PART IV

WORD PROMINENCE IN AUSTRALIAN LANGUAGES

13

The prosodic structure of Australian polysynthetic verbs

Bininj Gun-wok, Murrinhpatha, and Ngalakgan

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13.1 Introduction

The prosodic word is a recurrent feature of human languages, capturing the convergence of prominence, duration and segmental phenomena in the phonological realization of grammatical words (Selkirk 1984; Selkirk 2011; Nespor and Vogel 2012). Prosodic words are one level in a hierarchy of prosodic constituents, with mora, syllable, and foot constituents below, and various phonological phrase constituents above. One area of particular interest is how complex grammatical words map onto this hierarchy (e.g. Booij 1996; Peperkamp 1996; Peperkamp 1997; Hildebrandt 2015). It is not obvious how we should expect polysynthetic verbs to prosodify, since these verb structures typically have mixed characteristics of grammatical words and syntactic phrases (Bickel and Zúñiga 2017; Baker 2018; Haspelmath 2018). Polysynthetic verbs may encompass multiple lexical stems, derivational affixes, adverbial elements, and pronominal agreement with multiple participants (Baker 1996; Evans and Sasse 2002; Fortescue 2017). Word-like characteristics include non-extractability of parts for topicalization, inability of some parts to stand as words on their own, fixed ordering of internal parts, and non-insertability of parenthetic phrases. Phrase-like characteristic include presence of multiple stem elements, some of which may be able to stand alone as words, flexible ordering of parts, internal pausing, availability of incorporated stems to external modification, and the appearance of clitics in internal positions (Dixon and Aikhenvald 2002; Haspelmath 2011). Polysynthetic verbs typically combine some characteristics from each of these lists, but do not fully match the criteria for either word or phrase status. As we will see, this is true of the three northern Australian languages considered in this study: Bininj Gun-wok, Murrinhpatha, and Ngalakgan.

An interesting question, then, is whether polysynthetic verbs align more with prosodic word or prosodic phrase properties. Some studies of have found that polysynthetic verbs prosodify as phrases encompassing multiple prosodic words

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(e.g. Russell 1999; Evans et al. 2008; Dyck 2009). Similarly, in this chapter I review evidence for prosodic phrase constituency in northern Australian polysynthetic verbs. I draw primarily on existing literature (Bishop 2002a; Evans 2003; Baker 2008; Mansfield 2019), interwoven with some new analysis and commentary. The prosodic hierarchy provides an elegant account of phonological phenomena in these languages, though the evidence does not support the universalist approach of standard prosodic hierarchy theory (see references above). This follows recent work proposing language-particular prosodic hierarchies, rather than a single universal hierarchy (Bennett and Elfner 2019).

Some typologists have argued that the prosodic word constituent is not universal, and that in polysynthetic verbs in particular, there may be multiple prosodic levels between the foot and the phrase. For example, multiple word-like prosodic constituents have been proposed for polysynthetic verbs in Limbu (Hildebrandt 2007; Schiering et al. 2010) and Cherokee (Uchihara 2018). More radically, a typological study finds that most languages (polysynthetic or otherwise) have more than one prosodic constituent type between foot and phrase (Bickel et al. 2009). This study codes the morphological domains (stems, prefixes, suffixes, clitics) over which phonological phenomena span in 63 languages, to test whether phonological patterns tend to converge on a uniquely identifiable prosodic word constituent. Such a convergence is found in only nine of the 63 languages, suggesting that phonological phenomena between foot and phrase do not typically converge on a single prosodic word domain.

By contrast, in this study I report evidence for a uniquely identifiable prosodic word domain in each of the languages: Ngalakgan, Bininj Gun-wok, and Murrinhpatha. Despite ambiguity of grammatical word status in the verbs of these languages, in each case the most tightly interdependent elements of the verb mirror the phonological packaging of simple, canonical words (e.g. nouns). To reach this conclusion, I take a parsimonious approach to positing prosodic domains, applying skepticism to potential constituents such as metrical feet and multilevel prosodic words. In the discussion section, I suggest that this approach may provide better support for the prosodic word as a viable concept in typological research.

13.1.1 Scope of this chapter

The polysynthetic languages of northern Australia can be divided into two main groups with fairly distinct structures: the macro-Gunwinyguan languages (including Anindilyakwa, Bininj Gun-wok, Dalabon, Gaagudju, Ngalakgan, Rembarrnga, and Wubuy), and the Southern and Western Daly languages (including Marrithiyel, Marri Ngarr, Murrinhpatha, and Ngan'gityemerri). For most of these languages there are only brief sketches of prosodic constituency, and in this

chapter, I focus on the three for which the most detailed analyses are available: Bininj Gun-wok, Ngalakgan (both Gunwinyguan), and Murrinhpatha (Southern Daly). Bininj Gun-wok is the only one of the three for which phonetic data is available. For accounts of word prosody in Australian languages more generally see Goedemans (2010), Baker and colleagues (in prep.), and Jepson and Ennever (in prep.).

In this chapter I refer frequently to '(pitch) accents', by which I mean pitch peaks that are positioned with reference to prosodic word and phrase constituents. In the three languages here considered, these accents are the only form of prosodic prominence that has been clearly demonstrated. Accent placement depends on phrase constituency, though it also references prosodic word edges. The importance of prosodic word edges makes these pitch accents 'bottom-up' accents in Gordon's (2014) terms. I reserve the term 'stress' for purely word-level prominence such as syllables with extra duration, intensity or phonological contrasts (Beckman 1986; Hyman 2014), none of which are clearly present in the languages here described.

13.1.2 Overview of verb prosody in the three languages

I here provide a brief outline of prosodic verb structure in Ngalakgan, Bininj Gun-wok, and Murrinhpatha, to be filled in with further details in sections below.

Ngalakgan and Bininj Gun-wok have 'accentable' syllables, which by virtue of their position in prosodic constituents are potential anchor points for pitch accents, though these are only variably present. In Murrinhpatha, on the other hand, there is a single, consistent position for pitch accents on the penultimate syllable of the final prosodic word in a phonological phrase. In examples throughout this chapter I use accent diacritics to indicate *phonetically realized pitch accents*, following the primary sources. Thus these diacritics appear variably in Ngalakgan and Bininj Gun-wok examples, but predictably in Murrinhpatha examples.

In all three languages, prosodic word constituency reflects lexicalization. In Ngalakgan and Bininj Gun-wok, productive stem combinations are prosodically independent, while lexicalized combinations are prosodically integrated. In Murrinhpatha, where lexicalization is more prevalent, stem elements consistently integrate into a single prosodic word. The prosodic constituency of all three languages is primarily diagnosed based on pitch accent placement, and bimoraic minimality. Segmental effects play a relatively minor role.

In the Ngalakgan prosodic word (ω), syllables are organized into exactly bimoraic feet (Σ), where codas are moraic, and the first syllable of each foot is accentable (1). Polysynthetic verbs prosodify as a phonological phrase (φ), encompassing one or more ω constituents, with inflectional prefixes as prosodic adjuncts (2). Throughout this chapter I use the term 'adjunct' for syllables that are not

contained in the immediately superior level of the hierarchy, be it either the foot or prosodic word (Bennett et al. 2016).

(1) [(jár)$_{\Sigma}$(máɖa)$_{\Sigma}$]$_{\omega}$ *Ngalakgan*
'marsupial sp.'

(2) {ŋu-pu-[(kér)$_{\Sigma}$ŋe]$_{\omega}$-[(púrʔ)$_{\Sigma}$-(na-ni)$_{\Sigma}$-(kkóro)$_{\Sigma}$]$_{\omega}$}$_{\varphi}$
1MIN-3AUG-body-know-see-IRR-PRS.NEG
'I don't know them.' (Baker 2008: 94, 226)

For Bininj Gun-wok, the primary sources (Bishop 2002a; Evans 2003) describe simple words as constituting a single, unbounded Σ with a single initial accent. Polysynthetic verbs gather several such Σ elements into a ω. The proposed 'Σ' labeling here is somewhat unconventional, in that the constituent has no maximal or default size, and simple words of whatever length are prosodified as a single constituent. I therefore propose an alternative labeling, in which the proposed feet (Σ) are instead treated as prosodic words (ω) (3a). With this labeling, Binij Gun-wok polysynthetic verbs encompass several ω elements (3b), as in Ngalakgan, but without the internal organization of syllables into feet.

(3) a. [djírrirdirdi]$_{\omega}$ *Bininj Gun-wok*
'sacred kingfisher'
b. {[bárri]$_{\omega}$-[dúlubu-ni]$_{\omega}$}$_{\varphi}$
3AUG>3MIN-hit.from.distance-PST.IPFV
'They were shooting (it).' (Evans 2003: 99–100)

Murrinhpatha has a quite different structure, with a single penultimate accent on the right-most ω in a phrase (4, 5). In the verb, all stem and pronominal elements integrate into a single prosodic word, though a substantial amount of inflectional and adverbial material is prosodically adjunct (6).

(4) {[kunungíngki]$_{\omega}$}$_{\varphi}$ *Murrinhpatha*
'small'

(5) {[kale]$_{\omega}$ [nukúnu]$_{\omega}$}$_{\varphi}$
mother his
'his mother'

(6) {[dani-ngan-ngku-mardá-wurr]$_{\omega}$-ngime-dini}$_{\varphi}$
pierce.3SG.PST-1PL.OBJ-PAUC-belly-heat-PAUC.F-sit.IPFV
'We (*pauc., fem.*) were feeling angry.' (Mansfield 2019: 93)

The rest of this chapter runs as follows: I provide more detailed expositions of verb structure and prosodic constituency in Ngalakgan (§13.2), Bininj Gun-wok

(§13.3), and Murrinhpatha (§13.4). In the discussion section I argue that northern Australian polysynthetic languages exhibit nuanced relationships between morphosyntactic dependency and prosodic constituency, but at the same time support a modest version of prosodic hierarchy theory where different languages may have different constituents (§13.5).

13.2 Ngalakgan

We begin with Ngalakgan, which has the most complex prosodic word structure of the three languages here considered. Ngalakgan is a Gunwinyguan language which unfortunately has all but ceased to be spoken (Baker 2008: 5). Ngalakgan words exhibit foot structure, diagnosed by multiple accentable syllables, even in morphologically simple words. Polysynthetic verbs prosodify as one or more prosodic words encompassed by a phonological phrase, thus giving three prosodic constituency levels in the verb: foot, word, and phrase. In the following exposition I also mention examples of Wubuy (also known as 'Nunggubuyu' (Heath 1984; Hore 1981)), a nearby language that shares many of the same morphosyntactic and prosodic characteristics.

13.2.1 Verb structure

The Ngakalgan verb is based on a stem with a (sometimes fused) TAM suffix, occasionally followed by a number suffix. Verb stems are a closed class of 32 lexemes, and do not always make a transparent semantic contribution to the verbal predicate (Baker 2008: 96). The base stem often compounds with a second 'coverb' stem, as described below. Coverbs, nominal, and adverbial incorporates appear to the left of the base, and prefixes at the left edge of the complex (7). One or two prefixes encode person/number agreement for human participants and noun class of non-human participants, as well as some TAM marking. Obligatory elements are underlined, and '$^{+}$' indicates a prefix class from which multiple elements may be present.

(7) *Ngalakgan macro verb structure*
Agr/TAM^{+} - Adverbial – Nominal – Coverb – Stem – TAM – Number

Examples:

(8) cu-ŋamulu-kerŋe-ŋa-na
2MIN-really-body-see-FUT
'You'll have to really look for an animal.'

(9) ŋu-pu-ʈic-ɳa-na-ppiraʔ
1MIN-3AUG-stare.at-see-FUT-DU
'I'll stare at those two.'

(10) ku-ku-piɲi-wuɾk
NPST-NEUT-water-swallow
'He swallows water.' (Baker 2008: 85, 125, 126)

Baker (2018) argues that Ngalakgan and Wubuy verb complexes have a mixture of grammatical word and phrase characteristics. Nominal incorporation is in some instances 'syntactic', i.e. where the incorporation is productive, semantically transparent, paraphrasable by free nominals, and available for modification by external determiners (11). These are properties more typical of phrase structure than word structure. Other instances of incorporation are more lexicalized, i.e. semantically non-compositional, and not paraphrasable with free nominals (12).

(11) ŋa-ni-ʟanar-wawajuwaa na-wulawaa *Wubuy*
1SG-3M-nail-cut.PST.CONT M.TOP-two
'I cut two [toe]nails.'

(12) a. ŋu-weʔ-naɻʔ-miɲ *Ngalakgan*
1SG-water-die-PST.PUNC
'I'm thirsty.'
b. *weʔ ŋu-naɻʔ-miɲ
water 1SG-die-PST.PUNC
Attempted: 'I'm thirsty.' (Baker 2018: 263)

13.2.2 Feet and pitch accents in nouns

Ngalakgan is analyzed as having Σ, ω, and φ constituents. Trochaic feet (Σ) anchor accents on their initial syllables, though as we will see below higher constituents also play a role (Baker 2008: 196ff.). Feet are exactly bimoraic, thus consisting of either one heavy syllable or two light syllables (13, 14). Syllable weight is added by most coda consonants, but not by glottal stops or the first segment of geminate stops or homorganic nasal-stop clusters (Baker 2008: 178). A heavy syllable may leave light syllables on either side of it unfooted (15). In words with three light syllables, foot formation (diagnosed by accent) is at the left edge (16).[1]

(13) $[(\text{kúru})_{\Sigma}(\text{cáʈu})_{\Sigma}]_{\omega}$ 'olive python'

(14) $[(\text{kúr})_{\Sigma}(\text{múʟuʔ})_{\Sigma}]_{\omega}$ 'bluetongue lizard'

(15) $[\text{pu}(\text{ʈól})_{\Sigma}\text{koʔ}]_{\omega}$ 'brolga'

[1] Some variant patterns for specific lexemes are also noted (Baker 2008: 82, 225).

(16) [(pícu)$_{\Sigma}$ʈu]$_{\omega}$ 'whirlwind' (Baker 2008: 71, 82, 179, 226)

Bimoraicity is also demonstrated by monosyllabic words, which undergo vowel lengthening if they are open CV syllables (17). Vowel length is not phonemically contrastive in Ngalakgan or in the other languages described in this chapter.

(17) a. [(ké)$_{\Sigma}$]$_{\omega}$ → [keː] 'man's child'
b. [(kéɾ)$_{\Sigma}$]$_{\omega}$ → [keɾ] 'kurrajong' (Baker 2008: 76–77)

Variation in pitch accents diagnoses prosodic words (ω), because accentuation is only obligatory on the first foot in ω, but is optional on subsequent feet (18). If there is a second accent in ω, it is upstepped from the first.[2] Where the second Σ is unaccented, it is unclear whether some form of stress is phonetically realized (Baker 2008: 83). Dual accentuation is reported to be more consistently present in Wubuy (19).

(18) [(kúru)$_{\Sigma}$(cáʈu)$_{\Sigma}$]$_{\omega}$ ~ [(kúru)$_{\Sigma}$(caʈu)$_{\Sigma}$]$_{\omega}$ *Ngalakgan*
'olive python' (Baker 2008: 82, 226)

(19) [(lhála)$_{\Sigma}$(wúlbulg)$_{\Sigma}$]$_{\omega}$ *Wubuy*
'ant sp.' (Hore 1981: 13)

13.2.3 Prosodic structure of verbs

In the verb, the main stem and TAM suffix are integrated into a single ω constituent, while prefixes are prosodic adjuncts governed directly by the φ constituent (Baker 2008: 133ff.). The independence of a stem as a ω constituent is evidenced both by accent placement and bimoraic lengthening (20). Additional stem elements may form separate ω constituents, or may be prosodically integrated with the base, essentially according to the degree of lexicalization (see §13.2.4 below) (21, 22). Multiple prosodic words in the verb can be diagnosed by multiple obligatory accents, as in (22).

(20) {ŋuruɳ-mu-[(ɳéː)$_{\Sigma}$]$_{\omega}$}$_{\varphi}$
1INCL.OBJ-VEG-burn.PRS
'It (the sun) burns us.'

(21) {ŋuruɳ-pu-pak-[(pólk)$_{\Sigma}$-(pu-n)$_{\Sigma}$]$_{\omega}$}$_{\varphi}$
1INCL.OBJ-3AUG-APPL-noise-hit-PRS
'They are making noise on us.'

[2] Note that Baker uses distinct diacritics for secondary and primary stress, e.g. kùrucáʈu, whereas I use the same diacritic marker for any pitch accent, e.g. kúrucáʈu.

(22) {ŋun-[(ŋ̲áriɲ̲)$_\Sigma$]$_\omega$-[(pé-ɲ̲)$_\Sigma$]$_\omega$}$_\varphi$
1MIN.OBJ-hand-bite-PST.PUNC
'It bit my hand.' (Baker 2008: 167, 172)

Segmental patterns have little or no role in diagnosing prosodic constituency in Ngalakgan. Morphological junctures in the verb mostly preserve their underlying forms – for example there is no place assimilation in /ŋariɲ-peɲ/ above (Baker 2008: 64). The only attested juncture alternations are place assimilation among distinct coronal consonants, and deletion of glide onsets – but these processes are variable among speech tokens, and it is not clear whether they are specific to verb-internal junctures, or whether they also occur at word boundaries within phrases. 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: 7).

Multiple ω constituents in the verb obligatorily produce multiple, upstepping pitch accents. Although this accent pattern may also be found in single ω constituents with multiple feet (as in (18) above), the multi-ω structure is distinguished because it has obligatory multiple accents (23), as opposed to simple words where there is also the option of a single initial accent (Baker 2008: 91, 149).

(23) {[Ø-(céɲ)$_\Sigma$]$_\omega$-[(má-ŋiɲ)$_\Sigma$]$_\omega$}$_\varphi$ *{[Ø-(céɲ)$_\Sigma$]$_\omega$-[(ma-ŋiɲ)$_\Sigma$]$_\omega$}$_\varphi$
3MIN-fish-get-PST.CONT
'(S)he was getting fish.'

In both Ngalakgan and Wubuy, multi-ω verbs may also involve internal pausing. Speakers sometimes insert pauses in careful speech, but only at morphological junctures that form ω boundaries, i.e. prefix-stem and some stem-stem junctures (Baker 2008: 110; Baker & Bundgaard-Nielsen 2016; Baker 2018: 268):

(24) [jíɾiŋ]$_\omega$… [piː]$_\omega$… [pak]$_\omega$… [wóc-ma]$_\omega$
1AUG.OBJ-… 3AUG-… APPL-… steal-get.PRES
'They always steal from us.' (Baker 2008: 110)

13.2.4 Lexicalization among multiple stems

Whether adjacent stems integrate into a single ω constituent depends on whether they form a lexicalized combination (Baker 2008; Baker and Harvey 2003; for Wubuy see Hore 1981: 50ff.). Thus syntactically incorporated stems are separate ω constituents, but lexicalized incorporation, especially of coverbs, is prosodically integrated. In (25, 26) the first stem is syntactically incorporated, and thus an independent ω, while the second and third stems form a lexicalized combination and are thus prosodically integrated.

(25) {ŋun-[(ŋéj)$_\Sigma$]$_\omega$-[(wí-ŋa-n)$_\Sigma$]$_\omega$}$_\varphi$
1MIN.OBJ-name-forget-see-PRS
'He's forgotten my name.'

(26) {pur-[(kúɳʈu)$_\Sigma$]$_\omega$-[(ŋéj)$_\Sigma$-(pu-n)$_\Sigma$]$_\omega$}$_\varphi$
3AUG-country-name-hit-PRA
'They name the country.'

The integrated combinations tend to be semantically opaque, and involve some coverbs that have no usage independent of the compound. By contrast, prosodically independent stems are usually semantically compositional (27). Loanword stems are of the compositional type (e.g. *awc* < house in 28). Prosodic integration in the verb thus neatly reflects different degrees of semantic and morphosyntactic dependence.

(27) {[Ø-(céɲ)$_\Sigma$]$_\omega$-[(má-ŋiɲ)$_\Sigma$]$_\omega$}$_\varphi$
3MIN-fish-get-PST.CONT
'(S)he was getting fish.'

(28) {[Ø-(áwc)$_\Sigma$]$_\omega$-[(jó-ŋon)$_\Sigma$]$_\omega$}$_\varphi$
3MIN-house-sleep-PRS
'(S)he is sleeping in the house.'
(Baker and Harvey 2003: 4, 9; Baker 2008: 103)

13.2.5 Accent placement and phonological phrases

We saw above that longer ω constituents may host one or more accents, at least in simple nouns. But within complex verbs, it is only the final ω constituent that hosts multiple accents (29, 30).[3] Non-final ω constituents have initial accents only, even if they are long enough to have multiple feet (31).

(29) {cu-[(ŋámu)$_\Sigma$lu]$_\omega$-[(kérŋe)$_\Sigma$-(ŋá-na)$_\Sigma$]$_\omega$}$_\varphi$
2MIN-really-body-see-FUT
'You'll have to find that animal properly.'

(30) {ŋu-pu-[(kérŋe)$_\Sigma$]$_\omega$-[(púrʔ)$_\Sigma$-(na-ni)$_\Sigma$-(kkóɾo)$_\Sigma$]$_\omega$}$_\varphi$
1MIN-3A-body-know-see-IRR-PRS.NEG
'I don't know them.'

(31) {ku-[(káma)$_\Sigma$la]$_\omega$-[(kára)$_\Sigma$(kkaɾa)$_\Sigma$]$_\omega$-[(cáŋ-an)$_\Sigma$]$_\omega$}$_\varphi$
NPST-cloud/sky-together-stand-PRS
'Daylight breaks out.' (Baker 2008: 94)

[3] Example (30) also shows an additional TAM suffix, which varies between prosodic integration into the main stem ω (as in (30)), and independence as an additional ω constituent (not shown).

Baker (2008: 91ff.) interprets these examples as the outcome of constraints that place accents (a) on ω-initial feet; (b) on φ-final feet. This also explains why the foot (na-ni)$_{\Sigma}$ in (30) is not accented. The φ-final foot accent may also explain the variable single/dual accentuation on long nouns as in *kúrucáʈu ~ kúrucaʈu* (18 above), if we assume that the dual-accent version represents pronunciation as a complete phonological phrase.

But if the placement of accents in Ngalakgan is determined by ω and φ edges, this raises the question of whether accentuation can be explained purely with reference to ω and φ constituents, i.e. without metrical feet. As mentioned above, it is not clear whether the posited foot constituents exhibit any other form of prominence when they are not accented. Neither are they reported to determine segmental distributions as in some other metrical structures (Hyman 2014).

A footless alternative analysis would posit accentual placement on ω-initial and φ-penultimate syllables, rather than feet (32). A crucial assumption of this approach is that penultimate accent placement does *not* imply a trochaic foot. Rather, accent at a distance of one syllable from the edge can be independently explained by tone-crowding phenomena, e.g. the need for the penultimate H* accent to give space for an φ-final Low tone (Gordon 2014; see also Gordon, this volume).

(32) {ŋu-pu-[kérŋe]$_{\omega}$-[púrʔ-na-ni-kkóro]$_{\omega}$}$_{\varphi}$ (= 30)
1MIN-3AUG-body-know-see-IRR-PRS.NEG
'I don't know them.'

One challenge for a footless analysis is the weight-sensitivity of accents. As shown above (§13.2.2), accents may be non-ω-initial when the second syllable is heavy (33). The possibility of adjacent accents also depends on syllable weight: a light penult is not accentable when it is adjacent to a light initial syllable (34a), but if the initial syllable is heavy then accentual clash is permitted (34b). But while syllable weight is most typically associated with metrical structure, there are other languages such as Chickasaw in which phrasal accentuation has been shown to be weight-sensitive (Gordon 2003; Gordon 2014; Gordon and Martin, this volume).

(33) [pu.ʈól.koʔ] 'brolga'

(34) a. [pí.cu.ʈu] 'whirlwind'
b. [kúr.mú.ɭuʔ] 'bluetongue lizard' (= 14–16)

In Ngalakgan there may be other sources of evidence for foot structure, for example if stress can be demonstrated on unaccented feet. Without further data, and without undertaking a more comprehensive survey of Ngalakgan phonology, it is beyond the scope of this chapter to further pursue a footless analysis. In the discussion section below, I return to the issue of parsimony in positing levels of prosodic constituency.

13.3 Bininj Gun-wok

Bininj Gun-wok (BGW) is a Gunwinyguan dialect cluster extending over a considerable geographic area, with Kunwinjku and Mayali being the dialects most widely mentioned in linguistic literature (e.g. Oates 1964; Carroll 1976; Evans 1997; Fletcher & Evans 2000). BGW has about two thousand speakers, including some who use it as a lingua franca, and is still learned by children as L1 (Evans 2003: 6). In the discussion below I will also make some reference to Dalabon, which is closely related and formally similar to BGW, though it is distinct enough to be considered a separate language (Evans 2003: 36).

The prosodic structure of verbs in BGW and Dalabon is somewhat similar to Ngalagkan, though in BGW the presence of pitch accents on ω-initial syllables is more optional, apparently depending on higher-level intonation structure.

13.3.1 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 macro-structure of the BGW verb is as in (35) (for a more detailed template see Evans 2003: 318). Obligatory elements are underlined, while '+' indicates incorporated stems that are iterable.

(35) *Bininj Gun-wok macro verb structure*
Subj - Obj. - Adverbial^{+} - BEN - Nominal^{+} - COM - Verb.stem - TAM

A substantial proportion of verb tokens have at least one adverbial and/or nominal incorporated (36, 37). Less frequently, verbs incorporate multiple nominals and/or adverbials (38).

(36) ngarri-bolk-ngeibu-n
1AUG>3-place-call-NPST
'We call that place…'

(37) djama ga-bangmi-ngu-n
NEG 3-not.yet-eat-NPST
'He doesn't eat it yet.'

(38) bani-weleng-bepbe-marne-yaw-dulubu-rr-iny
3UA.P-then-each-BEN-child-spear-RECP-PST.PFV
'Then the two of them speared each other over (the death of) the child.'
(Evans 2003: 321, 709, 711)

As in Ngalakgan, stem compounding may be more or less lexicalized, 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, i.e. can be paraphrased with a phrasal form (39). But *bo-ngun* 'liquid-eat' is lexicalized, with the root *bo* 'liquid' appearing only in compounds. The closest free word simile is *gukku* 'water', but the 'liquid-eat' compound cannot be paraphrased using this (or any other) external noun (40).

(39) a. nga-ganj-ngun
1-meat-eat.NPST
'I eat the meat.'
b. nga-ngun gun-ganj
1-eat.NPST NC:IV-meat
'I eat the meat.'

(40) a. nga-bo-ngun
1-liquid-eat.NPST
'I drink the water.'
b. *nga-ngun gukku
1-eat.NPST water
Attempted: 'I drink the water.' (Evans 2003: 324)

Verbs may simultaneously host both a lexicalized compound and syntactic incorporation. In each of the following examples, the verb stem is in a lexicalized compound with the adjacent nominal (i.e. cannot be paraphrased), while further nominals are syntactically incorporated (i.e. can be paraphrased):

(41) an-barnadja ngarri-mim-bo-wo-ni
NC:III-owenia.vernicosa 1A-fruit-liquid-put-PST.IPFV
'We used to put owenia vernicosa in the water.'

(42) namarnde ba-yaw-guk-girri-bo-m
devil 3>3-baby-body-ground.oven-hit-PST.PFV
'The devil cooked the baby's body in the ground oven.'
(Evans 2003: 324, 328)

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 the borrowed coverb *album* (< Kriol *helbam* 'help'):

(43) ya-h-album-hm-urrun-iyan *Dalabon*
1INCL.DU-RECP-help-VBLZR-RECP-FUT
'Me and you will help each other.' (Maïa Ponsonnet, p.c.)

Like Ngalakgan, the BGW verb complex exhibits a mixture of word-like and phrase-like characteristics. Verb morphology has a generally fixed order, though

some adverbial and valency prefixes have flexible ordering (Evans 2003: 321–322). 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.

13.3.2 Prosodic constituency

BGW verbs have been described as having prosodic foot, word and phrase constituents (Σ, ω, φ) (Bishop 2002a; Evans 2003). However, the element labeled 'Σ' in these sources is quite unlike conventional metrical feet, in that it can contain any number of syllables, and it encompasses simple words of any length. Since this element is the default prosodification of simple words (e.g. nouns), I instead label it as a prosodic word 'ω'. The primary sources acknowledge that the distinction between their ω, φ constituents is rather unclear (see below), and I merge these two into a single φ level. My revised analysis therefore has just ω, φ constituents in the verb. Below I discuss consequences of replacing the three-level hierarchy (Σ, ω, φ) with two levels (ω, φ).

Previous BGW research also describes an Intonational Phrase (IP) unit (Bishop 2002a; Fletcher and Evans 2002), which is only briefly mentioned below.

The BGW ω constituent (i.e. Σ in Bishop and Evans) may host a H* pitch accent on its initial syllable, though this is variable and appears to depend on phrase-level factors (see §13.3.3 below) (Bishop 2002a; Fletcher and Evans 2002).[4] Simple words of any length are only accentable on the first syllable (Bishop 2002a: 124; Evans 2003: 99):

(44) [dáluk]$_{\omega}$
'woman'

(45) [djálamardawk]$_{\omega}$
'bush passionfruit' (Bishop 2002a: 124)

In polysynthetic verbs, ω constituents are built by the verb-TAM base, prefixes, and by stem elements that fall in between. One or more of these ω have initial accents:

(46) {[barri]$_{\omega}$-[dúlubu-ni]$_{\omega}$}$_{\varphi}$
3AUG>3-hit.from.distance-PST.IPFV
'They were shooting (it).' (Evans 2003: 99–100)

[4] Baker (2008: 181) argues that the Kuninjku dialect of BGW has weight-sensitive stress, rather than the fixed initial stress as in Bishop and Evans. Further research is required to resolve this discrepancy.

(47) {[bírri]$_{\omega}$-[káyhmeng]$_{\omega}$}$_{\varphi}$
3AUG-call.out.PP
'They called out.'

(48) {Ø-[ráwoyh]$_{\omega}$-[rdúrddu]$_{\omega}$-[dádjeng]$_{\omega}$}$_{\varphi}$
3-again-heart-cut.into.pieces.PST.PFV
'They cut his heart into pieces.' (Bishop 2002a: 150, 237)

The ω constituent is also indicated by bimoraic minimal weight, which can reveal ω constituency in complex verbs (Evans 2003: 74). As in Ngalakgan, open monosyllabic (CV) roots exhibit phonetic lengthening. Syntactically incorporated roots exhibit lengthening indicative of independent ω constituency (49a), while lexicalized combinations do not (49b). The prosodic integration of roots in Gunwinyguan languages forms an interesting comparison with 'prosodic fusion' in Circassian languages (Gordon and Applebaum, this volume). In Circassian languages such as Kabardian, integration serves a regular prosodic function of avoiding monomoraic prosodic words, irrespective of lexicalization. In Gunwinyguan languages, by contrast, light-syllable roots regularly undergo vowel lengthening to fulfill prosodic word requirements (49a), while prosodic integration occurs only where there is semantic integration as in (49b).

(49) a. {ga-[boː]$_{\omega}$-[yoː]$_{\omega}$}$_{\varphi}$
3-liquid-lie
'There is water.'
b. {nga-[bo-ngun]$_{\omega}$}$_{\varphi}$
1-liquid-eat.NPST
'I drink the water.'

Evans (2003: 101) claims that light monosyllabic (CV) prefixes have the same level of prosodic constituency as stems, while Bishop (2002a: 133), proposes that they are either adjuncts, or prosodically integrated with the following stem. But lengthening is not attested in CV prefixes, which favors Bishop's analysis.

Figure 13.1 illustrates the pitch trace for a single-accent verb. The ω-initial syllable is analyzed as the phonological anchor for the accent, though the actual phonetic pitch peak varies freely between first and second syllables (Bishop 2002a: 255). This 'late rise' intonation phenomenon is attested in other Australian languages (e.g. Kayardilid: Round 2009: 318). Figure 13.2 illustrates the pitch trace of a double-accent verb.

When ω-initial syllables do not attract an accent, they 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 is only significant for the /a/ vowel (Bishop 2002a: 226–233; Bishop 2002b). Thus the

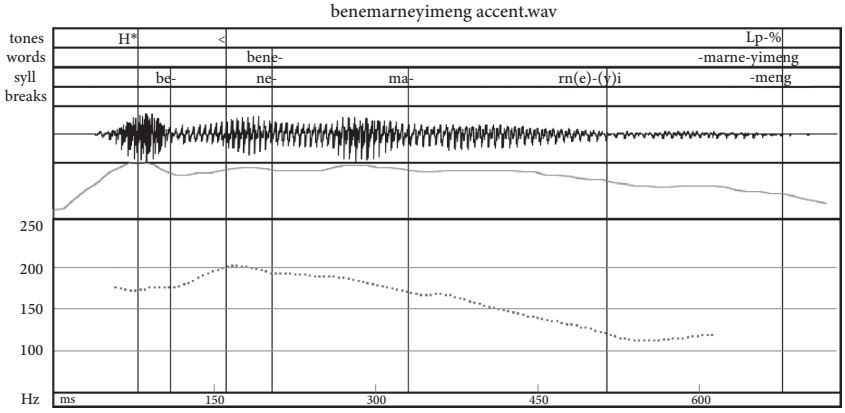

Figure 13.1 BGW single-accent verb (Bishop 2002a, p. 149). All BGW images are courtesy of Judith Bishop. The dotted line represents pitch, and the solid line intensity.

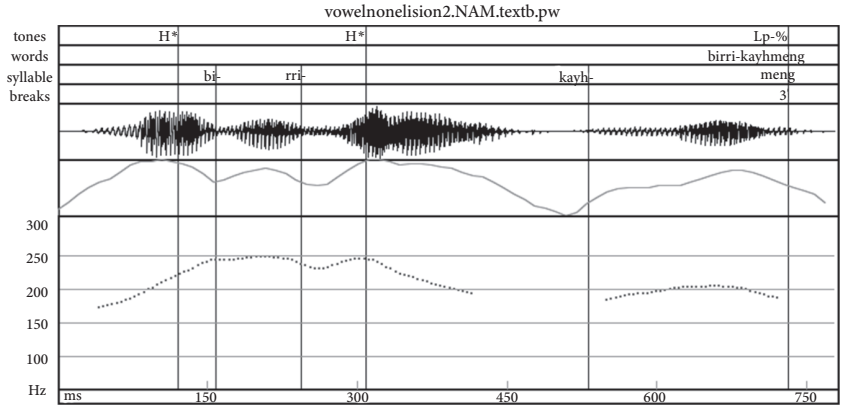

Figure 13.2 BGW double-accented verb (Bishop 2002a: 237).

phonetic prominences in BGW are more like intonational accents than classic 'word stress' (Beckman 1986). On the other hand, spectral tilt was not examined, nor were ω-initial but unaccented syllables compared to non-initial syllables.

There is, however, another variably-realized indicator of prosodic strength in ω-initial syllables (Bishop 2002a: 234; Evans 2003: 114). Vowels in non-initial syllables may be deleted (50, 51), while deletion is unattested in ω-initial syllables. Deletion patterns in some languages provide evidence for metrical structure (e.g. Yankunytjatjara: Goddard 1985: 14), however the description of vowel deletion in BGW only identifies non-initial syllables as targets for deletion, without providing more specific patterns that might diagnose prosodic constituency.

(50) [ngúrru̲du]$_{\omega}$ → [ŋúɾ_du]
'emu' (Fletcher and Evans 2002: 125)

(51) {[birri̲]-[dówe-rr-inj]$_{\omega}$}$_{\varphi}$ → [biɾ_dóweriɲ]
3AUG-die-REFL-PST.PFV
'They died.' (Bishop 2002a: 235)

13.3.3 Accent placement

The interaction between prosodic words and accentual placement in BGW is complex and variable (Bishop 2002b). The right-most ω commonly attracts accent placement (52). On the other hand, final syllables are not accentable, presumably because they host a L- phrasal tone (see §13.3.4 below). This can result in prosodic integration of a monosyllabic stem with an agreement prefix (53) (Bishop 2002a: 131).

(52) {[garri]$_{\omega}$-[dúrnde-ng]$_{\omega}$}$_{\varphi}$
1INCL.AUG-return-NPST
'We return.'

(53) {[bí-na-ng]$_{\omega}$}$_{\varphi}$
3>3-see-PST.PFV
'(S)he saw him/her.' (Evans 2003: 99, 102)

Verbs may have multiple accents, though there is a tendency to avoid adjacent (clashing) accents. Clash can be avoided by simply leaving a stem unaccented (54), or by prosodically integrating the stem with a monosyllabic prefix (55).

(54) {[ngárri]$_{\omega}$-[yawh]$_{\omega}$-[máknan]$_{\omega}$}$_{\varphi}$
1AUG-again-take.a.look.NPST
We'll try looking at one more place.'

(55) {[ná-djal]$_{\omega}$-[yáhwurdurd]$_{\omega}$}$_{\varphi}$
M-just-small.one
'The smallest one.' (Bishop 2002: 134, 147)

As in Ngalakgan, syllable weight plays a role in the resolution of accentual clash. Where all syllables are open (i.e. light), a potential prefix-stem clash may be resolved by either prefix adjunction or integration (56). But when two heavy syllables clash, adjacent accents may be tolerated (57), and when a heavy penult is adjacent to an open prefix, the prefix is always adjunct (58) (Evans 2003: 104). There are also a few verb stems reported to have exceptional, lexically defined accent placement (Evans 2003: 102).

(56) {nga-[yáwa-n]$_{\omega}$}$_{\varphi}$ ~ {[ngá-yawa-n]$_{\omega}$}$_{\varphi}$
1SG-search-NPST
'I am looking for her/him.'

(57) {[kán]$_{\omega}$-[wéybu]$_{\omega}$}$_{\varphi}$
2>1-give.IMP
'Give it to me!'

(58) {nga-[djóbge-ng]$_{\omega}$}$_{\varphi}$ *{[ngá-djobge-ng]$_{\omega}$}$_{\varphi}$
1SG-cut-PST
'I cut it.' (Bishop 2002: 143; Evans 2003: 104)

Despite the general patterns described above, accent placement is not fully predictable from word structure and syllable weight: different tokens of the same word may exhibit different accentuation, as in (56) above. Pitch accent placement may also depend on how the verb fits into higher-level intonational phrases, or on pragmatic factors such as topic and focus (Bishop 2002a: 162, 181; Evans 2003: 104). Some of the attested variations involve double-accentuation on a word that constitutes its own IP (59a), compared to the same wordform receiving just a single accent when it shares an IP with another accented word (59b). One possible explanation for this would be a preference for more than one accent in the IP constituent (cf. Selkirk, 2000), though this preference can only be met where the IP contains multiple ω constituents. This receives some support from the intonational descriptions of BGW and Dalabon, both of which are noted as commonly including accents near the beginning and end of the IP (Bishop 2002a; Fletcher and Evans 2002).

(59) a. {{[ngál]$_{\omega}$-[dah]$_{\omega}$-[dáluk]$_{\omega}$}$_{\varphi}$ }$_{\text{IP}}$
F-REDUP-woman
'The women.'
b. {{[ngal]-[dáh]$_{\omega}$-[daluk]$_{\omega}$}$_{\varphi}$ {[námekke]$_{\omega}$}$_{\varphi}$ }$_{\text{IP}}$
F-REDUP-woman DEM
'Those women.' (Bishop 2002: 153, 154)

In many theories of prosodic prominence, strong syllables are assumed to be fairly ridigly determined on the word level (e.g. Hayes 1995). From this perspective, BGW verbal accent may seem typologically unusual due to the variability of accent placement. On the other hand, if we view the BGW verb as a tightly bound syntactic phrase, rather than a word, then variable accent placement becomes more expected, as phrase-level accentual placement is highly sensitive to semantic focus, phrase edge proximity and avoidance of accentual clash (Shattuck-Hufnagel et al. 1994; Gussenhoven 2011).

13.3.4 The verb as a phonological phrase

The BGW phonological phrase (φ) constituent is marked by a Low (L-) boundary tone at its right edge (Bishop 2002a: 336). By this criterion, most content words (i.e. verbs, but also nouns and adjectives) are complete φ constituents:[5]

(60) {{[mán]$_{\omega}$-[korle]$_{\omega\ \text{L-}}$}$_{\varphi}$ {[béne]-[karrmeng]$_{\omega\ \text{L-}}$}$_{\varphi}$ {[bónj]$_{\omega\ \text{L-}}$}$_{\varphi}$ }$_{\text{IP}}$
CLF:III-spear 3UA.P-take.PST.PFV that's.it
'The two of them had spears, then they were ready.' (Bishop 2002: 354)

The φ analysis of verbs is supported by multiple accents in the verb, but also receives some support from pausing. As with Ngalakgan and Wubuy, speakers of BGW and Dalabon may pause within the verb complex, though this is more common in Dalabon (Evans 2003: 329; Evans et al. 2008). Evans and colleagues (2008) adduce pausing and other evidence to propose that the Dalabon verb consists of multiple prosodic words.

For BGW, however, both Evans and Bishop analyse an additional prosodic level between verb stems and the phrase. In their labeling this is the 'ω' constituent that encompasses the verb, as in {[(bene)$_{\Sigma}$-(karrmeng)$_{\Sigma}$]$_{\omega}$}$_{\varphi}$. But with stems identified as ω constituents, the whole-verb constituent could perhaps be analyzed as higher prosodic word level, an intermediate constituent such as the 'composite group' (Vogel 2009), or a recursive prosodic word (Peperkamp 1996). To justify this extra prosodic level, there should be phonological phenomena that distinguish polysynthetic verbs from multi-word phrases. Evans (2003: 105–106) reports that complex verbs are not strongly distinguishable from phrases, though he ultimately does propose such a distinction.

The main phenomena Evans proposes as diagnostic of a whole-verb prosodic word are heterosyllabic cluster effects, and intervocalic apical flapping. The cluster effects involve onset /ɻ/-deletion, and place assimilation among coronals (61, 62). These effects are described as 'sporadic', depending on speech rate (Evans 2003: 110–111). However, it is not clear whether these effects are limited to verb-internal clusters, or whether they also occur at word boundaries within phrases.

(61) barri-djal̠-rey → barridjal̠ey

(62) ga-ganj-nudman → gaganjnjudmen (Evans 2003: 110–111)

Apical flapping affects stem-initial, intervocalic /d/ in some words, including complex verbs (63). Evans (2003: 108) notes that its occurrence is to some degree specific to certain lexical constructions – i.e. some words flap and others don't,

[5] There are also some multi-word sequences that integrate into a single φ constituent. The first word in such sequences is usually a demonstrative, adverb, or pronoun, though there are also a couple of examples of prosodically integrated verb-verb sequences (Bishop 2002: 389ff.).

and there is no obvious prosodic motivation for these differences (64). Flapping is therefore more directly determined by lexical representations than prosodic constituency (cf. Schiering et al. 2010; Hildebrandt 2015).

(63) nga-danginj → ngarranginj
1-stand.PST.PFV
'I stood.'

(64) a. ga-bili-dowen → gabilirrowen
3-flame-die.NPST
'The flames are dying.'
b. garri-dowen → garridowen
1INCL.AUG-die.NPST
'We (incl.) are dying.' (Evans 2003: 107–108)

Neither cluster reductions nor apical flapping provide conclusive arguments for an extra prosodic level between verb stems and the phrase. Cluster reduction appears to be a phonetic variable and it is not clear whether it is restricted to verb-internal clusters, or whether it occurs at any consonant juncture formed in connected speech. Apical flapping, on the other hand, is determined by specific lexical constructions, rather than directly by prosody. More robust segmental evidence would be found in distributional patterns that occur consistently in the verb complex, but not in multi-word phrases. BGW does show some consistent constraints on segmental distribution, in particular the word-internal distribution of long obstruents and the phonemic tap/trill (Evans 2003: 81, 89; Stoakes 2013: 22). But in polysynthetic verbs these segments seem to occur only at ω-internal positions, thus negating the requirement for a higher prosodic word level encompasssing the whole verb.

13.4 Murrinhpatha

Murrinhpatha is a Southern Daly language spoken by some 3,000 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, both morphosyntactic and prosodic. The Murrinhpatha verb is a phonological phrase (φ) with just a single ω daughter, though some suffixes are adjunct syllables, i.e. outside the ω constituent. Accent placement is much simpler in Murrinhpatha: each φ constituent has exactly one H* accent, predictably positioned on the penultimate syllable of the right-most ω in the phrase.

13.4.1 Verb structure

The Murrinhpatha verb consists minimally of a finite verb stem, which encodes lexical semantics as well as subject agreement 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 morpheme (Mansfield & Nordlinger 2020). The finite stem is the base for more complex verbs with nominal and coverb compounding, and suffixation of additional pronominal agreement, number and TAM features (for further details see Nordlinger 2010; Mansfield 2019). The macro-structure of the verb is as in (65).

(65) *Murrinhpatha macro verb structure*
Finite.Stem - Agr - Nom - Coverb - TAM - Adv - Num - IPFV

The following examples show verbs with a finite stem and varying degrees of suffixation:

(66) pumam
say.3PL.NFUT
'They said.'

(67) pumam-nga
say.3PL.NFUT-1SG.OBL
'They said to me.'

(68) pume-nga-dha-neme-pardi
say.3PAUC.PST-1SG.OBL-PST-PAUC.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 et al. 2007; Mansfield 2016a). Most verbs are formed by combining the finite stem with a coverb, which is a much larger class, and in some cases also with a body-part nominal:

(69) thunu-lili
travel.2SG.IRR-walk
'(You) walk!'

(70) mem-ni-ngka-purl
use.hands.REFL.NFUT-REFL-face-wash
'I washed my face.'

Adverbials are identified as clitics because elsewhere (e.g. in NPs) they attach at the phrase edge. In verbs, however, they may appear between affix elements (cf. Spencer and Luis 2012):

(71) parde-lili-dha=matha-ngime
be.3PAUC.PST-walk-PST=just-PAUC.F
'They were just walking along.'

The lexical portion of the Murrinhpatha verb, i.e. the nexus of finite stem, coverb and body-part nominal, 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 and body-part nominals, which only appear in verbal compounds. Unlike Gunwinyguan verbs, the Murrinhpatha verb is generally closed to borrowed stems.[6] Furthermore, many 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' (72). Mutual dependence is also found, for example between the finite stem *bim* 'hear' and compound coverb *the-pup* 'ear-sit', both of which appear only in a compound meaning 'hear, listen' (73). Although the finite stem and coverb are, as in Ngalakgan, often mutually dependent, in Murrinhpatha they are not always adjacent, as pronominal agreement and some number suffixes may appear in between. The semantics of stem–bodypart–coverb compounding is often non-compositional, and although 'syntactic', productive incorporation does occur (as in (70) above), most complex verbs are to some degree lexicalized.

(72) bam-ngkardu
affect.1SG.NFUT-see
'I see (it).'

(73) bim-mpa-the-pup
hear.1SG.NFUT-2SG.OBL-ear-sit
'I heard you.'

Adverbial clitics and some inflectional suffixes are more ambiguous as to whether they belong to a verbal 'word' or 'phrase'. As mentioned above, adverbials are not always attached to verbs, but instead may occur in other phrasal constructions. Furthermore, the entire string encompassing TAM suffix, adverbials, imperfective, and some number suffixes is phrase-like in that it exhibits variable sequencing of elements without any change of meaning (cf. Bickel et al. 2007):

(74) a. purne-lili-dha-nime
go.3PAUC.PST-walk-PST-PAUC.M
'They were walking.'
b. purne-lili-nime-dha
go.3PAUC.PST-walk-PAUC.M-PST
'They were walking.'

[6] There is a single known exception to this, the borrowing *thigan* 'shake hands' (perhaps via Kriol *tjigan*), compounded as *mam-be-thigan* 'do.3SG.NFUT-arm-shake.hand' (Mansfield 2016b: 404).

(75) a. punnu-wun-ngku-birr-nu-nintha
feet.3PL.FUT-3PL.OBJ-PAUC.OBJ-spear-FUT-DU.M
'They will spear the two of them.'
b. pani-wurra-thurrk-nintha-nu
be.3SG.FUT-3PAUC.OBL-dive-DU.M-FUT
'He will dive in for the two of them,'

(Mansfield 2019: 160)

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 lexicalization versus productivity. Murrinhpatha verbs also exhibit more fusional morphology: whereas Gunwinyguan verb stems fuse to some extent with TAM suffixes, the Murrinhpaha verb stem is deeply fused with historical TAM suffixes and subject agreement prefixes (Mansfield and Nordlinger 2020).

13.4.2 Prosodic structure of the verb

The Murrinhpatha verb has just a single ω constituent, primarily identified by penultimate accent placement (see below). But ω does not encompass the whole verb. Inflectional suffixes are divided into prosodically integrated and adjunct elements (in a similar way to Circassian suffixes, see Gordon and Applebaum, this volume). Agreement suffixes marking object, oblique and reflexive are integrated, while TAM suffixes are adjunct (76). Adverbial clitics are prosodic adjuncts (77). Coverbs are prosodically internal, and their placement is most succinctly defined as the position to the right of all internal suffixes, and to the left of all adjunct affixes (78) (Mansfield 2017).

(76) {[pumé-nga]$_{\omega}$-dha}$_{\varphi}$
say.3PL.PST-1SG.OBL-PST
'They (*pl.*) said to me.'

(77) {[nungam-rtí-dharl]$_{\omega}$=warda=kathu-wurran}$_{\varphi}$
use.feet.3SG.NFUT-bottom-open=now=from-GO.IPFV
'Now he's slipping as he comes.'

(78) {[me-ngintha-nú-purl]$_{\omega}$-nu}$_{\varphi}$
use.hands.RR.3SG.IRR-DU.F-REFL-wash-FUT
'The two of them will wash themselves.'

Number marking involves both multiple and distributed exponence, with pronominal agreement marking more general number categories, and suffixes

adding further specification. Number suffixes are prosodically integrated when they are adjacent to the pronominal element they co-index (79a, first paucal marker in 79c), but adjunct when they are not adjacent (79b, second paucal marker in 79c).

(79) a. {[mam-ngintha]$_{\omega}$}$_{\varphi}$
say.3SG.NFUT-DU.F
'Two women said it.'
b. {[pumam-nga]$_{\omega}$-ngintha}$_{\varphi}$
say.3PL.NFUT-1SG.OBL-DU.F
'Two women said it to me.'
c. {[mam-wi-rru]$_{\omega}$-ngime}$_{\varphi}$
say.3SG.NFUT-3PL.OBJ-PAUC.OBJ-PAUC.F
'(S)he said to them (*pauc., fem*).'

13.4.3 Phonological diagnostics of the prosodic word

Murrinhpatha has prosodic word and phrase constituents (ω, φ), but no clear evidence has been adduced for a foot level beneath these two (Mansfield 2019: 87ff.).[7] Though there is no phonetic research on the question, I have not observed any systematic differences in pitch, duration, intensity, or vowel quality that might support the identification of stressed syllables, other than the anchoring of the H* pitch accent on the ω-penultimate syllable. As argued for Ngalakgan above, penultimate accentual placement does not in itself imply a trochaic foot, as the same effect can be explained by tone-crowding phenomena – i.e. the need to make space for a Low tone on ω-final syllable (Gordon 2014).

Penultimate prominence is consistently present on words spoken in isolation, but it appears only on the final word of configurational phrases, such as NPs or PPs (80, 81) (Mansfield 2019: 87). Thus, it is a phrase-level accent, though it also depends on word structure because its placement is determined by the right edge of a ω constituent (see below). This makes the prominence system of Murrinhpatha rather like that of French (Jun and Fougeron 2002), with predictable phrasal accents and no 'word stress' of the canonical type, though prosodic words still play a role.

(80) {[kale]$_{\omega}$ [nukúnu]$_{\omega}$}$_{\varphi}$
mother 3SG.M
'His mother.'

[7] Earlier accounts of Murrinhpatha posit secondary stress (Clemens 2013; Street and Mollinjin 1981; Walsh 1976), though without any details on proposed phonetic correlates or native-speaker perceptions. Interestingly, the three accounts differ significantly in their proposed locations for secondary stress (Mansfield 2019: 97; cf. de Lacy 2014).

(81) {[ngarra]$_{\omega}$ [tjalput]$_{\omega}$ [nhínhi]$_{\omega}$}$_{\varphi}$
LOC house 2SG
'At your house.'

In most cases the φ constituent comprises just a single content word, though this may host a noun classifier prefix and several suffixes or enclitics, thus producing long strings of non-prominent syllables:

(82) {da-[tjálput]$_{\omega}$=dhangunu}$_{\varphi}$
NC:PLACE-house=SOURCE
'From the house.'

(83) {[pumé-nga]$_{\omega}$-dha-neme-pardi}$_{\varphi}$
say.3PAUC.PST-1SG.OBL-PST-PAUC.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 13.3 illustrates the single pitch peak in a polysynthetic verb; Figure 13.4 illustrates the same for a two-word NP.

The Murrinhpatha ω constituent is also indicated, as in the Gunwinyguan languages, by bimoraic minimal weight. Where ω consists of a single CV syllable, the vowel is lengthened to provide a second mora, and the usually penultimate accent is hosted on the single long syllable (84). Lengthening provides another diagnostic for identifying the boundary of the ω constituent in verbs (85). In multiword phrases, lengthening indicates that non-rightmost content words do have

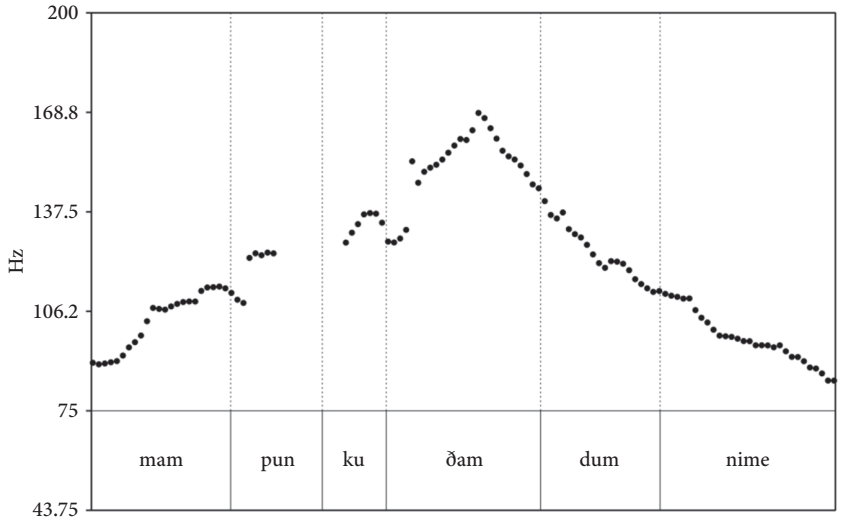

Figure 13.3 Pitch trace illustrating single accent in a polysynthetic verb.

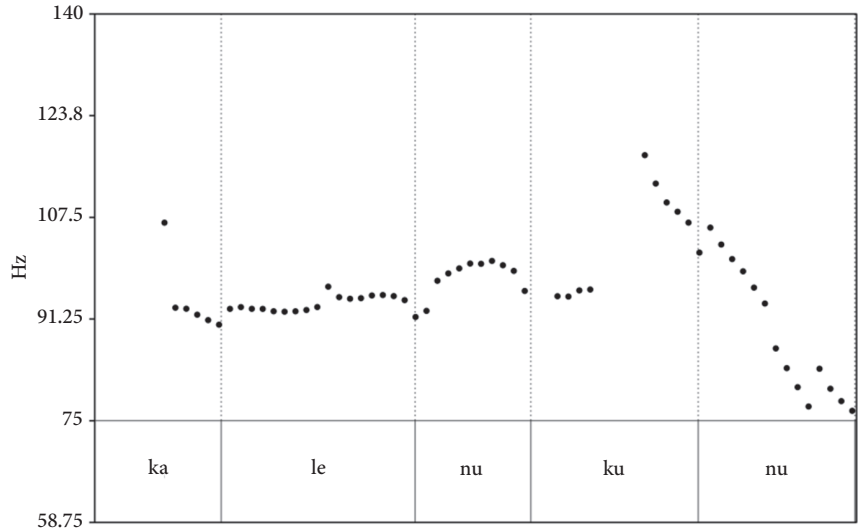

Figure 13.4 Pitch trace for a two-word phrase with a single pitch accent.

ω-constituency, i.e. φ may contain multiple ω daughters, though only the final ω is accented (86).

(84) {ku-[báː]$_{ω}$}$_{φ}$
NC:ANIM-blowfly
'blowfly'

(85) {[náː]$_{ω}$-dha-dini}$_{φ}$
travel.3SG.PST-PST-SIT.IPFV
'(S)he was traveling along.'

(86) {[theː]$_{ω}$ [wíye]$_{ω}$}$_{φ}$
ear sore
'sore ear' (Mansfield 2019: 86, 93, 173)

The ω constituent is also associated with consonant cluster assimilations and reductions, which are much more extensive in Murrinhpatha than in Ngalakgan or BGW (Mansfield 2019: 98ff.). These juncture effects are lexically specific, i.e. their outcomes cannot be predicted purely by phonological rules. A segmental process may apply in one word (87a, 88a), but fail to apply in another word with the same phonological environment, and the same morphosyntactic structure (87b, 88b). These juncture effects result in compound forms that conform to segmental restrictions observable in the lexicon of simple words (e.g. /np/ is in simple words, but not */nw/). But we cannot attribute juncture effects directly

to ω prosodification, since they are not absolute constraints but rather lexically determined.

(87) a. {[pán-werr]$_{\omega}$}$_{\varphi}$ → pánperr
pierce.3SG.NFUT-tremble
'(The engine) hums.'
b. {[wurdán-wi]$_{\omega}$}$_{\varphi}$ → wurdánwi
impel.3SG.NFUT-inflate
'(S)he smokes.'

(88) a. {[buni-wún-bat]$_{\omega}$-dha}$_{\varphi}$ → bunínbattha
descend.3SG.PST-3PL.OBJ-fall-PST
'(S)he made them fall.'
b. {[puní-wurr]$_{\omega}$-dha}$_{\varphi}$ → puníwurrdha
slash.3SG.PST-measure-PST
'(S)he measured it.'

Unpredictable juncture effects contribute to a high degree of morpho-phonological 'opacity' in the Murrinhpatha ω domain: given the segmental surface string of a verb, there is considerable complexity involved in identifying the morphological components. Furthermore, Murrinhpatha does not have the multiple prominences that signal stem components in Gunwinyguan languages. These forms or morpho-phonological opacity may contribute to the high degree of lexicalization in the Murrinhpatha verb.

13.5 Discussion

Polysynthetic verbs have mixed characteristics of grammatical words and phrases. Like phrases, they may contain multiple lexical stems and pronominal arguments, encoding all the information normally associated with a sentence. In Bininj Gunwok and Ngalakgan, careful pronounciation may insert pauses between stem elements. In Murrinhpatha, adverbial clitics may be inserted between the stem and inflectional suffixes. And in both Murrinhpatha, and to a lesser extent Bininj Gunwok, some elements show flexible ordering. On the other hand, in all three languages the polysynthetic verb is a tightly bound unit, and thus word-like, because many of its grammatical and lexical elements cannot appear outside the verb structure. The verbs also show high degrees of lexicalization (non-compositionality, non-productivity), more typical of complex words than phrases.

Prosodic hierarchy theory is perhaps demonstrated most directly with clearly distinguished words vs phrases, but in this chapter I have shown that its application to polysynthetic verbs is also revealing. The languages examined also have canonical word units, e.g. simple nouns, and these exhibit convergent

phonological patterns such as prominence, bimoraic minimal weight, and segmental distributional restrictions. A prosodic word constituent can be clearly motivated with reference to these canonical grammatical words. In each language, this prosodic word constituent maps onto subparts of the polysynthetic verb, and crucially, this mapping is not arbitrary, but rather packages the most semantically and morphosyntactically interdependent parts of the verb into an integrated prosodic unit. In Ngalakgan and Bininj Gun-wok, this mapping is variable, with lexicalized and bound incorporated stems being prosodically integrated, while productively incorporated stems are prosodically independent. In Murrinhpatha, where lexicalization is more prevalent in verb-coverb compounding, these stems are always prosodically integrated, while the loosely bound adverbials are always prosodically independent. In short, prosodic constituency tests reveal that the most word-like portions of the polysynthetic verb are phonologically packaged in the same way as canonical words.

Northern Australian polysynthetic verbs thus support the idea that prosodic constituency is an important structural dimension in all languages, even those that challenge the universality of the grammatical word. But while some kind of hierarchical prosodic packaging may be a feature of all languages, this is not to say that they must all instantiate the same hierarchy. In this chapter I have taken a parsimonious approach, in which the presence of a constituent level must be clearly demonstrated for a particular language, rather than being assumed to be universally present. Parsimony gives us a clearer typological view of which prosodic structures are empirically grounded, and which are theoretically assumed. (For a similarly sparse analysis of Inuktitut, see Arnhold Elfner, and Compton, this volume.)

In the languages considered here, language-particularity is most obvious with regards to metrical feet – i.e. rhythmic constituents that organize syllables within the prosodic word. Research in prosodic typology shows that some languages (like English, Japanese, and Yidiny) have clear evidence for foot structure (Dixon 1977; Poser 1990), while others (like French and Turkish), do not (Jun and Fougeron 2002; Özçelik 2016, and this volume). Of the three languages considered here, Murrinhpatha shows no evidence for feet, as accentual placement can be predicted purely by reference to prosodic word and phrase constituents. BGW also appears to be footless, as long prosodic words do not exhibit rhythmic structure (unless further evidence can be adduced on vowel deletion). BGW does show some degree of weight-sensitivity in accentual clash resolution, though accentuation also exhibits variability that is more typical of phrasal prominence than canonical word stress. Only Ngalakgan exhibits weight-sensitivity within simple words, which has been adduced as evidence of foot structure. However, even in Ngalakgan I have conjectured that a footless analysis may also be possible, since pitch accents are the only clearly attested form of prominence, and they are determined with reference to prosodic word and phrase edges.

As mentioned in the introduction, a more radical challenge to word-level prosodic constituency has been laid down by studies showing languages to have multiple word-like prosodic domains, rather than one (Hildebrandt 2007; Bickel et al. 2009; Schiering et al. 2010; Uchihara 2018). In the analysis of BGW above, a similar challenge was presented by consonant cluster effects in complex verbs, from which a higher prosodic word constituent could be diagnosed. I argued that the cluster reductions are insufficient evidence for another domain level, since they are phonetically variable, and most importantly, it is not clear whether they occur just within polysynthetic verbs, or also at word junctures in multi-word phrases. But the same critique may also apply to some purported word domains included in the typological study of Bickel et al. (2009). In descriptions of prosodic prominence, it is easy for phrase-level accent to be mistakenly identified as word-level stress (Himmelmann and Ladd 2008; Gordon 2014). The same pitfall may also apply to segmental phenomena, which are often identified as morphological juncture phenomena without actually demonstrating that they do not occur in phrase-level junctures. To the extent that phrasal phonology can be mistaken for word phonology in grammatical descriptions, this may have inflated the number of purportedly word-level prosodic domains included in the typological study. I propose that this merits follow-up research, in which prosodic word typology is contextualized within analyses of phrasal phonology.