prosodic and syntactic criteria, and group units where a strong degree of semantic cohesion of events is depicted. The important difference between the multi-verb IPs and the prosodic sentence is that prosodic sentences are a larger prosodic unit than the IP, and are based on semantic and syntactic criteria. Similarly a study of Dolakhae Newar shows that intonation is used to organise prosodic units into macro-units called prosodic sentences, where these prosodic sentences “function in narrative to produce prosodic cohesion over a number of independent prosodic units” (Genetti, In press). Although the prosodic sentences described in these studies span a larger prosodic domain than the IP, they nevertheless function to show cohesion of events, in the same way as the multi-verb IPs do in Dalabon and Kayardild.

Many of the aspects of multi-verb IPs (or prosodically integrated units) in the above studies are apparent in both Dalabon and Kayardild where multi-verb IPs typically denote closely related events or sub-events of a single notional event and generally display iconic ordering. These constructions furthermore illustrate that prosody may be used by speakers as a way of signalling such close relationships between events.
Although multi-verb IPs are not typical, they nevertheless challenge statements pertaining to the maximum amount of information which may be encoded in a single IP due to cognitive restraints (Chafe, 1994; Croft, 1995: 872). Chafe states that there is an upper cognitive limit on the content of an IP based on his finding that each IP contains at most one new idea (1994). Likewise, the IP Storage Hypothesis, (Croft, 1995: 872) which states that more complex units are likely to be separated over multiple IPs as they cannot be stored whole in the mind of the speaker, does not hold in these examples. Both Dalabon and Kayardild speakers then are perfectly capable of encoding large amounts of information in a single IP, as the use of these highly semantically integrated prosodic units overrides the need to prosodically separate grammatically complex units. These multi-verb IPs further illustrate the length and complexity possible within IPs, where more than two verbal words as well as nominal and adverbial phrases are found.
Chapter 7. Discussion

In this research I have investigated the interaction of prosody and grammar in two Australian languages with dramatically different typological profiles. It might be assumed that vast differences in grammatical structure would likewise be reflected in differences in prosodic structure. However, I have shown that this is not the case with Dalabon and Kayardild. Despite their significant typological differences, with Dalabon a polysynthetic head-marking language and Kayardild a dependent-marking language with extreme morphological marking of dependents, prosody behaves similarly in the two languages, providing evidence for the independence of prosodic and grammatical structure in the linguistic system.

The three main research questions investigated in this dissertation, as outlined in Section 1.3, explored: 1) the strength of the relationship between the clause and prosodic constituency, 2) the extent to which grammatical complexity is reflected in prosodic constituency, and 3) the extent to which prosodic length impacts on prosodic constituency. The following gives a brief overview of the answers to these three questions, while a detailed discussion of the details of these three areas follows later in this chapter.

Results pertaining to the first question reveal that the relationship between the clause and prosodic phrasing was very strong in both Dalabon and Kayardild, despite their very different grammatical structures. As predicted, clause boundaries showed more prominent prosodic marking (with pauses and IP boundaries more common and pause durations longer) than was found at locations within the clause. In this respect both Dalabon and Kayardild fit with expectations from the cross-linguistic literature. However, they showed some dramatic differences in the pause results, with some extremely long pause durations when compared with the literature (e.g. Campione & Véronis, 2002; Kendall, 2009; Strangert, 2003; Yang, 2004, 2007).
In regards to the second question concerning grammatical complexity, results revealed that grammatical complexity did not seem to be a factor in prosodic phrasing in either Dalabon or Kayardild. Although the average size of IPs in Dalabon and Kayardild is very small, in terms of words, morphemes and duration, the corpus revealed a relatively large amount of highly grammatically complex IPs comprised of multiple verbs and other lexical constituents. These grammatically complex examples (in that they comprise a minimum of two verbal words and often further nominals with a single IP) challenge the notion that grammatical complexity is a factor which affects prosodic phrasing.

The third main question which investigated the relationship between prosodic length and prosodic phrasing likewise did not reveal a correspondence. Again this is due to the generally very short prosodic phrases (in terms of constituent and morpheme counts) and may reflect cultural practices of oral monologic storytelling by Dalabon and Kayardild speakers. Speech genre has been shown to have a large effect on prosody (e.g. Kowal, et al., 1983) and further research is needed to identify the effects of speech genre on prosody in these languages.

One of the major findings which emerged from the analyses of Dalabon and Kayardild was the strong influence that discourse and informational factors play in prosodic patterning. This was most evident in the two areas discussed in Chapter 6, which looked at the prosodic behaviour of nominals, as well as instances of multi-verb IPs. The following discussion will summarise the findings of each of these areas in detail.

Both Dalabon and Kayardild behave similarly in that intonation serves a delimitative function. Despite the typological differences in grammatical structure, this is an expected finding as the delimitative function of intonation has been found cross-linguistically (e.g. Ladd, 2008). Prosodic phrasing is used as a delimitative device to chunk constituents and to group constituents together. Furthermore, the basic tune types found in connection with the different constituents show remarkable similarities across the languages. IP sizes were furthermore similar in Dalabon and Kayardild in
terms of both morpheme and word counts. It might be expected that such large grammatical differences would be reflected in prosodic differences, yet the findings presented in the current study indicate that prosodic structure and grammatical structure are somewhat independent of one another.

Two main approaches were used to examine the grammar and prosody interaction in Dalabon and Kayardild. One looked at syntactic boundary strength, while the other looked at the complexity of a constituent and its likelihood of being prosodically divided. Much research has employed these approaches, typically showing a strong correspondence between syntactic boundary strength and prosodic phrasing, but only mixed results when it comes to looking at the complexity of a constituent and its likelihood of being prosodically divided. This was likewise the case in Dalabon and Kayardild; major grammatical boundaries were more prosodically marked, but the complexity of a constituent did not seem to affect that constituent’s likelihood of being prosodically divided.

In regards to the alignment of grammatical boundaries and prosody, results showed clear positive correlations between major grammatical boundaries and prosodic boundary strength. No correlation was found between the grammatical complexity of a constituent and prosodic phrasing – i.e. a grammatically complex unit was not more likely to be prosodically divided than a grammatically simple unit. In regards to prosodic phrasing and pausing, no correlation was found between the complexity of a unit (measured in morpheme and word counts, as well as the level of syntactic case embedding found in Kayardild) and the location and strength of prosodic phrasing. One explanation for this lack of a correlation may be found in the genre of speech used in the present study, oral narratives which generally displayed very short IPs, in terms of morphemes, words and duration in milliseconds. The need to segment these IPs further then would be minimal.

Surprisingly, both the Dalabon and especially the Kayardild results reveal that pause durations may be extremely long, with the average pauses found at clause boundaries
measuring 1147ms in Dalabon and 1543ms in Kayardild, while average pauses found within clauses measure 735ms in Dalabon and 819ms in Kayardild. These results contrast with studies of other languages which typically reveal much lower pause durations, ranging from 160ms to 1025ms at the longest (Campione & Véronis, 2002; Kendall, 2009; Krivokapić, 2007a; Oliveira, 2002a, 2002b; Strangert, 2003; Jürgen Trouvain & Grice, 1999; Yang, 2004, 2007). The extremely long pause durations found in the Dalabon and Kayardild narratives may be an effect of genre, where oral monologic narratives often display longer pauses than other speech genres such as interviews. A study of five languages (English, Finnish, French, German and Spanish) shows that pause durations differ between speech genres with pauses averaging 940ms in storytelling and 530ms in interviews (Kowal, et al., 1983). In line with these findings, long pauses similar to those found in Dalabon and Kayardild are found in a study of oral narratives in Ahtna, an Athabascan language of south central Alaska, where findings reveal that pauses range from 1079 to 1103 ms (Berez, to appear).

In general pause results differ considerably between Dalabon and Kayardild. Pausing time differs significantly in the languages, with the total percentage of pause time in Dalabon at 38.7%, significantly lower than Kayardild at 50.9%. These considerably high percentages are reflected in a study of Kunwinjku narratives where pausing accounts for 61.1% of the total time (Carroll, 1996: 111). Generally, however, studies report lower pausing percentages of total time than those found for Dalabon, Kayardild and Kunwinjku. Pause time makes up 15 to 30% of total time in Swedish (Fant & KruckenFig989), 6 to 38% in French (Fletcher, 1988), and 16 to 35% of total speech time in German (Butcher, 1981). Likewise a study of five languages (English, Finnish, French, German and Spanish) shows similar low pausing percentages, as well as genre differences, with pauses making up 33.3% of storytelling and 17.2% of interviews (Kowal, et al., 1983). Similarly, a later study of Swedish read speech reports significant genre differences; pause time makes up 10% of total time in radio news reading time compared to 25% of total novel reading time (Fant, et al., 2003). Genre then may be a significant factor in pause behaviour, with oral narratives in Dalabon and especially Kayardild showing high percentages.
Cultural practices may also play a role in the higher pausing percentages found in Dalabon and Kayardild. The prevalence of silence in speech may reflect cultural practices, as some cultures are more accepting of silence in speech (such as New York Jewish culture – see Tannen, 1984; Tannen, 1985) than others (such as Apache culture – see Basso, 1970). Aboriginal Australian cultures have a tendency to value silence and consider it an important and positive part of communication (Eades, 1988, 1991; Mushin & Gardner, 2009; Ngarritjan-Kessaris, 1997; Watts, 2009). In many non-aboriginal cultures, however, silence tends to be viewed negatively, as a cause of embarrassment to speech participants, or as an indication that a breakdown in communication has occurred. Much research into the legal context indicates that silence in speech places Aboriginal Australians at a disadvantage, as silence may be wrongly perceived as a sign of confusion, evasion, insolence and/or guilt (Eades, 2007, 2010).

There is a general tendency for speech genre to affect pause durations with longer pauses found in spontaneous narratives and shorter pauses in conversation and experimental speech. The effects of genre are apparent in the results of several studies of Swedish which show the significant effect that genre may have on pause durations. These studies display very large differences in pause durations (ranging from 160 to 1100 ms) due to the tempo variations caused by genre differences (Fant, et al., 2003; Strangert, 2003). Genre may likewise be an important contributing factor into the extremely long pause durations found in the Dalabon and Kayardild oral narratives – a suggestion supported by the fact that similar results are found for oral narratives in Ahtna (Berez, to appear).

In regards to the clausal constituent, both Dalabon and Kayardild showed strikingly similar correspondences between the clause and the IP; clausal IPs comprise 43.9% of all Dalabon clauses and 44.6% of all Kayardild clauses. These percentages are lower than those found in other languages, such as Wardaman at 78.9% (Croft, 2007) or German at 54% (Schuetze-Coburn, 1994) but higher than Korean results as 29.2% (Park, 2002: 648). In regards to boundary alignment, results show that, as expected,
the boundaries of clauses display stronger prosodic marking than locations found within the clause; pauses are longer and more commonly found at clause boundaries than within a clause; IP boundaries are more commonly found at clause boundaries than within a clause; in Dalabon (not Kayardild) IP boundaries display differences depending on their location in the clause (final or within). IP-final boundary tones are more likely to be low in clause-final position than in clause-medial position, which is in line with findings that final low boundary tones typically signal finality, while IP-final boundary tones are more likely to be high in clause-medial position, in line with the finding that incompleteness is often marked by high or rising pitch contours (e.g. Brown, et al., 1980; Pierrehumbert & Hirschberg, 1990). The longer pauses and final falling contours found at clause boundaries signal to a listener that a grammatical constituent is complete. These results are all in accordance with numerous studies of related and unrelated languages indicating that one of the main functions of prosody is to act as a delimitative device in speech.

In Kayardild, the hypothesis that morphological marking on embedded constituents of higher syntactic relationships would be found in connection with longer pause durations was examined. Pauses are not commonly found within a clause in Kayardild, as approximately three quarters of all pauses are found at clause boundaries. Pauses located within a clause were found to separate the pre-verbal subject nominal from its predicate, or more commonly to separate a post-verbal nominal, argument or adjunct, from its predicate. Results did not show a strong correspondence between the durations of pauses and nominals with case marking reflecting deeper syntactic embedding. The average pause duration preceding a nominal with case marking signalling deeper levels of syntactic embedding is 1114.6ms, which is slightly higher than the average pause duration found within a clause (819ms) and considerably lower than pause durations found at clause boundaries (1543ms). However, as the durational differences are so slight and these instances so few, statistical correlations could not be made. For these reasons, this result does not confirm the hypothesis that pauses are longer when preceding more complex morphological units. Similar correlations cannot be made for Dalabon as nominals generally do not receive case marking.
The Dalabon and Kayardild findings therefore are in line with the notion that clause structure is universal in its role of providing the minimal complete information unit (Croft, 1991: 33). The clause has been treated by some researchers as the basic unit of spoken language (e.g. Halliday, 1989; Halliday, 2004), while others have viewed the IP as the basic unit of spoken language (e.g. Izre’el, 2005). The close connection thought to be apparent between the two units is apparent in the numerous studies which have associated and correlated the clause with the IP. As a result, the boundaries and correlations between all of these units (the clause, the IP and the information unit) often become blurred. Chafe finds that the clause often coincides with a unit of information where ‘Each clause verbalizes the idea of an event or state, and usually each intonation unit verbalizes a different event or state from the preceding’ (Chafe, 1994: 69). As the clause provides a highly significant unit of information organization then, the examination of the structure of clauses provides insight into the division of information as well as the reasons for these divisions.

Apart from the prosodic marking of clause boundaries (which often denote a complete information/discourse unit), discourse factors then seem to be the main role in prosodic phrasing in the oral narratives studied here (especially below the level of the clause). This may tie in with the significant role of performance in oral narratives. Typically each clause describes an event, and as such the prosodic marking of clause boundaries may tie in with not just the grammatical unit the clause, but instead be due to the packaging of ideas. If each clause contains a single idea or information unit then it follows that clause boundaries are likely to be prosodically marked (if we follow the notion that prosody and idea/information units interact).

Despite the fact that major grammatical (clause) boundaries attract prosodic boundaries, the findings presented here reveal that there is a large range of options or variability regarding the prosodic phrasing of clauses with NPs, showing a range of different prosodic phrasing patterns. Multiple prosodic structures may be possible for any given grammatical structure, and vice versa, a finding which is in line with much research in the field (e.g. Frazier, Clifton Jr, & Carlson, 2004; Ladd, 2008; Schafer et al.,
Specifically, it is within the clause that some notable differences emerge between the languages, particularly in connection with the prosodic marking of nominals. A striking difference is found in where in the clause prosodic boundaries are found in connection with nominals; nominals are more commonly prosodically dislocated in Kayardild than in Dalabon, which reflects the finding that Kayardild has a higher number of nominals than Dalabon. A surprising difference found between the languages is that prosodically dislocated nominals are more commonly found in a post-verbal position in Kayardild, while more are found in a pre-verbal position in Dalabon. This is despite the finding that word order is found to be the same in both languages, where argument NPs largely precede rather than follow the verb. In contrast to Dalabon, nominals in the typical clause-initial position in Kayardild favour sharing an IP with their verb. The reasons for this divide between the two languages may be due to the pragmatic purpose of including nominals in the discourse, where the prosodic patterning of nominals reflects the discourse functions of the nominals in these languages. Ellipsis of nominal arguments is a common feature of Australian languages (e.g. Bowe, 1990; Bowern, 2008; Evans, 2003a) and no less so in these languages. Dalabon clauses do not contain any overt specified argument nominals in 58.8% of all clauses, while a significantly lower percentage is found in Kayardild at 40.1%. As Dalabon clauses contain far fewer nominal arguments, where they do occur in the discourse they often introduce or clarify a referent to the discourse, and this function is often tied in with the clause-initial position. In Kayardild then, it seems that clause-initial position alone is an adequate marker of discourse prominence, and that further prosodic marking of these constituents is unnecessary (as pre-verbal nominals tend to share an IP with their predicate). This finding contrasts with Dalabon, where clause-initial position shows a high degree of discourse prominence as well as prosodic marking. Differences in nominal ellipsis percentages may therefore reflect nominal discourse functions, which in turn affect the prosodic behaviour of these nominals.

The general prosodic behaviour of nominals in Dalabon and Kayardild is overall typical of that found in Australian languages and cross-linguistically, where prosodic marking in connection with word order is generally used for the purposes of highlighting and
emphasising certain constituents in the discourse (e.g. B. Baker & Mushin, 2008; Bowe, 1990; Donaldson, 1980; Evans, 1995a; Heath, 1984; Mushin, 2005; Simpson, 2007; Simpson & Mushin, 2008). A high left-edge pitch accent, followed by sharply falling pitch and a lengthy pause are common prosodic markers of discourse boundaries. As in many languages displaying free word order, the word order patterns of Dalabon and Kayardild also function to highlight discourse prominent constituents with clause-initial position often connected to the introduction of referents, and clause-final position often connected to afterthought-like mentions as well as the clarification and elaboration of referents. These prosodic and word order patterns are found in Dalabon and Kayardild as well as many Australian, European and other unrelated languages, indicating the universal nature of prosody and word order as markers of discourse prominence. New or focused information is generally distinguished from given information through a combination of accent, longer duration, greater amplitude, or different pitch patterns on the focused constituent (e.g. Lieberman, 1967), or may be distinguished by the presence of prosodic breaks at the edge of a focused constituent (e.g. Hayes & Lahiri, 1991; Jun, 1993). Specifically in Dalabon and Kayardild clause-initial nominals typically act to introduce, clarify or reintroduce a referent, in addition to adding drama, suspense or emphasis to the narrative. In contrast, clause-final position is commonly found in connection with afterthought-like constructions, which act to elaborate, clarify or emphasise the referent. Dalabon and Kayardild differ considerably in the proportion of prosodically dislocated nominals which precede and follow the verb, despite both languages showing a preference for arguments to precede rather than follow the verb. Kayardild prefers post-verbal prosodically dislocated nominals (which may be either adjuncts or arguments), while Dalabon prefers pre-verbal prosodically dislocated nominals. In Dalabon and Kayardild then, word order, prosodic dislocation and other prosodic factors such as elevated or reduced pitch range, syllable lengthening, and final lowering, together act to signal information packaging and focus to the listener.

A further interesting finding in both Dalabon and Kayardild was the relatively widespread use of prosodic phrasing to mark the semantic cohesion of adjacent
clauses. Despite the differences in grammatical structures of Dalabon and Kayardild, and despite the many different grammatical means of signalling subordination in these two languages, the presence of multi-verb IPs in the Dalabon and Kayardild corpora was striking. Multi-verb IPs were found to always denote closely related events with a simultaneous or closely sequential temporal relationship. Furthermore, these multi-verb IPs could potentially be extremely grammatically complex comprising a high number of morphemes and words. A survey of the pauses found at multi-verb IP boundaries showed similar or shorter durations to those found at regular clause boundaries, with the following pause longer than the preceding pause in both Dalabon and Kayardild. In these instances, findings contradict the notion that prosodic phrasing and pause duration may be an indicator of grammatical complexity. Multi-verb IPs then, with their high number of morphemes and words, challenge the belief that grammatically complex constituents are prosodically divided in order to lessen the grammatical complexity of prosodic units. Instead, these examples suggest that prosodic phrasing (i.e. the grouping of constituents into a single IP) signals the semantic cohesion of events.

In both Dalabon and Kayardild, below the level of the clause, discourse and informational factors override grammatical phrasing (as illustrated by the frequent prosodic phrasing of nominals which may be grammatically simple), while above the level of the clause discourse/informational factors likewise override grammatical phrasing (as illustrated by the frequency of multi-verb IPs which are highly grammatically complex units denoting aspects of a single notional event). The strong prosodic boundary marking found at clause boundaries may then, in addition to delimiting grammatical constituents, also delimit idea or informational units, which largely coincide with clauses.

One of the main findings of this research is that prosody marks information and discourse boundaries as well as grammatical boundaries in the Dalabon and Kayardild narrative corpus examined. In the multi-verb IP examples, the prosodic marking of grammatical boundaries was systematically omitted between verbs, and instead
Intonational and prosodic phrasing was utilised to mark coherent discourse/informational units. This result ties in with the finding that grammatical boundaries align with discourse boundaries (mainly at clause boundaries) due to the natural correspondence between a clause and a single information/notional event. The idea that complex grammatical units are prosodically divided for ease of processing seems unfounded, given the numerous examples of multi-verb IPs, which may be grammatically complex. The prosodic chunking of units then seems to be listener oriented (to mark, highlight, or signal the grouping of linguistic units) rather than speaker oriented (for cognition purposes such as planning and processing). Prosody may therefore provide the structure within which utterance comprehension takes place (Frazier, et al., 2006). For these reasons it then follows that the IP is a more suitable basic linguistic unit than the clause in Dalabon and Kayardild, as this is the unit where cognitive marking and ‘chunking’ of constituents takes place.

The findings presented here for Dalabon and Kayardild show that, as expected, a range of factors influence prosodic phrasing, with major grammatical boundaries, discourse and informational factors the most important. Grammatical complexity and prosodic length are not the only factors which influence prosodic phrasing. The finding that a combination of factors affects prosodic grouping is likewise found in a number of studies which reveal that, although syntactic factors play a role in prosodic boundary location and strength, other factors such as prosodic length and complexity also play a role (F. Ferreira, 1988). The study of prosodic units must therefore include a variety of complex factors, where some factors may be more dominant than others. Based on the Dalabon and Kayardild findings presented in this dissertation, the overriding factor determining prosodic phrasing is discourse and informational rather than grammatical.

The cognitive factors which play a role in prosodic phrasing can be divided into two main groups: one for grammatical purposes (to assist in signalling grammatical boundaries for example to avoid ambiguity, as well as to limit the grammatical complexity of a unit in order to ease the cognitive load for speaker and listener), and one for discourse/informational purposes (to assist in grouping units of information in
the discourse, as well as to signal prominence in the discourse). Research within prosodic phrasing has investigated the notion of pre-fabricated constituents, the view that there is a maximum amount of constituents which can be stored by a speaker at one time, the clause as a central information unit, as well as the idea that extreme complexity is avoided within a single prosodic constituent. The findings presented in this dissertation did not back up these motivations, as both Dalabon and Kayardild results showed that examples of long IPs comprising multiple constituents were commonly found. Furthermore, speakers appear to have no trouble producing these IPs (based on their high frequency) and in some instances even swapped arguments around, so that the argument of a final verb preceded the initial verb. Such instances imply that speakers plan these entire utterances in advance. Moreover, these examples all showed a high degree of semantic coherence revealing that the prosodic phrasing was used as a means of signalling the temporal cohesion of the events depicted. These multi-verb IPs then challenge the possible upper limits of IP complexity, indicating that semantic coherence may be a significant factor in prosodic phrasing in both Dalabon and Kayardild, as in other languages.

In summary, the findings presented in this dissertation show that although grammatical structure typically aligns with prosodic structure, the mapping of the two is largely independent, with prosodic phrasing instead relying on discourse and informational factors. This is in line with for example Nespor and Vogel (1986), who state that prosodic domains are somewhat independent from syntax, though generally prosodic constituents are isomorphic with morphosyntactic constituents across languages. According to Selkirk prosodic structure and syntactic structure are distinctly separate, though syntactic structure is reflected in prosodic structure in certain ways (1978). Similarly, Ladd states that there is some essential difference between syntactic and prosodic structure in that prosodic structure is flatter than syntactic structure (2008: 297). Future work in this area will need to focus on the interaction between discourse and prosody in much further detail.
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