Word prominence in polysynthetic Australian languages:
Bininj Gun-wok, Ngalakgan and Murrinhpatha

John Mansfield

Abstract

This chapter summarises prosodic constituency and prominence in three polysynthetic languages of northern Australia: Bininj Gun-wok, Ngalakgan and Murrinhpatha. The relationship of prosody to morphosyntactic integration, i.e. 'wordhood', is also discussed. In all three languages, the main form of prosodic prominence is pitch accent, which is anchored to stressed syllables. Bininj Gun-wok and Ngalakgan are characterised by multiple prosodic constituents within the polysynthetic verb, potentially anchoring multiple accents. Considerable variation is attested in accentual placement. Murrinhpatha verbs, by contrast, integrate all stem elements into a single prosodic word constituent, though some suffixes are external to this. Murrinhpatha prosodic words have fixed penultimate stress, though only the right-most word in a phrase receives accentuation.

Keywords

word stress, prosodic prominence, wordhood, Australian languages, polysynthesis

1. Introduction

The polysynthetic languages of northern Australia can be divided into two main groups with fairly distinct structures: the Gunwinyguan languages, and the Daly languages. In this chapter I review and synthesise literature on word-level prosodic structure in these two groups, focusing on evidence from the Gunwinyguan languages Bininj Gun-wok and Ngalakgan (B. Baker, 2008; Bishop, 2002a; Evans, 2003), and the Southern Daly language Murrinhpatha (Mansfield, 2017, 2019). I focus on the interaction of word-level 'stress' and phrase-level 'accent', with particular attention to ways in which the

polysynthetic verb structure is more word-like or phrase-like in its prosodic constituency. Two main themes emerge among the languages considered:

1. The polysynthetic verb may not clearly or completely map onto a prosodic word constituent. This can be seen as a reflection of a morphosyntactic structure that has mixed characteristics of word and phrase.

2. Pitch accents are the main form of prosodic prominence. Word structure constrains accentual placement, but it is ultimately determined by phrase structure.

This chapter summarises evidence regarding prosodic constituency, also known as 'the prosodic hierarchy'. A basic assumption is that all languages package phonological material into a hierarchy of constituents, such as syllable, foot, prosodic word, phonological phrase, intonational phrase etc (Nespor & Vogel, 2012). On the other hand, different languages may have a different number of hierarchical levels (Jun, 2005; Schiering, Bickel, & Hildebrandt, 2010), and in this chapter we find variation as to whether a foot level is reported between the syllable and the word. Another assumption of this theoretical framework is that morphosyntactic constituency maps onto prosodic constituency, so that the phonological packaging of speech reflects the hierarchical syntactico-semantic structure of the information conveyed (Selkirk, 1984, 2011). In the Australian polysynthetic languages here considered, the verb complex has a mixture of properties normally associated with morphosyntactic words and phrases. They might just as well be described as 'loose words' or 'tight phrases', taking into account factors such as distributional (in)dependence, semantic (non-)compositionality, and fixed/free linear order. Prosodically, the verbs also show mixed characteristics. In Bininj Gun-wok, most morphemes prosodify as feet (Σ), which are phonologically similar to independent simple words, though there are some phenomena that motivate a prosodic word constituent (ω) encompassing the whole verb (1). Ngalakgan has a fairly similar verb structure, though it has been analysed as a phonological phrase (φ) (2). Murrinhpatha has a quite different structure, where stem and pronominal elements integrate into a single prosodic word constituent, but this leaves out some inflectional and adverbial suffixes as prosodic adjuncts (3). As we will

see below, degrees of prosodic integration in these languages strongly reflect degrees of morphosyntactic integration, providing an excellent illustration of prosodic mapping theory.

Bininj Gun-wok

(1) {[(bani-)$_\Sigma$(weleng-)$_\Sigma$(bepbe-)$_\Sigma$(marne-)$_\Sigma$(yaw-)$_\Sigma$(bu + rr + iny)$_\Sigma$]$_\omega$}$_\varphi$

3UA.P-then-separately-BEN-child-fight + RR + PP[1]

'Then they both fought each other over the child.' (Bishop 2002: 146)

Ngalakgan

(2) {ku-[kamala-]$_\omega$[kaɾakkaɾa-]$_\omega$[caŋ + an]$_\omega$}$_\varphi$

NP-cloud/sky-together-stand + PR

'Daylight breaks out.' (Baker 2008, p. 94)

Murrinhpatha

(3)   {[dani-ngan-ngku-marda-wurr]$_\omega$-ngime-dini}$_\varphi$

pierce.3SG.PST-1PL.OBJ-PC-belly-heat-PC.F-sit.IPFV

'We (*pauc., fem.*) were feeling angry.'   (Mansfield 2019, ch.1)

This chapter is a selective review, treating just those few languages for which reasonably detailed prosodic description is available. The main sources used are: Bininj Gun-wok (Bishop, 2002a; Evans, 2003); Ngalakgan (B. Baker, 2008, 2018); Murrinhpatha (Mansfield, 2019). The main criteria for source selection was analysis of a prosodic word constituency, including descriptions of prominence. For Bininj Gun-wok, this is enhanced by considerable phonetic evidence (Bishop, 2002a), while for Murrinhpatha and Ngalakgan there are only brief observations of phonetics. The morphosyntactic criteria used for identifying these languages as 'polysynthetic' are discussed in the next section (§2). This is followed by sections reviewing the three languages Bininj Gun-wok (§3), Ngalakgan (§4) and Murrinhpatha (§5), with a final section offering comparative discussion and conclusions (§6).

Some terminological and notational clarifications are in order. I use the term 'stress' in reference to prosodically strong syllables on the word level, and the term '(pitch) accent' in reference to a prosodic head on the phrase level. These often align due to accentual anchoring on stressed syllables, though we

---

[1] Morphological glosses throughout this chapter reproduce the abbreviations used in the original sources. See the original sources for information about the abbreviated grammatical categories.

will also encounter a large number of unaccented stresses. I use the term 'prominence' for phonetic properties of pitch, duration, amplitude vowel character. We will see that in the three languages under consideration, prominence is mostly limited to pitch, associated with phrasal accentuation. For an overview of word stress in Australian languages see Goedemans (2010). In the examples presented I use multiple bracketing to represent prosodic constituency, with round brackets for feet $(\_)\Sigma$, square for prosodic words $[\_]\omega$ and curly braces for phonological phrases $\{\_\}\varphi$. All these languages allocate stress as a mostly predicable edge-based phenomenon of Σ and ω constituents, and it would therefore be redundant to mark stress diacritically on syllables. Instead, I mark pitch accent diacritically as v́ for all three languages (4). In Ngalakgan only, there is secondary and primary stress, realised as accentual upstep, which I annotate as (Cv̀Cv)(Cv́Cv).

Annotation example

(4) $\{[(Cv\text{-})_\Sigma(Cv́Cv)_\Sigma]_\omega$ $[(Cv́Cv)_\Sigma]_\omega\}_\varphi$

AFFIX-stem   stem

'Translation.'   (Reference)

For both Bininj Gun-wok and Ngalakgan I follow my sources in distinguishing two types of morphological boundaries: 'x-y' the more agglutinative or non-cohering, and 'x+y' the more fusional or cohering. In Murrinhpatha verbs a clitic '=' versus affix '-' distinction is drawn.

2. Polysynthesis in northern Australia

In this chapter I use 'polysynthetic' as an informal label, following its application to several northern Australian languages (as well as others around the world) because of their highly synthetic verb complexes. Two often referenced morphological characteristics are pronominal affixation for multiple arguments, and the compounding or 'incorporation' of nominals (M. Baker, 1996; Evans & Sasse, 2002). In Australian polysynthesis, two other types of lexical elements are frequently incorporated: adverbials, which encode manner, temporal, spatial and modal meanings; and 'coverbs', non-finite verb stems that encode event semantics, often providing greater specificity to a broader event category encoded by the finite verb stem (Bowern, 2014; Schultze-Berndt, 2000). An essential, yet often overlooked

dimension of the 'polysynthetic' label is the implication that the verb complex constitutes a morphosyntactic 'word', rather than a 'phrase' (Bickel & Zúñiga, 2017; Haspelmath, 2018). In this review I briefly summarise morphosyntactic features of the verb complex for each language considered, in all cases finding that they have a mixture of canonically word-like and phrase-like characteristics.

Polysynthesis is found in three Australian language families – Gunwinyguan, Southern Daly and Western Daly – as well as the isolate Tiwi (Evans, 2017; Nordlinger, 2017). Other northern Australian languages, such as Maningrida languages and some Kimberley languages, have highly agglutinative verbs, without having all the characteristics of canonical polysynthesis. In this chapter I focus on the canonically polysynthetic languages, reviewing prosodic word structure for two Gunwinyguan languages (Bininj Gun-wok, Ngalakgan), and one Southern Daly language (Murrinhpatha). Along the way, I note apparent commonalities and differences with the related languages Dalabon, Wubuy, Ngan'gi and the Western Daly language Marrithiyel. I do not attempt to analyse Tiwi, for which there is very little prosodic information available (but see Osborne, 1974, p. 21).

3. Bininj Gun-wok
Bininj Gun-wok (BGW) is a dialect cluster extending over a considerable geographic area, with Kunwinjku being the dialect most widely discussed in linguistic literature (e.g. Carroll, 1976; Oates, 1964). BGW has about two thousand speakers, including some who use it as a lingua franca, and is still learnt by children as L1 (Evans, 2003, p. 6). In the discussion below I will also make some reference to Dalabon, which has very similar morphosyntactic and prosodic characteristics to BGW, though it is distinct enough to be considered to be a separate language (Evans, 2003, p. 36).

Prosodic prominence in BGW and Dalabon reflects considerable prosodic independence of morphological constituents within the polysynthetic verbs. The basic word-stress system involves initial stress on most morphological constituents, though this phonological strength is highly variable in its phonetic realisation. Pitch accent anchoring is the main phonetic indicator of

stress, but only a subset of stressed syllables are accented in any given utterance, and the selection of this subset is not directly determined by word structure, such as a predictable right-edge, left-edge, or stem-edge rule.

3.1. Verb structure

BGW verbs host prolific incorporation of nominal and adverbial elements. The verb is also marked for multiple pronominal participants, benefactive and comitative markers, and TAM inflection. The relative positioning of morphological elements in the verb is largely fixed, encoding argument structure, adverbial scope, and coreference relations.[2] This is in stark contrast to the phrasal arrangement of words, where the presence and relative ordering of almost all elements is optional (Evans, 2003, pp. 105, 119). The macro-structure of the BGW verb is as in (5) (for a more detailed template see (Evans, 2003, p. 318)). The ' + ' notation used for 'Subj + Obj' and 'Verb.stem + TAM' indicates that these involve some fusional morphology, in contrast with the agglutinative composition of the lexical elements that fall between them. The Kleene star '*' indicates that incorporated lexical elements are both optional and iterable.

(5) *Bininj Gun-wok macro verb structure*

Subj + Obj.pron–Adverbial*–BEN–Nominal*–COM–Verb.stem + TAM

The incorporation of nominals and adverbials is very common in BGW verbs. A substantial proportion of verbs have at least one adverbial and/or nominal incorporated (6, 7). Less frequently, verbs incorporate multiple nominals and/or adverbials (8).

(6) ngarri-<u>bolk</u>-ngeibu + n
     1A/3-<u>place</u>-call + NP
     'We call that place…'   (Evans 2003: 709)

(7) djama ga-<u>bangmi</u>-ngu + n
     NEG   3-<u>not.yet</u>-eat + NP
     'He doesn't eat it yet.'   (Evans 2003: 711)

---

[2] Interestingly, some adverbial and argument-structure prefixes appear to have variable order, which may or may not match syntactic scope (Evans, 2003, pp. 321–322).

(8)　bani-<u>weleng-bepbe</u>-marne-<u>yaw</u>-dulubu＋rr＋iny
　　　3UAP-<u>then-each</u>-BEN-<u>child</u>-spear＋RR＋PP
　　　'Then the two of them speared each other over (the death of) the child.'
　　　(Evans 2003: 321)

Incorporated adverbials encode a range of temporal, spatial and manner semantics (Evans, 2003, p. 324). Incorporated nominals fulfil a range of semantic roles, and fall into two distinct lexical classes, generics and body-parts, sequenced as [generic–bodypart–verbstem]. Nominal compounding may be more or less lexicalised, with concomitant restrictions on paraphrasing with an external noun, use of external modifiers, and semantic compositionality. For example *ganj-ngun* 'meat-eat' is syntactic incorporation, interchangeable with a phrasal form (9). But *bo-ngun* 'liquid-eat' is lexicalised, with a compound-only nominal root *bo* 'liquid'. The equivalent free nominal word is *gukku* 'water', but the compound verb cannot be paraphrased using this as an external noun (10). Incorporated adverbials are also a mixture of purely bound, and potentially free forms (Evans, 2003, p. 488).

(9a)　　nga-ganj-ngun
　　　　1-meat-eat.NP
　　　　'I eat the meat.'

(9b)　　nga-ngun　　　　gun-ganj
　　　　1-eat.NP　　　　NC:IV-meat
　　　　'I eat the meat.'

(10a)　　nga-bo＋ngun
　　　　1-liquid-eat.NP
　　　　'I drink the water.'　　　　(Evans, 2003, p. 324)

(10b)　　*nga-ngun　　　　gukku
　　　　1-eat.NP　　　　water
　　　　'I drink the water.'

Verbs may simultaneously host both a lexicalised compound and syntactic incorporation. In each of the following examples, the verb stem is in a

lexicalised compound with the adjacent nominal, while further nominals are syntactically incorporated:

(11) an-barnadja   ngarri-<u>mim-bo-wo</u> + ni

     NC:III-owenia.vernicosa   1A-<u>fruit-water-put</u> + PI

     'We used to put owenia vernicosa in the water.' (Evans 2003, p. 328)

(12) namarnde ba-<u>yau-guk-girri-bo</u> + m

     devil   3/3H-<u>baby-body-ground.oven-hit</u> + PP

     'The devil cooked the baby's body in the ground oven.'

     (Evans 2003, p. 324)

The productivity of incorporation is further evidenced by the appearance of lexical borrowings in the verb complex. This occurs in both BGW and Dalabon (Nicholas Evans, Maïa Ponsonnet, *p.c.*), for example with a borrowed coverb in Dalabon:

     Dalabon

(13) ya-h-<u>album</u>-hm-urrun-iyan

     1DU.INCL-R-<u>help</u>-VBLZR-RR-FUT

     'Me and you will help each other.'   (Maïa Ponsonnet, *p.c.*)

In summary, the BGW verb complex exhibits a mixture of word-like and phrase-like characteristics. Verb morphology has a generally fixed order, which contrasts with the free ordering of most word constituents in BGW. Some incorporated nominals and adverbials can only appear in the verb complex, which according to the often used criterion of the 'minimal free form', makes them bound elements of a complex word (Bloomfield, 1933; Haspelmath, 2011). But other verb complexes combine multiple stems that are otherwise independent words. Multiple lexical elements are sandwiched between the verb stem base on the right, and the pronominal prefixes on the left, which may be taken as delimitive of the verbal word. However a phrasal analysis might be sustained by relabeling the pronominals a left-edge clitic cluster.

3.2. Prosodic feet and pitch accents

BGW has been analysed as having prosodic foot, word and phrase constituents (Σ, ω, φ) (Bishop, 2002a). There are one or more pitch accents in

each phrase, which anchor on the initial syllables of feet. Monomorphemic nominals are only accented on their initial syllables, leading to their analysis as a single, unbounded foot – i.e. a foot that does not have a fixed number of syllables (14, 15). In polysynthetic verbs, feet are constituted by the verb + TAM base, the Subj + Obj prefix string, and by each of the stem elements that falls in between. One or more of these feet are accented (16–19). The fusional (+) and agglutinative (-) junctures mentioned above are thus reflected by prosodic foot integration and separation respectively. Each agglutinative morphological constituent has a similar prosodic constituency to a complete nominal word – i.e. an accentable foot. As we will see below, the phonological properties of the higher ω constituent are not strongly distinguished from Σ, which means that the polysynthetic verb is phonologically phrase-like.

(14) [(dá.luk)$_\Sigma$]$_\omega$

woman

(15) [(djí.rri.rdi.rdi)$_\Sigma$]$_\omega$

sacred kingfisher

(16) [(an-)$_\Sigma$(márne-)$_\Sigma$(bom)$_\Sigma$]$_\omega$

3/1-BEN-hit.PP

'He hit my relative.'

(17)   [(barri-)$_\Sigma$(dúlubu-ni)$_\Sigma$]$_\omega$

3A/3P-hit.from.distance-PI

'They were shooting (it).'   (Evans, 2003, pp. 99–100)

(18) [(bírri-)(káyhmeng)]

3A-call.out.PP

'They called out.'   (Bishop 2002a, p. 237)

(19) [(ø-ráwoyh-)(rdúrddu-)(dádjeng)$_\Sigma$]$_\omega$

3P-again-heart-cut.into.pieces.PP

'They cut his heart into pieces.' (Bishop 2002a, p. 150)

Following Bishop (2002a), I refer to the accentable initial syllable of each foot as bearing 'stress',[3] though this is an abstract phonological category, not always accompanied by phonetic prominence. The main phonetic indicator of

---

[3] Evans (2003: 99ff) uses 'stress' for those syllables that bear a pitch accent.

stress is the anchoring of H* pitch accents (Bishop, 2002a; Fletcher & Evans, 2002). As mentioned above, there may be one or more accents in a complex word. Figure 1 illustrates the pitch trace for a single-accent (in this instance with 'late rise', delayed from the anchoring syllable (Bishop, 2002a, p. 255)). Figure 2 illustrates the pitch trace of a double-accent verb.
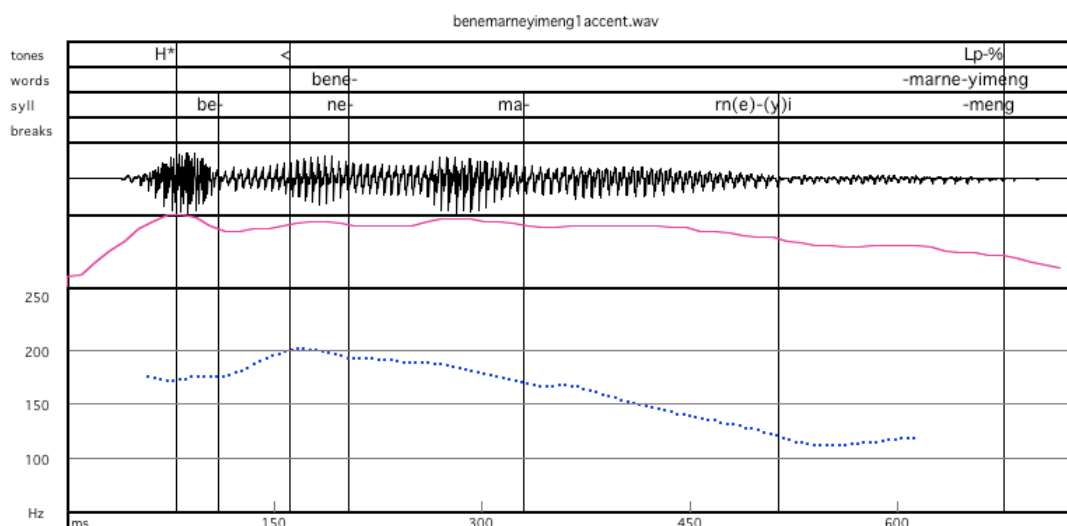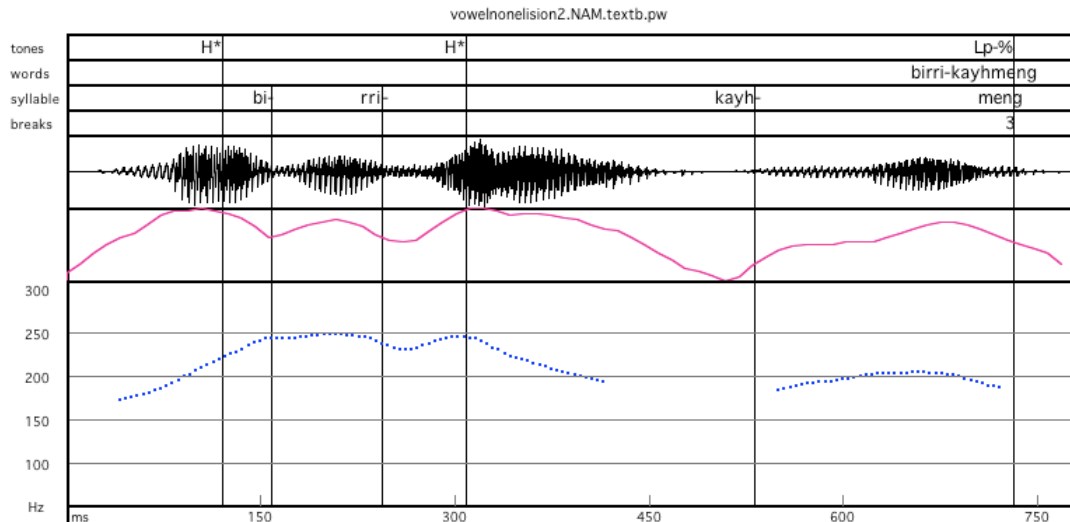

[(béne-)(marne-)(yimeng)$_\Sigma$]$_\omega$

3uaPAST - BEN - say.PP

'The two of them said to him.'

Figure 1. BGW single-accent verb (Bishop 2002a, p. 149). All BGW images are courtesty of Judith Bishop.

[(bírri-)(káyhmeng)$_\Sigma$]$_\omega$

3A-call.out.PP

'They called out.'

Figure 2. BGW double-accented verb (Bishop 2002a, p. 237).

BGW intonation often involves a 'hat pattern', with H* accents on the first and last stressed syllables, and a high-pitched plateau between the two (Bishop, 2002a; Fletcher & Evans, 2002). For long verbs, this means there is usually no detectable accent in medial morphs, as illustrated in Figure 3.
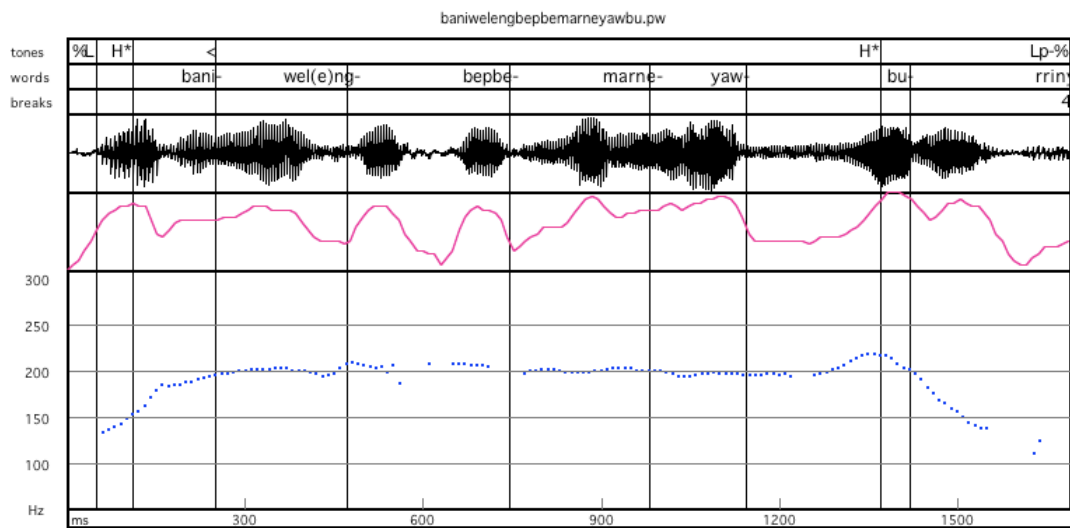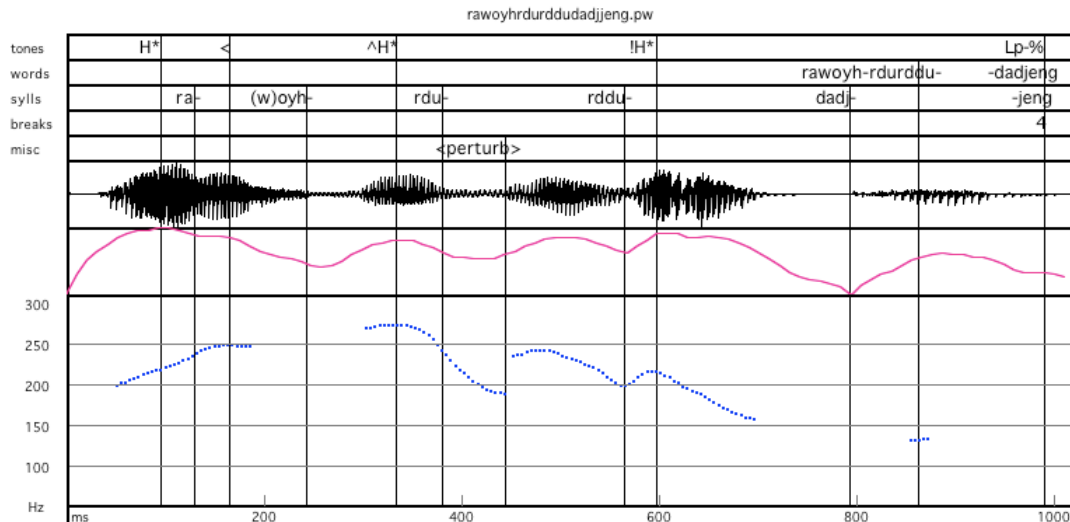
[(báni-)(weleng-)(bepbe-)(marne-)(yaw-)(bú + rr + iny)$_\Sigma$]$_\omega$

3UA.P-then-separately-BEN-child-fight + RR + PP

'Then they both fought each other over the child.'

Figure 3. BGW hat pattern between two pitch accents on verb (Bishop 2002: 146).

However, there are some instances in which a medial accent is detectable by upstep relative to the preceding accent, as illustrated in Figure 4.

[(ø-ráwoyh-)(rdúrddu-)(dádjeng)$_\Sigma$]$_\omega$

3P-again-heart-cut.into.pieces.PP

'They cut his heart into pieces.'

Figure 4. BGW verb with medial accent marked by accentual upstep (Bishop 2002a, p. 150).

Other than accentual anchoring, stressed syllables are not clearly marked by phonetic prominence. Bishop (2002a, 2002b) tests for phonetic differences, other than fundamental frequency, between accented and non-accented syllables. Accented syllables do not differ from unaccented syllables in duration or vowel quality. They do show slightly greater amplitude, though this difference was only significant for the /a/ vowel (Bishop, 2002a, pp. 226–233, 2002b). Stressed but non-accented syllables were not specifically tested, though given the largely negative results for accented syllables, it seems unlikely that non-accented syllables would show other forms of prominence. These results suggest that the BGW foot does not have rhythmic qualities (*pace* Evans 2003: 100), since vowel length does not differ significantly between strong/weak positions, and the syllabic length of feet varies widely.

There is, however, another variably-realised indicator of prosodic strength in stressed syllables. Vowels in unstressed syllables may be deleted in single- or multi-footed words (20, 21). But deletion is unattested in stressed syllables

(22). Unstressed vowels may be fully deleted, but do not exhibit reduced duration or more centralised vowel quality (Bishop 2002: 234).

(20)   [(ngúrru̱du)$_\Sigma$]$_\omega$ → [ŋúɾ‿du]
         emu   (Fletcher & Evans, 2002, p. 125)

(21)   [(birri̱-)(dówe + rr + inj)$_\Sigma$]$_\omega$ →   [biɾ‿dóweɾiɲ]
         3A-die + RR + PP
         'They died.'   (Bishop 2002: 235)

(22)   [(na-)(nga̱med)$_\Sigma$]$_\omega$ →   *[naŋ‿met]
         MASC-who
         'What's-its-name.'

Aside from phonetic prominence, foot constituency is indicated by bimoraic minimal weight. Open monosyllabic (CV) roots exhibit phonetic lengthening. For Dalabon this is stated as a general property of roots (23) (Evans et al 2008: 92), while for BGW the foot constituency is observed for syntactically incorporated roots, but not lexicalised compounds, e.g. *bo-ngun* 'water-eat' *[boːŋun].

   Dalabon

(23)   (bo-)no   → [boːno]
       liquid-part
       'river'   (Evans et al 2008: 92)

3.3. Accent placement

The interaction between foot structure and accentual placement in BGW is complex, variable, and requires further research (Bishop, 2002b). One simple restriction is that word-final syllables are not accentable in polysyllabic words. On the other hand, the right-most, non-final stressed syllable is a common target for accent placement:

(24) [(bí-)(na + ng)$_\Sigma$]$_\omega$
     3/3H-see + PP
     '(S)he saw him/her.'

(25) [(bi-)(ngérh-)(do-y)$_\Sigma$]$_\omega$
     3/3HP-heart-strike + PP
     'He speared him in the heart.'   (Evans 2003: 99)

Stressed syllables may be unaccented to avoid accent clash in adjacent syllables.[4] This may occur wherever there is a monosyllabic foot (26, 27). Some examples of this deaccentuation may be tied to the hat-pattern effect described above, though we will see further examples below that affect non-medial feet, and therefore cannot be hat effects.

(26) [(ngárri-)(yauh-)(máknan)$_\Sigma$]$_\omega$

    1A-again-take.a.look.NP

    'We'll try looking at one more place.' (Bishop 2002: 147)

(27) [(ná-djal-)(yáhwurdurd)$_\Sigma$]$_\omega$

    MASC-just-small.one

    'The smallest one.'   (Bishop 2002: 134)

Syllable weight plays a role in the resolution of accentual clash. Where all syllables are open, either first or second adjacent foot may be de-accented (28). But when the penult is a closed syllable it is consistently accented (29) (Evans 2003: 104). When two heavy syllables clash, adjacent accents may be tolerated (30, 31).

(28) [(nga-)(yáwa+n)$_\Sigma$]$_\omega$ ~ [(ngá-)(yawa+n)$_\Sigma$]$_\omega$

    1SG-search+NP

    'I am looking for her/him.'   (Evans 2003: 104)

(29) [(nga-)(djóbge+ng)$_\Sigma$]$_\omega$, *[(ngá-)(djobge+ng)$_\Sigma$]$_\omega$

    1SG-cut+PST

    'I cut it.'   (Evans 2003: 104)

(30) [(kán-)(wéybu)$_\Sigma$]$_\omega$

    2/1-give.IMP

    'Give it to me!'   (Bishop 2002: 143)

(31) [(bén-)(béngkang)$_\Sigma$]$_\omega$

    3P/3PL-know

    'He knew them.'   (Bishop 2002: 145)

---

[4] Bishop (2002a) describes these phenomena in terms of morphologically driven foot assignment, with subsequent derivational re-assignments of foot structure reflecting accentuation. I interpret the same facts as a single level of foot structure, with only a subset of feet being selected for accentuation.

Despite the general patterns described above, accent placement is not predictably determined by word structure or syllable weight: different tokens of the same word may select divergent accentuation (32). This suggests that higher-level intonational structure influences accent placement. Some of the attested variations involve double-accent on an IP-unique word, and single-accent when the same word shares an IP with another accented word (33, 34). One possible explanation for this would be a preference for more than one accent in the IP constituent (cf. Selkirk, 2000).

(32) [(ná-)(ngámed)$_\Sigma$]$_\omega$ ∼ [(ná-)(ngamed)$_\Sigma$]$_\omega$

   MASC-who

   'What's-its-name.'   (Bishop 2002: 137)

(33) {{[(ngál-)(dah-)(dáluk)]$_\omega$}$_\varphi$}$_{IP}$

   FEM-PL-woman

   'The women.'   (Bishop 2002: 153)

(34) {{[(ngal-)(dáh-)(daluk)]$_\omega$}$_\varphi$ {[(námekke)]$_\omega$}$_\varphi$}$_{IP}$

   FEM-PL-woman   DEM

   'Those women.'   (Bishop 2002: 154)

There are a few specific lexical stems or constructions in which accent falls on a stem-final syllable. For example, this occurs with certain incorporated nominals (35), and certain TAM allomorphs in certain dialects (36). There is no known explanation for these exceptions to accent placement.

(35) [(árri-bu)(lé-rri)$_\Sigma$]$_\omega$

   1A-charcoal-stand.NP

   'We Aboriginal people.'   (Evans, 2003, p. 102)

(36) [(ba-wa)(rré-meninj)$_\Sigma$]$_\omega$

   3P-go.bad-IRR

   'It would go bad.'   (Evans, 2003, p. 102)

The variability of accent placement in BGW appears to be typologically unusual, though it does bear some similarities to well-known English accentuation patterns. English pitch accent is mostly predictable in its selection of one strongest syllable (e.g. '(Missi)(ssípi)'), however the 'Rhythm Rule' of phrase formation can override this word-level default, in particular

to avoid adjacent accents (Gussenhoven, 1991; Liberman & Prince, 1977). Thus the potential clash of 'thirtéen mén' is avoided by shifting the accent on the first word to an earlier stressed syllable, i.e. 'thírteen mén'. This phenomenon is not in fact a 'Rule' as such, but rather is a variable phenomenon. Accent shift has been shown to depend on phrase-level speech planning, i.e. whether the whole phrase has already been planned when the first word is pronounced (Tilsen, 2012). Accentual placement in BGW complex words may be a similar phenomenon, in which the default accentual position plays a lesser role (or perhaps there is no default), and a greater role is played by variable, phrase-level planning effects. Thus the multiplicity of stressed syllables would in itself explain the variability of accentual placement in complex words.

3.4. Prosodic word and phonological phrase

In English and various other languages with metrical structure, the ω constituent that encompasses multiple Σ daughters is motivated by (among other things) the hosting of just one accent on the left-most or right-most Σ daughter. But in BGW we have seen that there may be multiple accents in the ω constituent. This is one of several reasons why ω is only weakly distinguished from Σ on the one hand, and from the prosodic phrase (φ) on the other. Evans describes the morpho-phonological structure of the Bininj Gun-wok words as 'lego-like' (Evans, 2003, p. 106), suggesting morphological pieces that maintain their structural integrity when fitted together. Another way of saying this is that the morphological components of complex words, prosodified as Σ constituents, are not very different from monomorphemic words (Evans, 2003, p. 89 ,105). The main cause of this is accentuation, as described above: incorporated stems and pronominal prefixes, like independent simple words, are eligible for accentuation on their initial syllables. To some extent, deaccentuation among adjacent stressed syllables in a complex word may distinguish this from a series of independent words. However this is not a way of distinguishing ω from φ, since deaccentuation can also affect independent words (Bishop, 2002a, p. 393).

Aside from prominence, segmental phonology in some languages distinguishes a prosodic word constituent – in particular where certain

segmental patterns distinguish ω edges from other syllable edges (e.g. Hildebrandt, 2007; Leeding, 1989, p. 17). However the BGW ω constituent again shows little distinction in this regard. A few morpho-phonological processes are attested in ω-internal heterosyllabic clusters, such as /ɻ/-deletion and place-assimilation among coronals (37, 38) (Evans pp. 110–111). However these ω-internal cluster constraints are not extensive.

(37) barri-djal-rey   → barridjaley

(38) ga-ganj-nudman   → gaganjnjudmen   (Evans pp. 110–111)

Some consonant types are described as having a word-internal distribution. In particular, BGW has a lenis/fortis obstruent contrast that is usually described as word-internal, and the tap/trill has the same restricted distribution (Evans, 2003, pp. 81, 89; Stoakes, 2013, p. 22). However, from available examples these consonants appear to be not just word-internal but morph-internal. If this is true, then their distribution does not distinguish ω from Σ (cf. Evans, Fletcher, & Ross, 2008, p. 101). On the other hand, ω-internal phonology does appear to be distinguished by apical flapping /d→ɾ/. This is reported to affect stem-initial /d/ in some instances, which may therefore distinguish incorporated stems from independent words (39, 40). However other examples do appear to show stem-initial /d/ being protected from flapping (41, 42); and it is not clear from the sources whether word-initial flapping is completely prohibited in phrase-internal positions.

(39) nga-danginj   → ngarranginj

(40) ga-bili-dowen   → gabilirrowen

(41) ngani-danginj   → nganidanginj

(42) bani-di   → banidi   (Evans 2003, p.107)

The phonological phrase (φ) constituent is marked by a Low boundary tone at its right edge (Bishop, 2002a, p. 336). Most φ constituents consist of just one ω child, which means that φ and ω are only occasionally distinct. Nouns, adjectives and verbs are usually complete φ constituents (43), while demonstratives, pronouns and adverbs show greater tendencies to prosodic integration with an adjacent word (Bishop, 2002a, p. 389ff.). However there are also some instances in which pairs of verbs that can be construed as a single event prosodify as a single φ constituent (44).

(43) {[(mán-)(korle)]ω]φ   [[(béne-)(karrmeng)]ω}φ   [[(bónj)]ω}φ

NC:III-spear   3UAP-take.PP   that's.it

'The two of them had spears, then they were ready.' (Bishop 2002: 354)

(44) {[(ø-djál-)(mankang)]ω   (ø-kúk-)(yoy)]ω}φ   {[(wanjh)]ω}φ

3P-just-fallPP   3P-body-liePP   then

'He just fell down dead'.   (Bishop 2002: 393)

The weak distinction between BGW ω and Σ raises the question of whether an alternative analysis can be supported in which the purported 'feet' are interpreted as prosodic words, with several such ω constituents found in polysynthetic verbs (45).

Footless alternative analysis

(45)   {[ngárri-]ω[yauh-]ω[máknan]ω}φ

1A-again-take.a.look.NP

'We'll try looking at one more place.' (Bishop 2002, p. 147)

The 'footless alternative analysis' has a couple of advantages: (a) it dispenses with the vacuous, unbounded Σ constituent posited for simple words, giving [djí.rri.rdi.rdi]ω instead of [(djí.rri.rdi.rdi)Σ]ω; (b) for complex words, which usually constitute a phonological phrase on their own, it dispenses with the vacuous ω constituent, giving {[ngárri-]ω[yauh-]ω[máknan]ω}φ instead of {[(ngárri-)Σ(yauh-)Σ(máknan)Σ]ω}φ. However, against this must be weighed two disadvantages: (a) consonant assimilation and flapping effects would lose their prosodic motivation; (b) there appears to be more deaccentuation in complex words than in series of independent words, and the whole-verb ω offers an explanation for this in terms of prosodic constituency.

3.5. Pausing

Pausing within the verb complex is possible in both BGW and Dalabon, though it is more common in the latter (Evans, 2003, p. 329; Evans et al., 2008). Dalabon has a very similar prosodic structure to BGW, though its polysynthetic verbs show even less prosodic integration (Fletcher & Evans, 2002). Evans and colleagues (2008) describe the Dalabon prosodic word as 'problematic' (p. 101), and label ω constituency on morphological components of the verb (p. 105). Some of the motivations for this are the

same as those described for BGW, i.e. multiple accents within the verb complex, and lack of segmental juncture effects. But Dalabon verb-internal pausing further supports a prosodic phrase analysis (Evans et al., 2008, p. 103). Attested pause breaks are between the prefix string and the stem string (46), and within the stem, between an incorporated noun or adverb and the verb root (47, 48).

(46) dorrng-no-duninj   ka-lng-h-…   dorrng-bulhm-inj
body-3POSS-real   3SGS-SEQ-As-   body-appear-PP
'Then his actual body (i.e., not his shadow) appeared.'
(Evans et al 2008: 105)

(47) ka-h-…   rak-…   m-iyan
3SGA/3SG.LO.O-As- wood-   get-FUT
'He … will get … firewood.' (Evans et al 2008: 105)

(48) dje-h-…   djarrk-… ning-iyan
12DISS-As-   together- sit-FUT
'We (disharmonic) will sit together.'   (Evans et al 2008: 105)

4. Ngalakgan

Ngalakgan is another Gunwinyguan language, sharing many morphosyntactic and prosodic characteristics with BGW. Sadly, Ngalakgan has recently all but ceased to be spoken (B. Baker, 2008, p. 5). Unlike BGW, phonetic prominence has not been analysed in Ngalakgan; however there is explicit analysis of prosodic constituency and wordhood criteria. As with BGW and Dalabon above, I will here again refer occasionally to a related language, Wubuy (also known as 'Nunggubuyu' (Heath, 1984; Hore, 1981)), which shares most of the morphosyntactic and prosodic characteristics of Ngalakan, though Ngalakgan has been the subject of more prosodic description.

4.1. Verb structure

Ngalakgan and Wubuy have many of the same polysynthetic characteristics as BGW. The verb complexes have been generally labelled 'words' (e.g. B. Baker, 2002, 2008; Heath, 1984), though Baker (2018) has recently argued that they have a mixture of word and phrase characteristics. The overall structure is similar to BGW, with a verb + TAM base at the right edge, nominal and adverbial incorporates to its left, and argument agreement

prefixes at the left edge (49). Ngalakgan prefixes encode not just person/number, but also noun class of non-human participants, and some TAM categories. Finite verb stems are a closed class of 32 lexemes, which select irregular tense suffixes, and do not always make a transparent semantic contribution to the verbal predicate (B. Baker, 2008, p. 96).[5] The finite stem often compounds with a coverb stem, as described below. The annotation of '+' and '-' morphological junctures is similar as for BGW, though in Ngalakgan the cohering '+' juncture may conjoin coverb or nominal stems to the finite verb base.

(49) *Ngalakgan macro verb structure*

 Agr/Tense–Adverbial–Nominal–Coverb±Finite.verb+TAM

Examples:

(50) cu-ŋamulu-keɽŋe-ŋa+na
 2MS-really-body-see+FUT
 'You'll have to really look for an animal.' (Baker 2008, p. 125)

(51) ŋu-pu-ʈic+ŋa+na-ppira?
 1MS-3A-stare.at+see+FUT-DU
 'I'll stare at those two.'   (Baker 2008, p. 126)

(52) ku-ku-piɲi-wuɽk
 NP-NEUT-water-swallow
 'He swallows water.'   (Baker 2008, p. 85)

As with BGW, Ngalakgan and Wubuy verbs have nominal incorporation of both syntactic and lexical types. With syntactic incorporates, one particularly phrase-like characteristic is their availability for modification by external determiners (53). On the other hand, Baker argues that these complexes have word-like properties, because their component lexical stems cannot be replaced by proforms, and cannot be coordinated within the verb complex (B. Baker, 2018, p. 257).

---

[5] These opaque finite stems have an approximate equivalent in BGW, identified as 'thematic' elements (Evans, 2003, p. 336), though these are not usually segmented in the morphological gloss.

Wubuy

(53) ŋa-ni-ḻanar-wawajuwaa   na-wulawaa
     1sg-3MASC-nail-cut.PC   MASC.TOP-two
     'I cut two [toe]nails. (Baker 2018, p. 263)

4.2. Prosodic constituency

Ngalakgan is analysed as having Σ, ω and φ constituents, though in this
instance the foot is bimoraic, i.e. has a rhythmic quality. Whereas long
monomorphemic words in BGW prosodify as a single unbounded Σ,
Ngalakgan has rhythmic footing in such words:

(54)   [(kójo)$_\Sigma$] $_\omega$ 'freshwater crocodile'   (Baker 2008, p. 70)

(55)   [(káma)$_\Sigma$la] $_\omega$ 'sky'   (Baker 2008, p. 71)

(56)   [(páɻa)$_\Sigma$(munu)$_\Sigma$]$_\omega$[6] 'sand goanna'   (Baker 2008, p. 82)

Feet are generally built from the left-edge of the prosodic word, as evidenced
by trisyllabic words with all-open syllables (57). However heavy syllables
introduce other patterns, either a right-edge foot with a heavy initial syllable
(58), or a heavy monosyllable foot followed by a disyllabic foot (59). There
are also reported to be some words with lexically specific patterns, and some
words with variable stress position. Baker (2008, p. 225) interprets these as
the manifestation of tension between left-headed (initial prominence) and
right-headed (penultimate prominence) tendencies in Ngalakgan, a
suggestion pursued by Goedemans in his typology of Australian word stress
(Goedemans, 2010).

(57)   [(pícu)$_\Sigma$ʈu]$_\omega$ 'whirlwind'   (Baker 2008, p. 71)

(58)   [pu(ʈólkoʔ)$_\Sigma$]$_\omega$ 'brolga'   (Baker 2008, p. 179)

(59)   [(jàr)$_\Sigma$(máɖa)$_\Sigma$]$_\omega$ 'marsupial sp.'   (Baker 2008, p. 226)

Feet constituted by open CV monosyllables exhibit bimoraic minimal weight,
with vowel lengthening contributing the required second mora:

(60a) [(ké)$_\Sigma$]$_\omega$ → [keː]   'man's child'   (Baker 2008, p. 76)

---

[6] Baker marks secondary stress on such forms as [(páɻa)$_\Sigma$(mùnu)$_\Sigma$]$_\omega$, however I reserve these
diacritics for accentual placement, and there is no accent on the secondary stress in this form
(Baker 2008, p. 83).

(60b) [(kéɾ)$_\Sigma$]$_\omega$ → [keɾ] 'kurrajong' (Baker 2008, p. 77)

In monomorphemic forms the prosodic head, indicated by H* accent anchoring, may be on the left-most foot (as in examples above), or at least for some words, may optionally be on the right-most foot (61). In the right-headed forms, secondary stress is realised by an H* accent on the first foot, with upstep on the head accent that follows. But in left-headed words, there is no accent after the initial H*, and it is unclear how or whether secondary stress is phonetically realised (B. Baker, 2008, p. 83). In Wubuy, the right-headed prosody is attested as the general pattern (62).

Ngalakgan

(61)   [(kùɾu)$_\Sigma$(cáʈu)$_\Sigma$]$_\omega$ ~ [(kúɾu)$_\Sigma$(caʈu)$_\Sigma$]$_\omega$ 'olive python' (Baker 2008: 82)

Wubuy

(62) [(lhàla)$_\Sigma$(wúlbulg)$_\Sigma$]$_\omega$ 'ant sp.' (Hore, 1981, p. 13)

In some complex word-forms, accentuation indicates a different prosodic constituency from the monomorphemic forms above. Some complex words are consistently right-headed, i.e. with multiple accents upstepping to the nuclear H* on the right-most stressed syllable (63), in contrast to long monomorphemic words where this is optional. Baker attributes consistent right-headedness to multiple ω constituents in the complex word, where the right-most stress must anchor H* because it is at the ω level rather than the Σ level. In other words, the prosodic head of φ is consistently its right-most ω daughter, while the prosodic head of ω may be either its left-most or right-most Σ daughter.

(63) {ku-[kàmala-]$_\omega$[kàɾakkaɾa-[7]]$_\omega$[cáŋ + an]$_\omega$}$_\varphi$

NP-cloud/sky-together-stand + PR

'Daylight breaks out.' (Baker 2008: 94)

---

[7] Baker's annotation does not indicate footing or associated accentuation within the component ω constituents of complex words. One possible analysis would be that the optional left/right headedness of ω daughters becomes consistently left-headed when multiple ω siblings are prosodically integrated into a φ.

However, not all complex words prosodify with multi-ω constituency. Ngalakgan morphology can be divided into structures that integrate into a single ω, and others that maintain separate ω constituents (B. Baker, 2008; B. Baker & Harvey, 2003; for Wubuy see Hore, 1981, p. 50ff.). Baker calls the more integrated type 'ROOT-level', and the more independent type 'WORD-level', following the stratal tradition in morphology (Borowsky, 1993; Kiparsky, 1982; Mohanan, 1986). Baker represents these by '+' (ROOT) and '-' (WORD) junctures. As shown in (63) above, the juncture between finite verb stem and tense suffix is ROOT-level, while the juncture between stem and prefix is WORD-level, with monosyllabic prefixes forming prosodic adjuncts, i.e. stray syllables directly dominated by a φ constituent (Bennett, Elfner, & McCloskey, 2016). Syntactically incorporated stems form WORD-level junctures, but other incorporates, especially coverbs, may form ROOT-level compounds (64, 65).

(64)   {ŋun-[ŋèj-]$_\omega$[wí+ŋa+n]$_\omega$}$_\varphi$
        1MO-name-forget+see+PR
        'He's forgotten my name.

(65)   {puɾ-[kùɳʈu-]$_\omega$[ŋéj+pu+n]$_\omega$}$_\varphi$
        3AS-country-name+hit+PR
        'They name the country.'

The ROOT level is not productive, tends to be semantically opaque, and involves many coverbs that have no usage independent of the compound (66). By contrast, the WORD level is productive and is usually semantically compositional (67). Only the WORD level permits loanword incorporation (68). Thus the prosodic difference between the ROOT and WORD junctures is correlated with different degrees of semantic and distributional independence.

(66) {[ø-ból + ma + nginy]ω}φ
      3SMS-rub + get + PC
      '(S)he was rubbing.'   (Baker and Harvey 2003, p. 9)

(67) {[ø-jèny]ω-[má + nginy]ω}φ
      3MSS-fish-get + PC
      '(S)he was getting fish.'   (Baker and Harvey 2003, p. 9)

(68) {[ø-àwtj]ω-[yó + ngon]ω}φ
      3SMS-house-sleep + PR
      '(S)he is sleeping in the house.'   (Baker and Harvey 2003, p. 4)

Longer ROOT-level constructs, like other prosodic words, may be optionally left-headed or right-headed. Following the general pattern, right-headedness produces lower H* accents upstepping to a final H* accent (69). This is the same accentuation pattern produced by the separate ω constituents of WORD-level compounding (as in examples above), so that Root-level and Word-level compounds are not consistently distinguished by accentuation (B. Baker, 2008, p. 149).

(69)   {ŋu-pu-[kèrŋe-]ω[(pùɾʔ + na)Σ + ni(+ kkóɾo)Σ]ω}φ
          1MS-3A-body-know + see + IRR + PRNEG
          'I don't know them.' (Baker 2008: 94)

As with BGW, Ngalakgan has very little segmental assimilation at morphological junctures (B. Baker, 2008, p. 64). In Wubuy, by contrast, there are very extensive segmental processes within the verb complex (Heath, 1984), and these have been used to motivate a ω constituent, encompassing the whole verb (Hore, 1981, p. 7).

4.3. Pausing and careful speech
Ngalakgan and Wubuy are like Dalabon in that polysynthetic verbs may be pronounced with pauses at morphological junctures. The pausing positions in Ngalakgan appear to be essentially the same as those attested in Dalabon, though for Ngalakgan the ROOT/WORD distinction is again evident, with pauses only found at WORD-level junctures. Baker reports that mid-verb pausing is common when consultants produce careful speech renditions for

the benefit of a linguist or other learner (B. Baker, 2008, p. 110, 2018, p. 268):

(70) [jíɾiŋ]…[bíː]…[bák]…[wóc + ma]

1PO-3P-APPL-steal + get.PRES

'They always steal from us.'   (Baker 2008: 110)

For Wubuy, a grammaticality judgement experiment was conducted to test speakers' acceptance of pauses at WORD-level versus ROOT-level junctures, as well as at morph-internal syllable breaks (Baker & Bundgaard-Nielsen, 2016). The results showed that speakers indeed preferred either WORD-juncture pauses, or no pauses at all, over other pause positions. Speakers rated WORD-juncture pauses and pauseless forms to have a similar level of acceptability. Since pausing has been sometimes treated as a criterion for distinguish phrase structure from word structure (Haspelmath, 2011), the acceptability of internally paused verb complexes is another phrase-like feature.

5. Murrinhpatha

Murrinhpatha is a Southern Daly language spoken by some 3000 people, and unfortunately is now the only Daly region language consistently being transmitted to the next generation. The verb structure of Murrinhpatha (and other Daly languages) has some commonalities with Gunwinyguan languages discussed above, though there are also major differences. In Murrinhpatha, these structural differences are accompanied by a very different prosodic structure. The Murrinhpatha prosodic word has a single fixed stress on its penultimate syllable, though phonetic prominence is realised only by phrasal accent, which attaches to the right-most ω in a phonological phrase. Accent placement does not show the variability of Gunwinyguan, and the prosodic word provides just one accentable syllable. However, word structure still has a role in accent placement, as some morphology is integrated in ω while other elements are adjuncts – i.e. external to the ω constituent.

5.1. Verb structure

The Murrinhpatha verb consists minimally of a finite verb stem, which encodes both lexical semantics and inflectional categories of subject and TAM. This 'stem' encompasses what were historically a subject prefix, verb

root and TAM suffix, though these have become so fused that the whole is usually presented as a single morphological constituent. The finite stem is the base for more complex verbs, with suffixation marking additional pronominal arguments, number and TAM features, and secondary finite stems encoding imperfective aspect (for a full template see (Nordlinger, 2010)). The macro-structure of the verb is as in (71), also illustrating the ω constituent boundary between prosodically integrated and adjunct morphology.

(71) *Murrinhpatha macro verb structure*

$$[[\text{Subj} + \text{Verb} + \text{TAM}]_{\text{FIN.STEM}} - \text{Pron} - \text{Coverb}]_\omega - \text{TAM} - \text{Adv} - \text{Number} - \text{IPFV}$$

Examples:

(72) {[núngam]$_\omega$}$_\varphi$
use.feet.3SG.NFUT
'(S)he is walking / running.'

(73) {[pumám-nga]$_\omega$}$_\varphi$
say.3PL.NFUT-1SG.OBL
'They said to me.'

(74) {[pumé-nga]$_\omega$-dha-neme-pardi}$_\varphi$
say.3PC.PST-1SG.OBL-PST-PC.M-be.IPFV
'They (*pauc. masc.*) were saying to me.'

As with Ngalakgan, Murrinhpatha finite stems are a closed class, in this case with 39 members (Blythe, Nordlinger, & Reid, 2007; Mansfield, 2016b). Coverbs are a much larger class, comprising hundreds of members once compound coverbs are taken into account (see below). Therefore the vast majority of verbal predicates are formed by combining finite stems with coverbs, as well as body-part nominals (75, 76). Adverbial elements may also be inserted among the suffixes (77, 78). Adverbials are clitics, elsewhere attaching at a phrasal level, so that in their verbal context they are 'endoclitics' (cf. Harris, 2002).

(75) {[thunu-líli]ω}φ
    use.feet.2SG.IRR-walk
    '(You) walk!'

(76) {[mem-ni-ngká-purl]ω}φ
    use.hands.RR.NFUT-RR-face-wash
    'I washed my face.'

(77) {[parde-líli]ω=matha-ngime}φ
    be.3PC.PST-walk=SPECIC-PC.F
    'They were just walking along.'

(78) {[nungam-rtí-dharl]ω=warda=kathu-wurran}φ
    use.feet.3SG.NFUT-bottom-open=SEQ=FROM-go.IPFV
    'Now he's slipping as he comes.'   (LCh, 2015-07-01_2-3)

The lexical portion of the Murrinhpatha verb, i.e. the nexus of finite stem, coverb and body-part nominals, shows generally word-like characteristics. Most finite stems (28 out of 39) cannot be used without a compounded coverb; the same is true for the majority of coverbs, which only appear in verbal compounds. Furthermore, some finite stems and coverbs are only attested within a specific compound, i.e. they are 'cranberry' morphs. For example the coverb *ngkardu* 'see' is only attested in a compound with the finite stem *bam* 'affect' (79), though this finite stem appears with several other coverbs. An example of mutual dependence is the combination of finite verb *bim* 'hear' and compound coverb *the-pup* 'ear-sit', both of which appear only in a compound meaning 'hear, listen' (80).[8] Although the finite stem and coverb are, as in Ngalakgan, often mutually dependent, in Murrinhpatha they are not always adjacent, as pronominal arguments and some number suffixes may appear in between.

---

[8] These co-occurrence restrictions are adduced from the Murrinhpatha Morpho-Corpus, which has over 100,000 morphologically annotated words of conversation, narrative and elicitation (Mansfield, Blythe, Nordlinger, & Street, 2018).

(79) {[bam-ngkárdu]ω}φ

  affect.1SG.NFUT-see

  'I see (it).'

(80) {[bim-mpa-thé-pup]ω}φ

  hear-2SG.OBL-ear-sit

  'I heard you.'

As can be seen in (78, 80) above, the semantics of finite–(bodypart–)coverb compounding is often non-compositional. 'Syntactic' stem–coverb compounding (i.e. semantically compositional, productive) does occur (81), though this appears impressionistically to be less frequent than the 'lexical' type.[9] With regards to bodypart–coverb compounding, the syntactic type (82) is fairly rare, while lexicalised incorporation is very common (Forshaw, 2011). Unlike Gunwinyguan languages, English/Kriol loanwords cannot be incorporated into the Murrinhpatha verb complex.[10]

(81a) {[<u>dim</u>-kámpa]ω}φ

  sit.3SG.NFUT-laugh

  '(S)he is (sitting) laughing.'

(81b) {[<u>wurran</u>-kámpa]ω}φ

  go.3SG.NFUT-laugh

  '(S)he is (sitting) laughing.'

(82a) {[dem-ngi-<u>dhawí</u>-rtum]ω}φ

  pierce.RR.NFUT-1SG.OBJ-mouth-dry

  'I've got a dry mouth.'

(82b) {[dem-ngi-<u>dhamá</u>-rtum]ω}φ

  pierce.RR.NFUT-1SG.OBJ-throat-dry

  'I've got a dry throat.'

Adverbial endoclitics and the imperfective secondary finite stem have more phrase-like characteristics. This is clear for the adverbials, since they occur in other contexts and usually in phrase-final position, though never as independent words. The secondary finite stems have a separate function as

[9] Confirmation of this conjecture will require quantitative research, using a formal criterion for identifying lexicalisation.

[10] There is a single known exception to this, the borrowing *thigan* 'shake hands', compounded as *mam-be-thigan* 'do.3SG.NFUT-arm-shake.hand' (Mansfield, 2016a, p. 404).

independent verbal words. The string encompassing TAM suffix, adverbials, imperfective and some number suffixes is also phrase-like in that it exhibits variable sequencing of elements:

(83a) {[purne-líli]_ω-<u>dha-nime</u>}_φ
   go.3PC.PST-walk-<u>PST-PAUC</u>
   'They were walking.'

(83b) {[purne-líli]_ω-<u>nime-dha</u>}_φ
   go.3PC.PST-walk-<u>PAUC-PST</u>
   'They were walking.'

(84a) {[punnu-wun-ngkú-birr]_ω-<u>nu-nintha</u>}_φ
   feet.3NS.FUT-3PL.OBJ-PC.OBJ-spear-<u>FUT-DUAL</u>
   'They will spear the two of them.'

(84b) {[pani-wurrá-thurrk]_ω-<u>nintha-nu</u>}_φ
   be.3SG.FUT-3PC.OBL-dive-<u>DUAL-FUT</u>
   'He will dive in for the two of them,' (Mansfield 2019, Ch.6)

The Murrinhpatha verb is thus somewhat similar to Ngalakgan in its finite verb – coverb nexus, though it shows less syntactic incorporation than Ngalakgan, and much less than BGW. All three languages share a prolific compounding tendency, but each has a different balance of lexicalisation versus productivity. Murrinhpatha also exhibits the following structural differences from Gunwinyguan polysynthesis:

 a) The Murrinhpatha finite verb stem has fused with subject prefixes and TAM suffixes;
 b) Murrinhpatha coverb and nominal elements are compounded to the right of the finite stem, whereas Gunwinyguan compounds to the left;
 c) Gunwinyguan incorporation involves a large and semantically diverse nominal lexicon whereas Murrinhpatha nominal incorporation is restricted to a closed class of body-part nominals.

5.2. Prosodic constituency

Murrinhpatha has prosodic word and phrase constituents (ω, φ), but no clear evidence has been adduced for a foot level between these two. Phonological descriptions mostly agree in positing the main prominence on the

penultimate syllable, but whereas earlier accounts posit secondary stress in a variety of positions (Clemens, 2013; Street & Mollinjin, 1981; Walsh, 1976), a more recent account proposes that there are no secondary prominences (Mansfield, 2019). Although it is difficult to demonstrate the non-existence of secondary stress, Mansfield makes two arguments in support of this claim. Firstly, the earlier accounts vary widely in their impressions of secondary stress, e.g. *yùngám-ninthá-wuy* (Street and Mollinjin) vs *bàngam-ngìnthá-parl* (Clemens). If secondary stress were clearly present, we might expect linguists to hear it in the same places. Secondly, after careful listening and inspection of spectrograms for a large number of examples, Mansfield could not detect any differences in pitch, duration, intensity or vowel quality that might support a hypothesis of secondary stress.

With regards to the penultimate prominence that it largely agreed upon in all accounts, Mansfield observes that while it is consistently present on words spoken in isolation, it appears only on the final word of configurational phrases, such as NPs or PPs (85, 86) (Mansfield, 2019 Ch. 4). This indicates that it is a phrase-level prominence, namely an H* pitch accent, in a right-headed φ constituent. However, accentual positioning does depend on word structure in one crucial respect: the accent is anchored to the penultimate syllable of the right-most ω constituent within the φ. This syllable is not always phrase-penultimate, because many suffixes and all endoclitics are external to the ω constituent (87) – a topic to which I return below.

(85) {[kale]ω   [nukúnu]ω}φ

      mother   3SG.M

      'His mother.'

(86) {[ngarra]ω[tjalput]ω   [nhínhi]ω}φ

      LOC   house   2SG

      'At your house.'

(87) {[pumám-nga]ω-neme}φ

      say.3PL.NFUT-1SG.OBL-PC.M

      'They (*pauc. masc.*) were saying to me.'   (Mansfield 2019, Ch.4)

Murrinhpatha prosody thus involves only one prominent syllable per φ constituent, with all other syllables being equally non-prominent. In most cases the φ constituent comprises just a single morphosyntactic word, though

this may host a noun classifier prefix and several suffixes or enclitics, thus producing long strings of non-prominent syllables:

(88) {da-[tjálput]ω=dhangunu}φ

    PLACE-house=SOURCE

    'From the house.'

(89) {[pumé-nga]ω-dha-neme-pardi}φ

    say.3PC.PST-1SG.OBL-PST-PC.M-be.IPFV

    'They (*pauc. masc.*) were saying to me.'

As a result, the characteristic pitch pattern of Murrinhpatha, at least for declarative sentences, is a series of phrases that each rise to single peak then fall again. Figure 5 illustrates the single pitch peak in a phrase-unique polysynthetic verb; Figure 6 illustrates the same for a two-word NP.
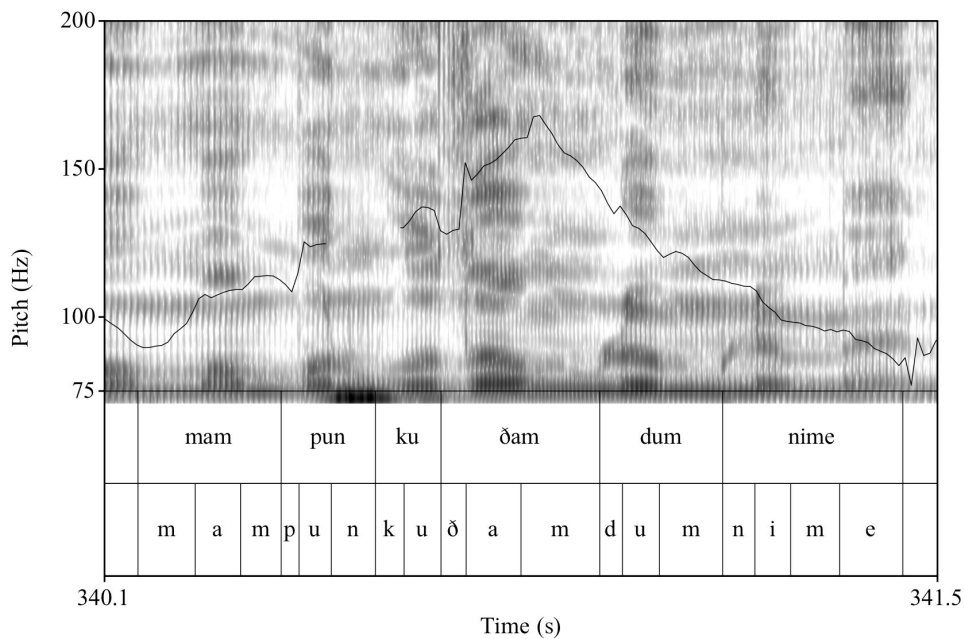
{[mam-wun-ngku-dhámdum]ω-nime}φ

    use.hands.3SG.NFUT-3PL.OBJ-PC.OBJ-squash-PAUC.M

    '(S)he is squashing them.'   (Mansfield 2019, Ch.4)

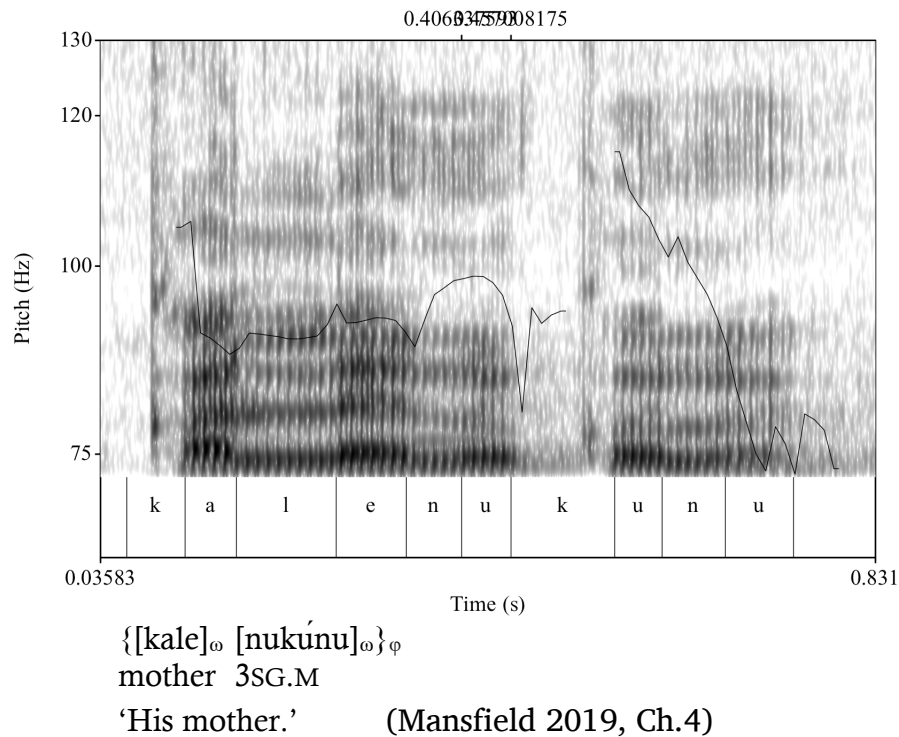**Figure 5. Spectrogram and pitch trace illustrating single pitch accent in a polysynthetic verb.**

{[kale]ω [nukúnu]ω}φ
mother 3SG.M
'His mother.'   (Mansfield 2019, Ch.4)

Figure 6. Spectrogram and pitch trace for a two-word phrase with a single pitch accent.

5.3. Prosodically internal and external morphology

The Murrinhpatha prosodic word does not encompass all elements of the polysynthetic verb. Endoclitics and the imperfective secondary stem are external to the ω domain (90). Inflectional suffixes are divided into prosodically internal and external elements: pronominal suffixes marking object, oblique and reflexive are internal, while TAM suffixes are external (91). Number suffixes may be internal or external, according to a complex system of cumulative exponence and morphotactic adjacency (see Mansfield, 2019 Ch. 6). Coverbs are prosodically internal, and occur to the right of any prosodically internal suffixes (Mansfield, 2017).

(90)   {[nungam-rtí-dharl]ω = warda = kathu-wurran}φ
        use.feet.3SG.NFUT-bottom-open = SEQ = FROM-go.IPFV
        'Now he's slipping as he comes.'

(91) {[pumé-nga]ω-dha}φ

    say.3PL.PST-1SG.OBL-PST

    'They (*pl.*) said to me.'

The distinction between prosodically internal and external morphology is realised not just by the positioning of the ω-anchored H* accent, but also by morpho-phonological juncture effects that occur only within the ω domain (Mansfield 2019, Ch. 4). These are much more extensive than in BGW or Ngalakgan. Some segmental processes, though ω-internal only, are fairly regular within that domain: this is true for example of intervocalic voiceless obstruent lenition (92). But other ω-internal consonant mutations are lexically specific, rather than systematic (93, 94) (Mansfield, 2019, Ch. 4).

(92) {[than<u>i-kút</u>-kut]ω-nu=<u>k</u>a}φ   →   than<u>iɣút</u>kutnuka

    be.2SG.IRR-collect.PLRCT-FUT

    'You collect (them)…'

(93a) {[pá<u>n-w</u>err]ω}φ   →   pá<u>np</u>err

    ARC.3SG.NFUT-tremble

    the engine hums

(93b) {[wurdá<u>n-wi</u>]ω}φ   →   wurdá<u>nw</u>i

    IMPEL.3SG.NFUT-inflate

    (S)he smokes

(94a) {[b<u>uni-wún</u>-bat]ω-dha}φ   →   bun<u>ín</u>battha

    descend.3SG.PST-fall-PST

    '(S)he made them fall.'

(94b) {[pu<u>ní-wurr</u>]ω-dha}φ   →   pu<u>níwurr</u>dha

    slash.3SG.PST-measure-PST

    '(S)he measured it.'

Unpredictable juncture effects contribute to morpho-phonological 'opacity' in the ω-internal domain: given the segmental surface string of a verb, there is considerable complexity involved in identifying the morphological components. This exacerbates the lack of prosodic prominences that in other languages help identify morphological components. Together, these forms or morpho-phonological opacity may contribute to lexicalisation and non-productivity in the lexical portion of the verb.

5.4. Other Daly languages

The other polysynthetic languages of the Daly region have largely the same morphosyntactic structure as Murrinhpatha, but quite different prosodic structure. These are Murrinhpatha's sister language Ngan'gi, and the Western Daly languages Marrithiyel, Marri Ngarr and Emmi (as well as other related dialects) (Nordlinger, 2017; Tryon, 1974). All share the same verb structure based around finite stem and coverb. But while Murrinhpatha has only a phrasal accent on the penultimate syllable, other Daly polysynthetic languages have been described as having initial primary stress for all word types, and thus on the first syllable of the finite stem in verbs (Ford, 1998, p. 70ff.; Green, 1989, p. 36; Reid, 1990, p. 96). The initial syllable of the coverb receives a secondary stress, reminiscent of the multiple morph-aligned prominences in Gunwinyguan languages. Note however that Daly verbs are prosodically left-headed, while Ngalakgan and BGW show some right-headed tendencies.

6. Discussion and conclusions

In polysynthetic languages of northern Australia, pitch accents are the main form of prominence indicating prosodic constituency in the speech stream. These accents are assigned by phrase structure, and although they depend on word-level prosodic constituency for their positioning, they are not directly determined by word-level prosody. I here briefly compare the main features of Gunwinyguan and Murrinhpatha word stress and pitch accent, and discuss the apparent connection between prosodic integration and morphosyntactic integration in these languages.

In the case of BGW and Dalabon, complex verbs have multiple stressed syllables, in the initial positions of each stem and prefix morpheme. The intonation system selects one or more of these stressed syllables as the anchor points for accentuation. The fundamental principle of accent anchoring to stress is shared with more familiar 'bottom-up' prosodic systems such as English (Gordon, 2014, p. 88), but BGW departs from such a system by showing greater variation in the accentual position. Whereas English pitch accent position is usually determined by the word's internal structure, BGW pitch accents select different anchor points in different contexts, presumably

based on the higher-level phrase structure in which the word is embedded, and on extra-grammatical factors such as speech rate and planning (Tilsen, 2012). Another respect in which BGW departs from English-like systems is in the possibility of multiple pitch accents in the prosodic word. However, this feature depends on one particular analysis of prosodic constituency, where morphologically complex words are labelled as multiple foot constituents governed by a prosodic word constituent. An alternative analysis treats each of these morphological projections as a prosodic word, without any mediating foot constituent. In this footless analysis, BGW and Dalabon polysynthetic verbs comprise multiple ω constituents, and phrasal prosody assigns a maximum of one accent per ω.

The alternative analysis sketched above has to some extent been applied by Baker (2008, 2018) to Ngalakgan and Wubuy, where he proposes multiple prosodic words in the polysynthetic verb. However, both foot and prosodic word elements are proposed here, as long monomorphemic words have multiple stresses indicative of bound trochaic feet. Baker distinguishes Σ from ω constituents, arguing that the right-most of ω siblings is always the prosodic head, while among Σ siblings there is variation between left-most and right-most heads. This suggests that, as in BGW, Ngalakgan pitch accents exhibit variability in their selection among stress anchor points.

In Murrinhpatha, by contrast, prominence is assigned completely predictably for each phonological phrase. Again the prosodic word has a role, in that it is the penultimate syllable of the right-most ω daughter that anchors accent, rather than a 'φ-absolute' target. But since only the right-most ω anchors accent, other ω constituents have no prominence whatsoever (though they do have bimoraic minimal weight). Other Daly polysynthetic languages have been described as having fixed word-initial primary stress, though phrasal accent and word–phrase prosodic interaction has not been analysed for these languages.

Morphosyntactically, the verb complexes in Gunwinyguan and Daly languages only partly correspond to the notion of 'word'. Gunwinyguan verb complexes have phrase-like characteristics such as highly productive

incorporation, and the syntactic availability of some incorporated stems. Against these must be weighed the fact that many of the nominal and adverbial stems so used do not occur outside the verb complex. Incorporated nominals have different degrees of morphosyntactic integration in the verb, in some cases being fully lexicalised, in other cases semantically compositional and syntactically available. Baker's (2008) analysis of Ngalakgan draws particular attention to how morphosyntactic integration corresponds to prosodic integration: incorporated nominals that are independent prosodic words may show syntactic characteristics (WORD compounds), whereas incorporated nominals that are integrated into a ω with the verb root form lexicalised compounds (ROOT compounds). By contrast, Murrinhpatha integrates all incorporated nominals into the ω headed by the verb stem. But in another sense, Murrinhpatha follows the Ngalakgan pattern of prosody/morphosyntactic relations: Murrinhpatha adverbials, which are productive and 'syntactic', are external to the ω, while incorporated nominals and coverbs are frequently lexicalised, and prosodically integrated. Nonetheless, on the rare occasions when body-part nominals are syntactically incorporated in Murrinhpatha, they are nonetheless prosodically integrated. Furthermore, the ω constituent also spans pronominal and number suffixes that are completely transparent and productive. Overall, the Murrinhpatha stem/pronominal zone exhibits more consistent prosodic integration than the equivalent morphological elements in BGW and Ngalakgan.

References

Baker, B. 2002. How referential is agreement? The interpretation of polysynthetic dis-agreement morphology in Ngalakgan. In N. Evans (Ed.), *Problems of Polysynthesis* (pp. 51–85). Berlin: Akademie Verlag.

Baker, B. 2008. *Word structure in Ngalakgan.* Stanford: CSLI Publications.

Baker, B. 2018. Super-complexity and the status of 'word' in Gunwinyguan languages of Australia. In G. Booij (Ed.), *The construction of words: Advances in Construction Morphology* (pp. 255–286). Berlin: Springer.

Baker, B., & Bundgaard-Nielsen, R. 2016. Pause acceptability is predicted by morphological transparency in Wubuy. In C. Carignan & M. D. Tyler (Eds.), *Proceedings of the Sixteenth Australasian International Conference*

on Speech Science and Technology. Sydney: Australasian Speech Science and Technology Association.

Baker, B., & Harvey, M. 2003. Word structure in Australian languages. *Australian Journal of Linguistics, 23*(1), 3–33.

Baker, M. 1996. *The polysynthesis parameter*. Oxford: Oxford University Press.

Bennett, R., Elfner, E., & McCloskey, J. 2016. Lightest to the Right: An Apparently Anomalous Displacement in Irish. *Linguistic Inquiry, 47*(2), 169–234.

Bickel, B., & Zúñiga, F. 2017. The "word" in polysynthetic languages: Phonological and syntactic challenges. In M. Fortescue, M. Mithun, & N. Evans (Eds.), *The Oxford handbook of polysynthesis*. Oxford: Oxford University Press.

Bishop, J. 2002a. *Aspects of intonation and prosody in Bininj gun-wok: autosegmental- metrical analysis* (PhD thesis). University of Melbourne, Melbourne.

Bishop, J. 2002b. "Stress accent" without phonetic stress: Accent type and distribution in Bininj Gun-wok. In *Proceedings of Speech Prosody 2002: An international conference*. Aix-en-Provence, France: Laboratoire Parole et Langage, CNRS / Université de Provence.

Bloomfield, L. 1933. *Language*. New York: Henry Holt.

Blythe, J., Nordlinger, R., & Reid, N. 2007. Murriny Patha finite verb paradigms. unpublished ms.

Borowsky, T. 1993. On the word level. In S. Hargus & E. M. Kaisse (Eds.), *Studies in lexical phonology* (pp. 199–234). San Diego: Academic Press.

Bowern, C. 2014. Complex predicates in Australian languages. In H. Koch & R. Nordlinger (Eds.), *The languages and linguistics of Australia: a comprehensive guide* (pp. 263–294). Berlin: Mouton de Gruyter.

Carroll, P. 1976. *Kunwinjku: a language of Western Arnhem Land* (MA thesis). Australian National University, Canberra.

Clemens, M. 2013. *Verbal stress patterns in a morphologically complex language: Murrinh-Patha* (Honours thesis). University of Melbourne, Melbourne.

Evans, N. 2003. *Bininj Gun-Wok: a pan-dialectal grammar of Mayali, Kunwinjku and Kune*. Canberra: Pacific Linguistics.

Evans, N. 2017. Polysynthesis in northern Australia. In M. Fortescue, M. Mithun, & N. Evans (Eds.), *Oxford handbook of polysynthesis* (pp. 312–335). Oxford: Oxford University Press.

Evans, N., Fletcher, J., & Ross, B. 2008. Big words, small phrases: Mismatches between pause units and the polysynthetic word in Dalabon. *Linguistics, 46*(1), 89–129.

Evans, N., & Sasse, H.-J. 2002. Introduction: problems of polysynthesis. In *Problems of polysynthesis* (pp. 1–13). Berlin: Akademie Verlag.

Fletcher, J., & Evans, N. 2002. An acoustic phonetic analysis of intonational prominence in two Australian languages. *Journal of the International Phonetic Association, 32*(2), 123–140.

Ford, L. 1998. *A description of the Emmi language of the Northern Territory of Australia* (PhD thesis). Australian National Univeristy, Canberra.

Forshaw, W. 2011. *A continuum of incorporation: Noun incorporation in Murrinh-Patha* (Honours thesis). University of Melbourne, Melbourne.

Goedemans, R. 2010. An overview of word stress in Australian Aboriginal languages. In H. van der Hulst & E. van Zanten (Eds.), *A survey of word accentual patterns in the languages of the world* (pp. 55–86). Berlin: De Gruyter Mouton.

Gordon, M. K. 2014. Disentangling stress and pitch-accent: A typology of prominence at different prosodic levels. In H. van der Hulst (Ed.), *Word stress: Theoretical and typological issues* (pp. 83–118). Cambridge: Cambridge University Press.

Green, I. 1989. *Marrithiyel: a language of the Daly River region of Australia's Northern Territory* (PhD). Australian National Univeristy, Canberra.

Gussenhoven, C. 1991. The English Rhythm Rule as an accent deletion rule. *Phonology, 8,* 1–35.

Harris, A. C. 2002. *Endoclitics and the origins of Udi morphosyntax*. Oxford: Oxford University Press.

Haspelmath, M. 2011. The indeterminacy of word segmentation and the nature of morphology and syntax. *Folia Linguistica, 45*(1), 31–80.

Haspelmath, M. 2018. The last word on polysynthesis (Review of Oxford Handbook of Polysynthesis). *Linguistic Typology, 22*(2), 307–326.

Heath, J. 1984. *Functional Grammar of Nunggubuyu*. Canberra: AIAS.

Hildebrandt, K. A. 2007. Prosodic and grammatical domains in Limbu. *Himalayan Linguistics*, *8*, 1–34.

Hore, M. 1981. Syllable length and stress in Nunggubuyu. *Work Papers of SIL-AAB, A-5*, 1–62.

Jun, S.-A. 2005. *Prosodic typology: The phonology of intonation and phrasing.* Oxford: Oxford University Press.

Kiparsky, P. 1982. Lexical phonology and morphology. In I. S. Yang (Ed.), *Linguistics in the morning calm* (Vol. Volume 2, pp. 3–91). Seoul: Hanshin.

Leeding, V. 1989. *Anindilyakwa Phonology and Morphology* (PhD thesis). University of Sydney.

Liberman, A. M., & Prince, A. S. 1977. On stress and linguistic rhythm. *Linguistic Inquiry*, *8*, 249–336.

Mansfield, J. B. 2016a. Borrowed verbs and the expansion of light verb phrases in Murrinhpatha. In F. Meakins & C. O'Shannessy (Eds.), *Loss and renewal: Australian languages since contact* (pp. 397–424). Berlin: Mouton de Gruyter.

Mansfield, J. B. 2016b. Intersecting formatives and inflectional predictability: How do speakers and learners predict the correct form of Murrinhpatha verbs? *Word Structure*, *9*(2), 183–214.

Mansfield, J. B. 2017. Prosodic words in cyclic derivation: The strange case of Murrinhpatha compound verbs. *Morphology*, *27*(3), 359–382.

Mansfield, J. B. 2019. *Murrinpatha morphology and phonology*. De Gruyter Mouton.

Mansfield, J. B., Blythe, J., Nordlinger, R., & Street, C. 2018. *Murrinhpatha morpho-corpus*. Retrieved from langwidj.org/Murrinhpatha-morpho-corpus

Mohanan, K. P. 1986. *The theory of lexical phonology*. Dordrecht: Kluwer Academic Publishers.

Nespor, M., & Vogel, I. 2012. *Prosodic phonology* (Second edition). Berlin: Mouton de Gruyter.

Nordlinger, R. 2010. Verbal morphology in Murrinh-Patha: Evidence for templates. *Morphology*, *20*(2), 321–341.

Nordlinger, R. 2017. The languages of the Daly River region (Northern Australia). In M. Fortescue, M. Mithun, & N. Evans (Eds.), *Oxford handbook of polysynthesis*. Oxford: Oxford University Press.

Oates, L. F. 1964. *A tentative description of the Gunwinggu language (of western Arnhem Land)*. Sydney: Oceania Monographs.

Osborne, C. R. 1974. *The Tiwi language*. Canberra: Australian Institute of Aboriginal Studies.

Reid, N. 1990. *Ngan'gityemerri: a language of the Daly River region, Northern Territory of Australia* (PhD thesis). Australian National Univeristy, Canberra.

Schiering, R., Bickel, B., & Hildebrandt, K. A. 2010. The prosodic word is not universal, but emergent. *Journal of Linguistics*, *46*(3), 657–709.

Schultze-Berndt, E. 2000. *Simple and complex verbs in Jaminjung* (PhD thesis). Katholieke Universiteit Nijmegen, Nijmegen.

Selkirk, E. O. 1984. *Phonology and Syntax: the relation between sound and structure*. Cambridge, MA: MIT Press.

Selkirk, E. O. 2000. The interaction of constraints on prosodic phrasing. In M. Horne (Ed.), *Prosody: Theory and experiments* (pp. 231–262). Dordrecht: Kluwer.

Selkirk, E. O. 2011. The syntax-phonology interface. In J. A. Goldsmith, J. Riggle, & A. C. Yu (Eds.), *The handbook of phonological theory* (Second edition, pp. 435–484). Oxford: Blackwell.

Stoakes, H. 2013. *An acoustic and aerodynamic analysis of consonant articulation in Bininj Gun-wok* (PhD thesis). University of Melbourne, Melbourne.

Street, C., & Mollinjin, G. P. 1981. The phonology of Murinbata. *Work Papers of SIL-AAB, Series A, Volume 5*, 183–244.

Tilsen, S. 2012. Utterance preparation and stress clash: Planning prosodic alternations. In S. Fuchs, M. Weirich, D. Pape, & P. Perrier (Eds.), *Speech production and perception vol. 1: Speech planning and dynamics* (pp. 119–156). Frankfurt: Peter Lang.

Tryon, D. 1974. *Daly family languages, Australia*. Canberra: Pacific Linguistics.

Walsh, M. 1976. *The Murinypata language of north-west Australia* (PhD thesis). Australian National Univeristy, Canberra.