SURFACE PROCESSES, WORD MINIMALITY AND STRESS ASSIGNMENT IN BLANGA

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Abstract
Considering word minimality and assuming prosodic structure maximalisation, Hayes' (1995) metrical stress theory predicts that if a syllabic trochee language that does not necessarily distinguish segmental length phonologically shows some evidence of heavy syllables, then a heavy syllable at one edge of the parse constitutes a proper syllabic trochee. At the same time, the author points out that the prediction is difficult to check due to lack of available data. This paper provides supporting evidence from Blanga, a recently documented Austronesian language of the Solomon Islands with no contrastive segmental length and no underlying heavy syllables, in which underlying stress is always penultimate and thus uses the syllabic trochee, a non-quantity-sensitive type of foot, as the minimal metric constituent. However, surface processes generate heavy syllables in all positions and stress on the last syllable if heavy, suggesting that the language counts moras, rather than syllables, for purposes of stress assignment. Applying the principles and constraints postulated by Hayes, and thus confirming their validity, I will reject the moraic trochee hypothesis and show that the underlying stress pattern is preserved at the surface by allowing a heavy syllable to form a trochee on its own as long as it occurs either in parse-final or parse-initial position and it is the only heavy syllable available at word level.

Keywords: stress, word minima, hiatus avoidance
ISO-639-3: blp

1 Introduction

The language known in the literature as Blablanga but currently referred to by its speakers and their neighbours almost exclusively as Blanga, belongs to the Northwest Solomonic linkage of the Meso-Melanesian cluster of Western Oceanic (Ross 1988:217, 258). Oceanic languages are usually described as lacking phonological complexity. At segmental level, this is generally not far from the truth, but there are significant exceptions, amongst which the best known are the languages of New Caledonia and the Loyalty Islands (Lynch *et al.* 2002:35). It has also been established that a handful of languages of New Caledonia and Papua New Guinea have phonemic tone (Lynch *et al.* 2002:35, Lynch 1988:80-83). Otherwise not much has been said so far about other prosodic structures in Oceanic, such as stress, pause or intonation (again with important exceptions such as that mentioned in §1.3). This paper attempts an analysis of Blanga stress assignment couched in a parametric metrical theory (Hayes 1995), the principles of which will be explained in §4. The introductory section states the specific purpose and significance of the study, presents the language and its speakers and reviews the existing sources. It is followed by a description of aspects considered to be relevant for stress assignment, in the form of a brief sketch of Blanga phonology (§2) and a discussion of surface processes resulting from the strong hiatus avoidance tendency present in the language (§3). Stress assignment is analysed in detail in §4, while §5 concludes by summarising the meaning and significance of the findings.

The data and their analysis were first presented in different sections of the second chapter in Voica (2017:65-144). This article represents a slightly revised and restructured version of those passages. In order to avoid repeated quotations of the same work, the reader is referred from the beginning to the full chapter.

1.1 A matter of stress

Many works on Oceanic languages focus on syntax, while stress is only briefly mentioned in introductory grammar sketches and simply characterised as falling on a particular syllable, usually the penultimate. While there is no doubt that stress is a property of the syllable, statements limited to indicating the syllables that carry main (and sometimes secondary) stress are not enough to capture the complexities of stress assignment patterns across languages. A thorough account must be able to predict stress assignment rules and identify the principles on which they are based. In a language in which stress is distributed rhythmically, as is the case of Blanga, the theory will define metric constituents, identify them for that particular language and explain their organisation and the relations between them. It will also establish if the minimal metric constituents are quantity-sensitive or not and will take into account the surface processes that may interfere with stress assignment, making sure that the resulting surface forms are consistent with the postulated underlying structure.

Underlyingly, Blanga has no heavy syllables and displays the canonical Oceanic (Lynch *et al.* 2002:35) penultimate pattern, as is unequivocally revealed in list elicitation with multiple consultants of different ages and sexes. At the surface, however, heavy syllables are formed, and final stress frequently occurs due to different processes that are subsequent to stress assignment. An analysis solely based on the position of main stress relative to syllables would have to admit that the underlying stress pattern is different from the surface one, which would be paradoxical. Stress is only assigned once and that happens, naturally, at the underlying level. The analysis of Blanga stress proposed here, as will be detailed in §4, shows that the underlying stress pattern is preserved at the surface, while different surface processes are allowed only as long as they do not interfere with the assigned rhythmical structure.

Blanga employs the syllabic trochee, a non-quantity-sensitive type of foot, as the minimal metric constituent. A prediction made by Hayes (1995:103) in his seminal work on metrical stress theory, states that if a syllabic trochee language with no phonological segmental length distinction shows any evidence of heavy syllables, then a heavy syllable at the end of the parse makes a proper syllabic trochee. The prediction assumes prosodic structure maximalisation and takes cues from word minima in different languages, but is difficult to check, as emphasised by Hayes, due to the lack of relevant data in available descriptions. The Blanga data presented here support Hayes' prediction, complement it by showing that, under certain circumstances, heavy syllabic trochees are possible at the beginning of the parse, and confirms the validity of the assumptions made and the principles and constraints postulated in his theory, including syllable extrametricality (Hayes 1995:56-60, 105-110), the Strong Position Constraint on degenerate feet (Hayes 1995:87), the Continuous Column Constraint (Hayes 1995:34) and The Priority Clause (Hayes 1995:95), all of which will be defined in §4.

1.2 The language and its speakers

There are six indigenous languages currently spoken on Santa Isabel Island in the Solomon Islands. These are, from SE to NW, Bughotu, Gao, Cheke Holo (a.k.a. Maringe, Hograno or Ghema), Blanga (Blablanga or Ghoi), Kokota and Zabana (a.k.a. Kia). A seventh language, Laghu, is reported to have died out sometime in the 1970's, all the Laghu descendents being nowadays native Zabana speakers. Of these languages, Bughotu belongs genetically to the Northeast Solomonic network, while all the others form the Isabel subgroup of Northwest Solomonic.

Following a pattern not uncommon on long and narrow Melanesian islands, the languages of Isabel are generally distributed in "dialect bands" (White *et al.* 1988:vii) that cross the mountainous inland, being thus spoken on both sides of the volcanic range rising along the island's main axis, as a consequence of the speakers' gradual descent towards the coasts from their naturally protected settlements in the highlands after the end of the head-hunting era (early 20th century). As far as Blanga is concerned, it currently consists of three distinct, but only slightly different, dialects, with a total of 1,100 speakers (2009). One, Northern Blanga or Loghahaza Blanga, is on the northern coast and spoken by approximately 500 people in the villages and settlements of Popoheo, Kolobou, Tiromola, Garanga, Sisirio, Kovo, Kolosori and Susubona and, as a minority language, in Hovukoilo. The other two are found on the southern coast. Southwestern

Blanga or Zazao Blanga, again with about 500 speakers, is spoken in Kilokaka, Gazuhungari, Gugugluro, Kotlomuro, Galili (Fizaghalia), Hiroleghu, Biraki and Tavol, while Southeastern Blanga is spoken by about 150 people in Biluro, Hiroleghu and Tavol. Kilokaka was previously considered a different language and consequently assigned a different iso 639-3 code (jaj). The analysis in this article is based on data from Northern Blanga exclusively.

Blanga is endangered and threatened mostly by its vigorous neighbour Cheke Holo (the main trade language of Isabel) and to a lesser extent by Pijin. Most adult Blanga speakers are multilingual and use Cheke Holo for communication with neighbouring communities in most spheres of activity, while Pijin is employed for exchanges during their trips outside the island or with Isabel residents of non-Isabel origin. Strong Cheke Holo and Pijin influences are reflected in phonology and vocabulary. The contact situations are multiple and complex and range from more general, such as those found in education and religious settings, to village-specific, such as mixed population and proximity to multilingual settings (major schools or colonies of migrant workers). Although the language is still passed from parents to children, the current status of Blanga seems to be that of an oral language restricted to communication at village level.

1.3 Research on Blanga so far

Until recently, the language was undocumented and undescribed, except for the few materials listed below. Some data on Blanga, and Kilokaka as a separate language, were published as part of Tryon & Hackman's (1983) sound correspondences analysis of 111 communalects in the Solomons, accompanied by a 324-item comparative wordlist. The study is a survey of the languages spoken at that time within the borders of the Solomon Islands state and does not treat Blanga in particular

Not much else had been published, except for a two-page grammatical sketch of Zazao (Kilokaka) (Ray 1926: 532-534), which is mainly concerned with morphology and whose source is a vocabulary collected at the beginning of the 20th century and later published by Napu (1953). This vocabulary consists of 418 words and 48 phrases with Mota equivalents. The English translations of the Mota words can be found in a different article in the same volume (Towia and Riulera 1953).

Regional varieties of Blanga and its relationships with Kilokaka are discussed by Palmer (1999:9-10) where he revises the standard language map of Santa Isabel.

Blanga was also mentioned in two major comparative studies relevant for the classification of the Isabel languages (Ross 1986 and Ross 1988).

The sole comprehensive study of the structure of Blanga is by Voica (2017). This opens with a sociolinguistic and ethnographic introduction to the language, their speakers and the linguistic ecology of the region, followed by a presentation of the main phonological features and processes and a thorough analysis of stress assignment, on which this article is based. It also contains a detailed description of major morphological and morphosyntactic aspects, a discussion of *Aktionsart*, types of predicates and their subcategorisation frames, and sentence-level coordination and subordination. It then focuses on the relations established between a predicate and its arguments and their implications for the general theory.

The only other analysis of stress within Northwest Solomonic that I am aware of is the chapter on stress in Kokota in Palmer (1999; 2009), supplemented by an online publication on the same topic (Palmer 2003).

I am not aware of any unpublished Blanga data, except for my own, and, to my knowledge, audio or video recordings did not exist prior to my documentation project. The Blanga data I have collected so far are deposited under open access protocol with the Endangered Language Archive (ELAR) at SOAS, University of London and the Pacific and Regional Archive of Digital Sources in Endangered Cultures (PARADISEC), University of Sydney. The access links are listed in the Sources section at the end of this article.

2 Preliminaries

Before proceeding to stress analysis, it is necessary to become acquainted with the segmental inventory and main phonological processes, the syllable structure and the phonotactics of the language. This section consists of a brief sketch of Blanga phonology, pointing out different aspects that are relevant for stress assignment.

2.1 Consonant inventory

Generation-based differences constitute an important feature of present-day (2019) Northern Blanga. In segmental phonology those are manifested by the existence of different consonant phoneme inventories for

older (very roughly above the age of 55) and younger speakers (very roughly below 55). The Cheke Holo influence mentioned in §1.2 is, as expected, much stronger with the latter. In the older speakers' system (Table 1), only three place classes are represented: [+anterior –coronal], [+anterior +coronal], and [–anterior –coronal]. The fourth possible place class, [–anterior +coronal], is absent in this variety. Obstruents consist of plosives and fricatives. Within the three place classes, plosives are represented in three places of articulation: labial (bilabial) for [+anterior –coronal], alveolar for [+anterior +coronal], and velar for [–anterior –coronal]. All plosives show a phonemic three-way contrast between voiceless aspirated, voiceless unaspirated, and voiced. No prenasalised stops are found. Fricatives contrast voiced with voiceless in the labial (labio-dental) and alveolar places, while the voiced velar fricative is contrasted with the voiceless glottal fricative. There are three nasals homorganic with the plosives, one for each place class. The sonorant class is completed by a rhotic trill and a lateral approximant. There are no affricates and no underlying glides. Glides are however formed or inserted at the surface, as will be seen in §3.1.

Table 1: *The consonant system of Northern Blanga older speakers*

	Bilabial			Labiodental		Alveolar			Velar			Glottal
Plosive	p	pʰ	b			t	tʰ	d	k	kʰ	g	
Nasal			m					n			ŋ	
Fricative				f	v	s		z			ɣ	h
Trill								r				
Lateral Approximant								l				

In younger people's speech, the voiced alveolar fricative /z/ has been replaced by an affricate. This is most frequently realized as [dʒ], but there is variation between idiolects, the affricate being produced by some speakers as [dz] or even as [dʑ]. The different surface realizations may appear in free variation in the same idiolect and the range of possible phonetic articulation places for one phonological segment may reflect different stages of the change. Based on frequency, I refer to this affricate as the postalveolar /dʒ/. The appearance of the postalveolar affricate introduces the place class [–anterior +coronal] as one main difference between the younger generation's and the older generation's consonant systems.

The voiceless alveolar fricative /s/ seems to be only in the process of being gradually replaced by /tʃ/. Unlike with /z/, the change of /s/ is neither general, nor complete. Interestingly, young speakers use /tʃ/ in some instances where old speakers use /s/ but with significant exceptions perhaps again under the influence of Cheke Holo. One illustrative example is the case of the word pronounced /ˈsuu/ by the older generation, which can be either the word for 'breast' or for 'suck'. Younger speakers have /ˈtʃuu/ for the former meaning but keep /ˈsuu/ for the latter, thus generating a contrast between /s/ and /tʃ/. Another example is the pair consisting of *sara* 'there.DIST' and the Cheke Holo loanword *tʃara* 'rubbish'. This means creating a system in which, while the voiced alveolar fricative /z/ became the affricate /dʒ/ in all positions, thus no phonemic contrast existing between the two, the emergence of the voiceless affricate / tʃ/ did not lead to the complete disappearance of /s/, the tendency being to keep the former, at least in order to avoid homonymy. This tendency is weak at this stage but it does affect the voicing balance of the consonant system of the younger generation of Northern Blanga speakers.

Another important difference between the old generation's and the young generation's consonant systems is the tendency in the latter towards the phonologization of the glottal stop. This is suggested by few pairs in which the glottal stop is contrasted with zero. These are limited to the pairs below and perhaps a few others, which are not attested in my corpus.

/ba.ba.ɔ/ 'be.tired' vs. /ba.ba.**ʔɔ**/ 'carry.on.back'
/pʰa.**e**/ 'destroy' vs. /pʰa.**ʔe**/ 'be.bright'
/ku.**e**/ 'grandparent'/'in-law' vs. /ku.**ʔe**/ 'sound made by pig'
/fu.**a**/ 'fruit' vs. /fu.**ʔa**/ 'be loaded with fruit'
/kʰɔ.**a**/ 'mangrove' vs. /kʰo.**ʔa**/ 'testicle'

The pairs above suggest that the glottal stop has acquired or is acquiring some marginal phonemic status in the Northern Blanga variety spoken by the younger generation. It is important to notice that all of them are also attested in Cheke Holo, a language in which the glottal stop is described as phonemic (White *et al.* 1988;

White 1995). At the current stage, due to its very restricted distribution, I incline to regard this marginal phonologization of the glottal stop as a relatively recent innovation due to Cheke Holo influence. The caveat here is that, in a very incipient stage, it is difficult to tell whether an innovation will eventually be fully adopted or later discarded. Moreover, the examples are elicited, and I have the impression that in naturally occurring speech the younger speakers do not always observe the contrast. The older consultants make no formal difference whatsoever between the members of the pairs. Indeed, for them the difference is only semantic, the forms being simply homonymous. At this stage, it is safer to talk about a *tendency* of marginal phonologisation of the glottal stop. The process is neither general, nor complete. The younger people's consonant system is shown in Table 2, where the recently emerged affricates are rendered in bold and the marginally phonemic glottal stop is rendered in italics.

Table 2: *The consonant system of Northern Blanga younger people*

	Bilabial			Labiodental		Alveolar			Velar			Glottal
Plosive	p	pʰ	b			t	tʰ	d	k	kʰ	g	*ʔ*
Nasal			m					n			ŋ	
Fricative				f	v	s					ɣ	h
Affricate						**tʃ**		**dʒ**				
Trill								r				
Lateral Approximant								l				

2.2 Surface glottal stops

In both older and younger people's speech glottal stops are optionally present at the surface either word-internally or word-finally. Word-final surface glottal stops are attested in item enumeration, both in elicited examples and in natural speech and appear to mark some sort of major pause or prosodic boundary. Prosodic glottal stops will be investigated in a future study and will receive no further mention here.

Word-internal glottal stops are restricted to intervocalic position. They can be found either between identical ($V_i ʔ V_i$) or non-identical vowels ($V_i ʔ V_j$). Most sequences of identical vowels appear in reduplicated forms. With some of these (1), the unreduplicated form is attested.

(1) /a.au/ →[aʔau] 'remain' from /a.u/ →[au] 'exist/stay'

Others (2), (3) are cases of frozen reduplication, the base not being synchronically present in the language.

(2) /i.izu/ →[iʔizu] 'write'/ 'scribble', most probably from */izu/

(3) /ɔ.ɔe/ →[ɔʔɔe] 'language'/'talk' most probably from */ɔe/

Yet other VV sequences (4), (5), (6) seem to involve the deletion or metathesis of a consonant segment. For some words, this hypothesis is supported by cognates from related languages within or outside the Northwest Solomonic cluster.

(4) /suu/ → [suʔu] 'breast/suck' ← *susu*; cf. Uruava *susu* 'breast' (Palmer 2007); Longgu *susu* 'breast.milk' (Hill 1992; 2002)

(5) /frɔɔ/ [frɔʔɔ] 'squeeze' ← * *foro*; cf. Cheke Holo *foro* 'coconut milk' (resulted from squeezing grated coconut) (White *et al.*1988)

(6) /glaa/ → [glaʔa] 'be.thin' ← *gala*; cf. East Futuna *hala* 'thin' (Moyse-Faurie 1993)

For other words (7), no cognates have been found yet.

(7) /baa/ → [baʔa] 'fish.sp', /natʰuu/ → [natʰuʔu] 'tomorrow'

Consonant deletion is also attested synchronically. The [–anterior –coronal] fricatives are often dropped in casual or rapid speech. If this happens between two identical vowels (8), then a glottal stop may be inserted.

(8) /gaɣase/ → [gaʔase] 'girl'/ 'female'

Surface word-internal glottal stops also occur between non-identical vowels as in (9).

(9) /fu.a/ → [fu.ʔa] 'fruit', (10) /ku.e/ → [ku.ʔe] 'grandparent', (11) /gru.i/ → [gru.ʔi] 'plant (v.)', (12) /gle.a/ → [gle.ʔa] 'be.happy', (13) /kʰɔ.a/ → [kʰɔ.ʔa] 'mangrove', (14) /pe.pe.ɔ/ → [pe.pe.ʔɔ] 'lip', (15) /knɔ.e/ → [knɔ.ʔe] 'be.short', (16) /ma.e/ → [ma.ʔe] 'laugh', (17) /pʰa.u/ → [pʰa.ʔu] 'head' (18) /dɔ.u/ → [dɔ.ʔu] 'be.big', (19) /kʰe.i/ → [kʰe.ʔi] 'tooth'.

The V_iV_i examples above are the result of partial reduplication, consonant metathesis or consonant deletion and, for most of them, it is tempting to explain surface glottal epenthesis as a means of compensating for the historical or synchronic loss of an intervocalic consonant segment. For the V_iV_j sequences, however, although possible, there is no apparent evidence of segmental loss. §3 will explain both $[V_iʔV_i]$ and $[V_iʔV_j]$ sequences as a means of hiatus avoidance when other surface phenomena, such as coalescence, glide formation and diphthong formation, are blocked by different constraints, or in slow or casual speech.

2.3 Consonant clusters

Consonant clusters are allowed as syllable onsets in Blanga, but they can only consist of two elements in a particular order: an obstruent followed by a sonorant. Further constraints affect the first element, which cannot be a coronal plosive, an aspirated plosive, a voiced fricative or the emerging glottal stop phoneme. With the exception of the velar nasal, all sonorant consonants present in the language can be the second element of a cluster, subject to the condition that the two members of a cluster are not homorganic. The velar nasal only appears in word-medial clusters with /h/ as the first element. Some examples of possible clusters are shown in (20).

(20) **pn**isu 'spit' (v.), (21) dede**pl**u 'flame', (22) **hn**ubra 'burn', (23) **kr**edi 'egg', (24) dɔ**gl**ɔ 'be.straight', (25) gu**fn**u 'dust', (26) nah**ŋ**a 'name'

2.4 Vocalic inventory

As is common within Oceanic (Lynch 1998:75), Blanga displays a five-vowel pattern (Figure 1), with a low vowel in the central series and contrasting a high with a mid vowel in the front and back series respectively. The front vowels are unrounded and the back vowels are rounded; nasality and length are not contrastive. There is no tense-lax distinction, but the front mid vowel is typically produced as mid-close, while the back front one is pronounced as mid-open. The language has no underlying diphthongs, although they frequently occur at the surface (§3.2).

Figure 1: *The contrastive vowels of Blanga*
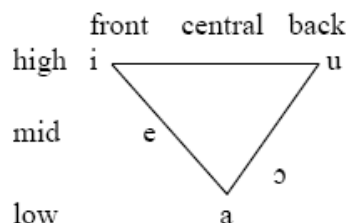
2.5 Word-final vowel deletion

In isolation or in careful speech, word-final vowels are always pronounced but they tend to be dropped in rapid or casual speech unless they occupy the phrase-final position. This phenomenon is widespread in the language and can take place both when the vowel in question is preceded by a consonant and when it is preceded by another vowel. In the former case, vowels cannot be deleted if preceded by a consonant cluster. They can only be deleted when part of a CV syllable pattern but not as part of a CCV pattern, since that will

generate an unacceptable sequence of three consonants. Blanga allows two-member consonant clusters, subject to the constraints introduced in §2.3, but sequences of three consonants are not permitted either within the same syllable or across adjacent syllables.

(27) /mane dɔu/ 'big/important man' → [mandɔu]

but

(28) /kakafre dɔu/ 'big spider' → *[kakafrdɔu]

Word-final vowel deletion in a CV pattern generates surface syllabic codas, which are not allowed underlyingly. Underlying syllable structure is described in §2.6, while surface syllable representations are discussed in §2.7.

In the case of a final vowel preceded by another vowel, *i.e.* (C)(C)VV, the process can be illustrated with examples like the one in (29), in which a 3.SG agreement marker, =*ni*, is encliticised to the transitive verb *fakae* 'see'.

(29) /fakaeni/ → [fakani]

Such cases seem to be consequences of the widespread tendency of hiatus avoidance, mentioned in §2.2 and further discussed in §3, which is manifested both within the word and across word boundaries, and possibly across morpheme boundaries as well.

2.6 Underlying syllable structure

The underlying syllable structure in Blanga is (C)(C)V. This is illustrated by the bold syllables in (30), (31), (32), in initial, medial and final position.

(30) V: ***i**.fu* 'blow', *hna.**i**.tu* 'spirit', *fa.ka.**e*** 'see'

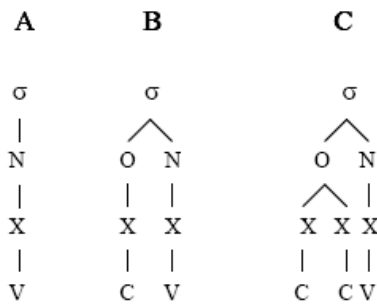(31) CV: ***na**.**ha**.**ni*** 'rain', *hnɔ.**ra**.ɔ* 'yesterday'

(32) CCV: ***bla**.**bla**.hŋɔ* 'hips', *tɔ.tɔ.**fra*** 'star'

Blanga does not allow underlying syllable codas. This is initially suggested by the fact that no words end in a closed syllable. A more detailed investigation shows that all word-medial consonants are attracted into the onset of a following syllable according to the onset maximalisation principle. On the other hand, two-member consonant clusters are possible not only word-medially but also word-initially (§2.3), which suggests that they make good branching onsets and are thus syllabified as such without exception, observing again the onset maximalisation principle. Underlying syllable codas, however, may be formed at the surface due to word-final vowel deletion in casual or rapid speech (§2.5; §2.7).
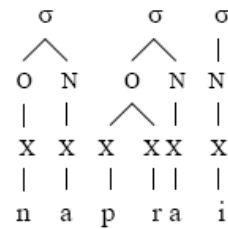
Underlying Blanga nuclei consist of a single segment, always a vocalic monophthong, and length is not contrastive. In terms of weight, underlying nuclei are always light. No underlying heavy nuclei and no underlying codas being possible, branching is only allowed at the onset of Blanga syllables. The absence of branching within the rhyme, both at the R and the N node, makes it possible in most cases to analyse Blanga syllables as sequences of onsets and nuclei.

The representations of possible underlying Blanga syllables are thus restricted to the diagrams in (33) A, B and C and all possible underlying syllable types are illustrated in the word *naprai* 'sun' (34).

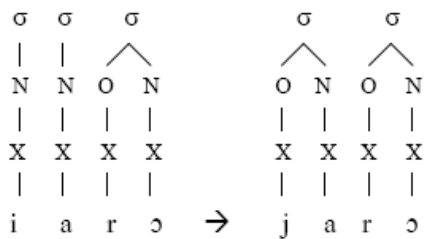(33)   (34)

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A          B              C

σ          σ              σ               σ          σ    σ
|         /\             /\              /\         /\    |
N        O   N          O   N           O   N      O  N   N
|        |   |          /\  |           |   |      /\  |  |
X        X   X          X X X           X X X      X X X  X
|        |   |          | ||            | | |      | || |
V        C   V          C CV            n a p      r a   i
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2.7 Surface syllable representations

Among the surface processes that may interact with syllable structure are glide formation (§3.1), diphthong formation (§3.2) and final vowel deletion (§2.5).
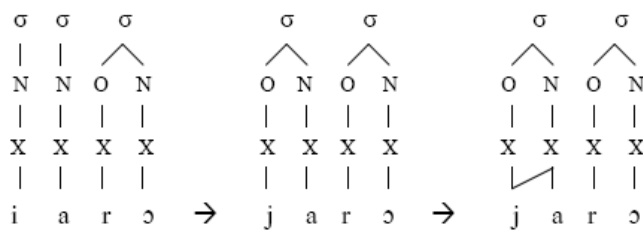
High vowels surface as glides when they precede a non-high vowel. Although this process naturally reduces the number of syllables and changes the distribution of segments between the syllables of the word, it does not affect the overall weight and does not violate the general structural pattern of the syllable. Since a consonant cluster cannot consist of more than two consonants (§2.3), the high vowel surfacing as a glide can be either the nucleus of an underlyingly no onset syllable, like in /i.a.rɔ/ 'DEM.N.PL', or of a syllable with a non-branching onset, such as the first syllable in /kʰu.a.li/ 'arrow'. In the former case, /i.a.rɔ/ surfaces as [ja.ro], reducing the number of syllables from three to two by reducing two no onset syllables to one syllable consisting of an onset and a nucleus (35).
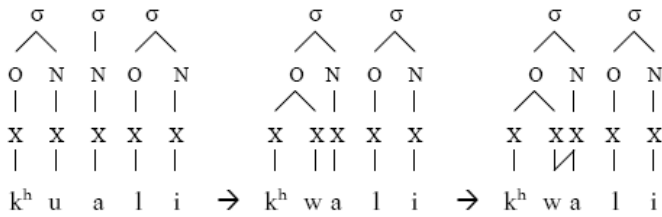
(35)

```
σ  σ  σ              σ      σ
|  |  /\            /\     /\
N  N  O N           O N    O N
|  |  | |           | |    | |
X  X  X X           X X    X X
|  |  | |           | |    | |
i  a  r ɔ    →      j a    r ɔ
```

No constraints are violated. The gliding of [j] into the syllable nucleus may be more accurately represented as in (36).

(36)

```
σ  σ  σ              σ      σ             σ      σ
|  |  /\            /\     /\            /\     /\
N  N  O N           O N    O N           O N    O N
|  |  | |           | |    | |           | |    | |
X  X  X X           X X    X X           X X    X X
|  |  | |           | |    | |            ⌐|    | |
i  a  r ɔ    →      j a    r ɔ    →      j a    r ɔ
```

A similar process takes place when the high vowel represents the nucleus of a CV syllable. The underlying form /kʰu.a.li/ 'arrow' often surfaces as [kʰwa.li] (37).

(37)

The semi-vocalic character of the glide is again represented by associating it with both the onset and the nucleus under the timing tier. However, the glide does belong to the onset, which is proved by the fact that the V in a CCV sequence cannot be realized as a glide, observing the constraint that dictates that consonant clusters can consist of a maximum of two consonants and they only occur as syllable onsets (§2.3; §2.6). The constraint on the second element of the cluster (§2.3) is also observed, [w] being a sonorant. What seems to be violated by the surface realisation [kʰwa.li] is the constraint that dictates that the obstruent element cannot be an aspirated plosive. The violation is only apparent. While, by their nature, consonants cannot be aspirated before another consonant, glides are an exception due to their partially vocalic nature.

In some cases, constraints on word minimality (§2.8) prevent glide formation with the reduction of the number of syllables. Forms such as /bi.a/ 'cassava' and /fu.a/ 'be.loaded.with.fruit' cannot surface as * [bja] or *[fwa]. What happens instead depends on the series of underlying vowels. With the front vowel, the hiatus avoidance strategy is the insertion of the corresponding glide, thus keeping the number of syllables intact and obeying the constraints. In (38), /bi.a/ surfaces as [bi.ja].
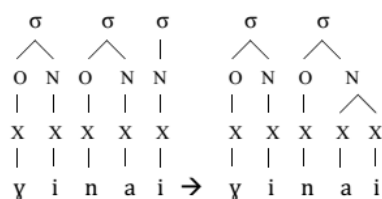
(38)
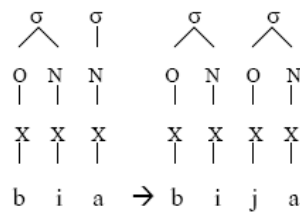
With the back vowel, the preferred strategy is glottal stop insertion, thus /fu.a/ can surface as [fu.ʔa] (39). Both strategies create an onset for the second syllable.
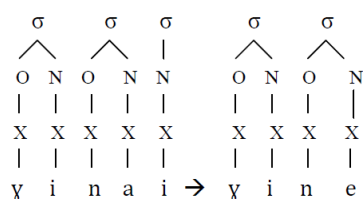
(39)
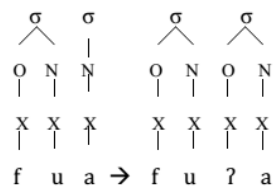
§3.2 and §3.3 discuss the surface formation of diphthongs within certain constraints as a means of hiatus avoidance. Such processes result in a (C)(C)VV structure, as in /ɣi.na.i/ → [ɣi.nai] 'FUT' (40) and /fa.ka.e/ → [fa.kai] 'see' (42). In rapid speech, hiatus can also be avoided either by coalescence of a V.V sequence (§3.2) or by V2 deletion (§2.5), thus /ɣi.na.i/ → [ɣi.ne] (41) and /fa.ka.e/ → [fa.ka] (43).
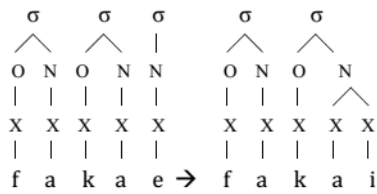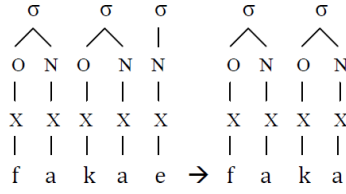
(40)   (41)

(42)

σ σ σ σ σ
O N O N N O N O N
| | | | | | | |
X X X X X X X X X
| | | | | | | | |
f a k a e → f a k a i

(43)

σ σ σ σ σ
O N O N N O N O N
| | | | | | | | |
X X X X X X X X
| | | | | | | |
f a k a e → f a k a

Vowel deletion can also occur in word-final position preceded by a consonant (§2.5). This has important consequences for syllable structure as it creates syllable codas, which are not allowed underlyingly (§2.6), as illustrated in (44). Notice that, in the resulting surface form, the final consonant of the first syllable cannot be attracted into the onset of the following syllable because of the constraints on consonant clusters mentioned in §2.3.

(44)

σ σ σ σ
O N O N O N N
| | | | | |
X X X X X X X
| | | | |
ma ne do u →

σ σ σ
O N Cd O N N
| | | |
X X X X X
| | | |
ma n do u
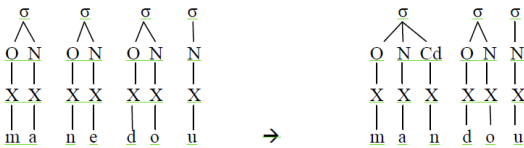
2.8 Word minimality and syllable count

Underlying monosyllabic words are rare in Blanga and restricted to *function* words. They are often clitics or can optionally cliticise in speech, forming a single phonological word with their host. Word minima refer to the minimum size of a *content* word in a particular language. For Blanga, I shall postulate here that the minimal word consists underlyingly of two syllables (σσ). This is supported by the constraint on glide formation discussed at the end of §3.1. At the surface, due to diphthong formation (§3.2) and word-final vowel deletion (§2.5), the minimal Blanga word may be said to consist of one *heavy* syllable. Word minimality is in a crucial relation with stress assignment as will be seen in §4.

The great majority of underived content Blanga words are disyllabic and only a few have three syllables or more without being obviously loanwords or the result of a diachronic process. Most three-syllable words and almost all of the rare cases of words with four or five syllables seem to be synchronic or historical reduplications, derivations, compounds, or combinations of those.

(45) *za.za.hɔ* 'walk (v.)' ← *za.hɔ* 'go' (partial reduplication)

(46) *na.fri.hŋe* 'work (n.)' ← *fri.hŋe* 'work (v.)' (derivation with nominalising prefix)

(47) *ti.hi.tu.bu* 'place.name' ← *tihi* 'wash' + *tʰubu* 'sore (n.)' (compounding)

(48) *fu.fu.ɣɔ.ga.e* 'morning', lit. 'beginning of daylight' ← **fu.fu.ɣɔ* (*cf.* the attested *fufunu* 'start') + *ga.e* 'be.clear' (reduplication and compounding).

3 Hiatus avoidance

With the exception of quotation, very careful speech or syllabified forms, Blanga does not seem to tolerate the hiatus that may appear between adjacent syllables and the different strategies employed in order to avoid it are manifested as surface processes with important consequences for stress assignment. These processes are listed in (a) to (c):

a) Glide formation and glide insertion;
b) Diphthong formation and vowel coalescence;
c) Glottal stop insertion.

Final vowel deletion (§2.5) also plays a partial role in hiatus avoidance (§2.7). Having discussed each of the above points, the section will end with a summary of hiatus avoidance strategies.

3.1 Glide formation, glide insertion and epenthetic glottal stops

There are no underlying glides in Blanga. Nevertheless, they can appear in surface forms as allophones of high vowels when those are followed by a central or low vowel in a syllable with no onset position filled. The syllable containing the high vowel may, in turn, consist only of the nucleus or may have an obstruent in its onset.

(49) /i.a.ɔ/ → [ja.ɔ] 'DEM.PV.SG', (49) /i.a.rɔ/ → [ja.rɔ] 'DEM.PV.PL';

(50) /de.ŋi.ɔ/ → [de.ŋjɔ] 'place.name';

(51) /ga.u.a/ → [ga.wa] 'fish.sp', (52) /ga.u.a.i/ → [ga.wai] 'far';

(53) /kʰu.a.li/ → [kʰwa.li] 'arrow'

Glide formation takes precedence over diphthong formation (§3.2), the preference being for filling the onset position of the following syllable rather than forming a branching nucleus in the previous one.

(54) /ga.u.a./ → [ga.wa] 'fish sp.', not *[gau.a]

However, glide formation does not prevent further or additional branching in the nucleus of the syllable whose onset position it has filled if the conditions for diphthong formation are met. In (55), glide and diphthong formation take place simultaneously, reducing the number of syllables from four to two.

(55) /ga.u.a.i/ → [ga.wai] 'far'

A constraint on consonant clusters in Blanga dictates that they can only consist of two segments, with C1 being an obstruent and C2 a sonorant (§2.3). Surface glide formation, as illustrated above, observes the constraint since glides belong to the natural class of sonorants. However, the V in a CCV syllable cannot surface as a glide, since this would violate the constraint in that it will generate a three-consonant onset.

(56) /na.gru.i/ → *[na.grwi]

In such cases, hiatus is avoided by the insertion of an epenthetic glottal stop.

(57) /na.gru.i/ → [na.gru.ʔi]

Surface glide formation cannot be generated by disyllabic underlying forms. Such forms would result in a surface word consisting of a single light syllable. I regard this restriction as evidence that a surface Blanga word minimally consists of a heavy syllable (§2.8). Surface glide formation can therefore be constrained by word minimality. In such cases, hiatus is avoided by two different strategies. If the high vowel is /i/, the strategy is glide insertion, rather than glide formation, *i.e.* the corresponding glide will be inserted as onset of the following syllable.

(58) /bi.a/ 'cassava'→ [bi.ja], rather than *[bja]

If the high vowel is /u/ a glottal stop will be inserted as the onset of the following syllable.

(59) /fu.a/ 'fruit' → [fu.ʔa], rather than *[fwa] or *[fu.wa]

(60) /ku.e/ 'grandparent' → [ku.ʔe], rather than *[kwe] or *[ku.we]

An apparent exception is the dummy particle *ia*, which allows /i.a/ → [ja], rather than [i.ja]. This can be explained by the fact that constraints on word minimality only apply to content words. Finally, it is worth

mentioning that, in (61), (62), glide formation is blocked by both the constraint on consonant clusters and that on word minimality.

(61) /fni.ɔ/ 'glans (of penis)' → [fni. jɔ], rather than *[fnjɔ]

(62) /hnu.a/ 'gulf' → [hnu.ʔa], rather than *[hnwa]

3.2 Coalescence, diphthong formation and epenthetic glottal stops

When asked to syllabify, consultants, without exception, assign each vowel in a sequence to separate syllables. Underlyingly therefore, with no coda positions being available (§2.6), each segment in a VV sequence constitutes the nucleus of a distinct light syllable. At the surface, on the other hand, synchronic coalescence and diphthong formation can appear as the next available strategy for hiatus avoidance when no candidates for glide formation or triggers of glide insertion are present. The fusion between two adjacent vocalic segments into one single syllabic nucleus can be realised in one of the two ways, depending on speech speed. In rapid and very rapid speech, much favoured by Northern Blanga speakers, it may be realised as coalescence, thus resulting in a monophthong. In less rapid casual speech, the result of fusion is a diphthong. Coalescence is much more restricted than diphthong formation.

In order to account for all the constraints on diphthong formation and coalescence, it is useful to distinguish between four categories of possible diphthongs according to the dimension along which different VV sequences are aligned within the vowel space:

a) identical diphthongs, formed from sequences of identical vowels;
b) descending diphthongs, formed from sequences of high to low along the height dimension;
c) ascending diphthongs, formed from sequences of low to high along the height dimension;
d) level diphthongs, formed either from left to right or from right to left along the front-back dimension at the same height.

Identical diphthongs (a) are never formed in Blanga. Within a fairly normal speech rhythm, an epenthetic glottal stop appears as the onset of the second syllable in identical VV sequences. In rapid speech, the two identical vowels coalesce.

(63) /i.i.zu/ 'write'   → [i.ʔi.zu] (casual speech)
                     → [i.zu] (rapid speech)

(64) /ɔ.ɔ.e/ 'talk/word' → [ɔ.ʔɔ.e] (casual speech)
                      → [ɔ.e] (rapid speech)

(64) reveals one more interesting thing, namely that the hiatus avoidance tendency is less strong in sequences of more than two vowels. In such rare cases, hiatus is normally avoided between V1 and V2 but not necessarily between V2 and V3.

Descending diphthongs (b) are also excluded. In fact, the very possibilities are here much more limited. From the definition of descending diphthongs, it follows that high vowels can only occupy the V1 position in such cases but, as mentioned in 3.1, glide formation takes precedence over diphthong formation. The only candidates left, the sequences /e.a/ and /ɔ.a/, never surface as diphthongs. From an articulatory point of view, it is possible for /e/ and /ɔ/ to generate surface glides in the same way as the high back vowels, but that, again, does not happen in Blanga. Moreover, it is not only diphthong formation but also coalescence that is excluded in descending sequences. I shall show below that there are strong phonological grounds for such exclusions, not only with descending candidates but also with some ascending and level ones. For now, let us notice that the only possible hiatus avoidance strategy here is glottal stop insertion.

(65) /ɣe.pe.a/ '1.DL.EXCL' → [ɣe.pe.ʔa]; /gle.a/ 'be.happy' → [gle.ʔa]

(66) /lɔ.lɔ.a/ 'be.straight' → [lɔ.lɔ.ʔa]; /kʰɔ.a/ 'mangrove' → [kʰɔ.ʔa]

Ascending diphthongs (c) are frequently formed at the surface. The sequences /a.i/ and /a.e/ both generate [ai] (67)-(70), while the sequences /a.u/ and /a.ɔ/ both generate [au] (71)-(74).

(67) /hma.i.ri/ → [hmai.ri] 'left', (68) /na.pra.i/ → [na.prai] 'sun'

(69) /ha.e/ → [hai] 'where', (70) /fa.ka.e/ → [fa.kai] 'see'

(71) /na.u.tʰɔ.glu/ → [nau.tʰɔ.glu] 'earth', (72) /na.na.u/ → [na.nau] 'village'

(73) /ni.ha.ɔ/ → [ni.hau] 'when', (74) /hnɔ.ra.ɔ/ → [hnɔ.rau] 'yesterday'

The other sequences surface as follows: /e.u/ → [eu] (75); /ɔ.i/ → [ɔi] (76), (77); /e.i/→ [ei] (77), (78); /ɔ.u/ → [ɔu] (79).

(75) /na.kʰe.u/ → [na.kʰeu] 'earthquake'

(76) /kʰɔ.i.lɔ/ → [kʰɔɪ.lɔ] 'coconut', (77) /ɣɔ.i.nɔ/ → [ɣɔɪ.nɔ] 'now/today'

(77) /ma.ne.i/ → [ma.nei] 's/he', (78) /i.he.i/ → [i.hei] 'whoever'

(79) /ma.ne do.u/ → [man. dɔu] 'big man'

The last sequence is quite rare in polysyllabic words, hence the compound used in the example, which counts as a single phonological word.
With ascending sequences, glottal stop epenthesis is possible as a hiatus avoidance strategy but more rarely employed because of the availability of diphthong formation. It occurs mainly in underlyingly disyllabic words when the rhythm of speech is slow (non-characteristic to N Blanga).

(80) /ma.e/ → [ma.ʔe] 'laugh'

(81) /pʰa.u/ → [pʰa.ʔu] 'head'

(82) /dɔ.u/ → [dɔ.ʔu] 'be.big'

(83) /kʰe.i/ → [kʰe.ʔi] 'tooth'

Coalescence can also sometimes appear in ascending sequences but it is rare and available only for the combinations /a.i/ → [e] (84) and /a.u/ → [ɔ] (85).

(84) /ɣa.i.pe.a/ '1.DL.EXCL'→ [ɣe.pe.a]

(85) /ɣa.u.pe.a/ '2.DL.' → [ɣɔ.pe.a]

It does not occur in word-final position.

(86) /ɣa.i/ '2.SG.EXCL' → *[ɣe], (87) /na.pra.i/ 'sun' → *[na.pre]

(88) /ɣa.u/ '2.SG' → *[ɣɔ], (89) /na.na.u/ → *[na.nɔ]

Level diphthongs (d) are not formed and coalescence between the two vowels of a level sequence is not possible. Hiatus is avoided by glottal stop insertion. The sequences /i.u/ and /u.i/ are not appropriate candidates because of the precedence of glide formation over diphthong formation (3.1). More thorough constraints on diphthong formation and coalescence will be formulated in the next section. With level sequences, hiatus is avoided by glottal stop insertion.

(90) /pe.pe.ɔ/ → [pe.pe.ʔɔ] 'lip'

(91) /knɔ.e/ → [knɔ.ʔe] 'be.short'

The previous section showed that glide formation or insertion takes precedence over diphthong formation and coalescence, while this section suggested that the choice between glottal stops epenthesis and other hiatus avoidance strategies depends on the rapidity of speech. The glottal stop appears in less rapid, albeit still casual, unmonitored speech, while diphthong formation and vowel coalescence are employed in more rapid speech. However, when no other strategy is available, the occurrence of a glottal stop is no longer conditioned by the rapidity of speech. §3.4 will revise the preference for each possible strategy. Before that, it is necessary to formulate the constraints that prevent the employment of the most preferred strategies, which will make the topic of the next section.

3.3 Constraints on diphthong formation and coalescence
The glide precedence constraint can be formulated as follows.

> *The glide precedence constraint*
> When there are candidates for glide formation and all phonotactic and word minimality constraints are observed, glide formation takes precedence over diphthong formation.

We have also seen that diphthongs other than ascending ones are not formed.

> *Constraint on diphthong formation*
> The first element of a Blanga diphthong must be lower than the second one.

Since glides are allophones of high vowels and since every other vowel is lower than the high vowels, the glide precedence constraint becomes redundant.

As far as coalescence is concerned, we noticed that this is only permitted either in sequences of identical vowels or, more rarely, in the ascending sequences /a.i/ and /a.u/. A third constraint can be thus formulated.

> *Constraint on coalescence*
> Two non-identical vowels can coalesce only if they are quantum vowels in an ascending sequence.

A strong base for such a constraint can be revealed within a phonological theory of elements (Backley 2011). In the simplified version employed here, any surface manifestation is linked to an underlying expression that can consist of one element (simplex expressions), two elements (duplex expressions) or three elements (triplex expressions). Expressions consisting of more than one element can be generally referred to as 'complex expressions'. Elements, symbolised by capital letters, are thus 'contained' by expressions and the conventional means of representing such 'containers' is to delimit them by square brackets. Since this can create confusion (square brackets being normally used in phonology to signal surface forms), I shall use bolded round brackets here to symbolise the containers, *i.e.* the underlying forms, and no brackets whatsoever for the surface forms. The contained elements will also be shown in bold.

Only the three quantum vowels, a, i and u, are linked to simplex underlying expressions. These are respectively **(A)**, **(I)** and **(U)**, and I shall call their elements 'primary elements'. The linking can be conventionally represented as below.

```
    a         i       u
    |         |       |
  (A)       (I)     (U)
```
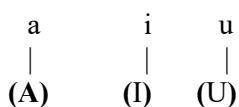
Other vowels are linked to expressions consisting of combinations of the primary elements, somehow reflecting combinations of articulatory features. In the case of Blanga, the other vowels are /e/ and /ɔ/, linked respectively to the underlying expressions **(AI)** and **(AU)**.

```
    e         ɔ
    |         |
  (AI)     (AU)
```
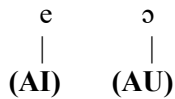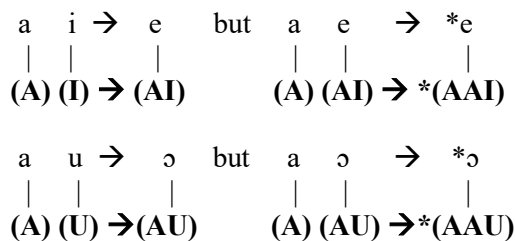
A key restriction of the theory is that complex expressions cannot contain identical elements (Backley 2011:7-11, 24-26). Expressions such as *(AAI) or *(AAU) are excluded. Now remember that coalescence results in a monophthong and appears between non-identical Blanga vowels as a consequence of hiatus avoidance in very rapid speech in sequences otherwise eligible for diphthong formation. Thus, the constraint on coalescence can be reformulated as follows:

> *Constraint on coalescence*
> Coalescence between two non-identical Blanga vowels can appear only in a sequence eligible for diphthong formation and only if the complex expression to which the resulting surface form is linked combines the elements of the original expressions involved, observing the ban on identical elements.

The constraint above explains why only quantum vowels can coalesce into a monophthong.

```
  a    i → e      but    a    e   →  *e
  |    |    |            |    |       |
 (A)  (I) → (AI)        (A) (AI) → *(AAI)


  a    u → ɔ      but    a    ɔ   →  *ɔ
  |    |    |            |    |       |
 (A)  (U) →(AU)         (A) (AU) →*(AAU)
```

None of the other permitted diphthongs can be reduced by coalescence between its V1 and V2. It is noticed that the remaining possibilities would be between a simplex and a complex element. With the sequences a-(A) + e-(AI), a-(A) + ɔ-(AU), and e-(AI) + i-(I) fusion cannot take place due to the impossibility of two identical expressions to coexist in an element: *(AAI), *(AAU), or *(AII), which is universal. In the cases of e-(AI) + u-(U) and o-(AU) + i-(I), the possible fusion is blocked by a language-specific constraint: coalescence between a simplex and a complex element is not permitted in Blanga to avoid the surface creation of additional rounded vowels.

Diphthong formation and coalescence between both identical and non-identical vowels within the limits imposed by the constraints above are also possible across word or morpheme boundaries. Both are illustrated by the combination between the limiter particle *bla* and the existential verb *au*.

(92) /bla a.u/ → [bla.u] → [blau]

3.4 Summary of hiatus avoidance

The choice of hiatus avoidance strategies seems to depend on the nature of the vowels involved and the rapidity of speech. Here, I summarise the strategies found and the order in which they are employed.

If high vowels in V1 position are present, then the preferred hiatus avoidance strategy is glide formation. When glide formation is prevented by constraints on consonant clusters, the hiatus avoidance strategy is glottal stop insertion, thus avoiding the surface creation of triple branching in the syllable onset, since the language only allows two-member consonant clusters. When glide formation is prevented by constraints on word minimality, hiatus is avoided in two ways, depending on which high vowel is V1. If V1 is the back high vowel, hiatus is avoided by glottal stop insertion, rather than glide formation, while if V1 is the high front vowel, glide insertion, rather than glide formation or glottal stop insertion, is the hiatus avoidance strategy. Both strategies avoid the surface creation of words consisting of a single light syllable.

When there are no candidates for glide formation, we distinguish mainly between situations when V1 and V2 are identical, on the one hand, and situations when V1 and V2 are different, on the other. When V1 and V2 are identical, the hiatus avoidance strategy is glottal stop insertion in casual speech or moderate speed, while in more rapid speech identical vowels coalesce into one single segment, without length preservation.

When V1 and V2 are different, we distinguish between ascending, descending and level sequences. In ascending sequences, the preferred hiatus avoidance strategy is diphthong formation in casual speech or moderate speed. Glottal stop epenthesis is rare and occurs mainly in disyllabic words. In more rapid speech the quantum vowels may coalesce in ascending sequences in non-word-final position, while in a combination of a quantum vowel with a secondary vowel hiatus can be avoided only by diphthong formation, regardless of the speech speed. Similarly, in descending and level sequences, the only strategy of hiatus avoidance is glottal stop insertion.

4 Stress assignment in Blanga

The analysis employed here is performed within the framework of Hayes' (1995) parametric metrical theory, according to which "stress is the linguistic manifestation of rhythmic structure" and a property of the syllable (Hayes 1995:8). However, rather than merely pointing at syllables, capturing rhythmic stress assignment rules requires identifying metrical constituents and understanding the relations between them. The foot is considered to be the smallest metrical constituent and only three bounded foot types are recognised in this particular version of the theory: the syllabic trochee, the moraic trochee, and the iamb. Rhythmic structure is hierarchical, allowing for multiple degrees of stress, and the syllable assigned the main stress is regarded as the strongest syllable in a domain. Stress levels within a domain (foot, word, phrase and possibly higher) are determined by the rhythmical character of the structure, rather than by differences in their physical manifestations.

Of the three-foot types, the iamb and the moraic trochee, are quantity-sensitive meaning that they count moras for purposes of stress assignment. They are thus expected to be found mostly, though not exclusively, in languages that have a segmental length contrast. The remaining foot, the syllabic trochee, is not quantity-sensitive, meaning that, for stress assignment, the language might count syllables without taking their weight into account. It is important to point out that syllabic trochee systems do not appear exclusively in languages with no length distinction (if that were the case, the postulation of such a foot type would be unnecessary). Hayes (1995:101-102) shows examples of languages with quantity opposition whose stress pattern can be or has been analysed with syllabic trochees.

The importance of Blanga stress assignment is that it confirms Hayes' (1995:103) prediction that if a language using a syllabic trochee system shows some evidence of heavy syllables, which does not necessarily mean a segmental length contrast, then a heavy syllable at one edge of the parse constitutes a proper syllabic trochee. Hayes points out that his prediction is difficult to check due to the fact that, in most languages described so far, crucial cases either do not exist or have not been made available in the sources. The Blanga data not only reveal such a case, but also show that well-formed syllabic trochees consisting of a single heavy syllable can occur not only at the end of the parse, as in Hayes' examples, but also at the beginning of the parse under some conditions.

4.1 Analysis of underlying forms

Quantity-sensitive languages that employ syllabic trochee systems are in fact unequivocal cases of languages counting syllables for stress assignment. Blanga has no contrastive segmental length, no underlying diphthongs and no underlying codas, meaning that all its syllables are underlyingly light. Since all syllables are light and light syllables consist of only one mora each, the question of whether the language counts syllables or moras becomes superfluous but, following Hayes (1995:102), the convention is to consider that such languages do count syllables, rather than moras, and this is crucial in explaining Blanga surface forms with final stress as it will be seen in §4.2.

List elicitations of quotation forms of underived words and frozen derivations with different numbers of syllables show that Blanga main stress is invariably penultimate: ˈi.fu 'blow', ˈsu.a 'child', ˈba.kɔ 'cheek', ˈgra.fi 'evening', ˈzi.fla 'exit', dɔ.ˈve.le 'tuber', ma.za.ˈɣa.ni 'be.young', fu.fu.ɣɔ.ˈga.e 'morning'. Given the penultimate stress and the lack of heavy syllables, one might assume from the start that Blanga employs syllabic trochees. However, careful analysis is still required since surface phenomena such as diphthong formation and vowel coalescence (§3.2) or vowel deletion (§2.5) can generate words with final stress, thus adding a certain degree of complexity to the matter. Let us first look at underlying forms. For convenience, the metrical structure of some of the illustrating words above is first shown using a tree formalism that specifies (metrically) strong (s) and weak (w) constituents.

(93)
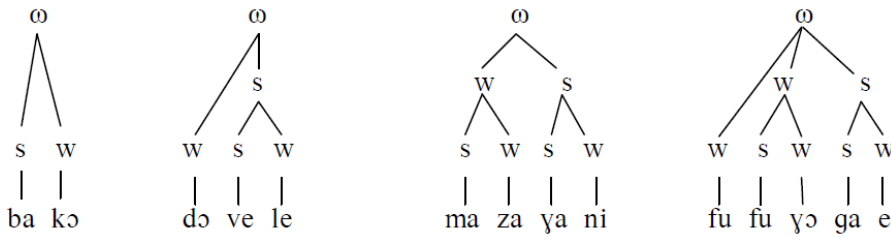
In what follows, however, I shall adopt the bracketed grid representation used by Hayes (1995), in which constituents are identified by bracketing, prominence within a constituent is marked by an /x/ at that level, and a dot symbol /./ is used to identify stressless syllables. This system is both simple and able to render complexities. Blanga stress assignment rules first group syllables into minimal metrical constituents (feet), leaving an unfooted syllable at the left edge in words with an odd number of syllables. They mark each foot as left-prominent.

(94)

(x .)	(x .)	(x .) (x .)	(x .) (x .)
bakɔ	dɔ ve le	ma za ɣa ni	fu fu ɣɔ ga e
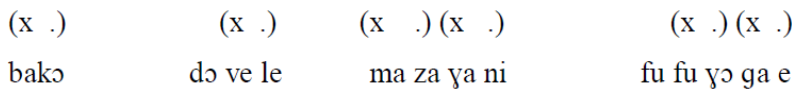
The rules then group the resulting feet into a higher constituent of maximal size, the word, and mark the rightmost foot of the word as the most prominent, which is obvious in the examples with more than three syllables.

(95)

(x)	(x)	(x)	(x)
(x .)	(x .)	(x .) (x .)	(x .) (x .)
bakɔ	dɔ ve le	ma za ɣa ni	fu fu ɣɔ ga e
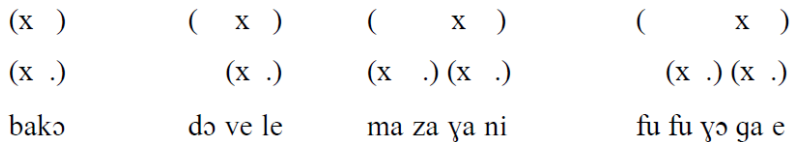
The interpretation of both the tree diagram and the bracketed grid representation is that Blanga feet are disyllabic and left-headed (syllabic trochees) and constructed from right to left, as attested by the odd syllable examples. In the word layer, main stress is derived by what Hayes calls an "End Rule". Blanga applies "End Rule Right", which assigns the head of the word constituent to the rightmost available position.

4.2 Taking into account surface diphthongs

Blanga (phonological) words, therefore, are right-headed and parsed into right-aligned syllabic trochees, at least as revealed by the underlying forms analysed so far. A more thorough account of Blanga stress, however, must take into account the different surface processes that might interact with stress assignment. Let us repeat that, so far, it has been assumed that the language counts syllables rather than moras for stress assignment.

A more complex picture emerges if one considers what happens at the surface. I have shown in §3.2 and §3.3 that the widespread Blanga tendency of hiatus avoidance may generate surface diphthongs under certain conditions. Only ascending V.V sequences (as defined in §3.3) are eligible for diphthong formation and their surface realisations are as follows: /a.i/→[ai], /a.e/→[ai], /a.u/→[au], /a.ɔ/→[au], /e.u/→[eu], /ɔ.i/→[ɔi], /e.i/→[ei], and /ɔ.u/→[ɔu]. Diphthong formation reduces by one the number of syllables in a word, disyllabic words becoming monosyllabic, three-syllable words becoming disyllabic etc.

(96) /ˈŋa.u/→[ŋau] 'eat'

(97) /ga.ˈu.sa/→[ˈgau.sa] 'betel nut', (98) /da.ˈta.u/→[da.ˈtau] 'chief'

(99) /na.u.ˈtho.glu/→[nau.ˈthɔ.glu], 'earth', (100) /kɔ.kɔ.ˈi.lɔ/→[kɔ.ˈkɔi.lɔ]'stomach'

(101) /hna.pu.ˈga.e/→[hna.pu.ˈgai] 'morning'

(102) /hɔ.vu.kɔ.ˈi.lɔ/→[hɔ.vu.ˈkɔi.lɔ] 'place.name'

Three situations can be distinguished as far as the surface behaviour of the vowel in the underlyingly stressed syllable is concerned:

a) cases in which the vowel of the underlyingly stressed syllable becomes V2 of the surface diphthong, such as in (97), (100) and (102);

b) examples such as (99), where the vowel of the underlyingly stressed syllable does not participate in surface diphthong formation;

c) situations where the vowel of the underlyingly stressed syllable becomes V1 of the surface diphthong, as in (98) and (101).

The situations in (a) are not problematic. The stress remains penultimate and the reduction of the number of syllables either creates or eliminates an unfooted syllable but otherwise preserves the underlying pattern. The surface forms in the examples below can be analysed just like any odd-syllable or even-syllable underlying word and it can still be claimed that the language doesn't count moras. The grid marks for (100) and (102) are given in the examples below.

(100)   (102)

```
(     x  )    (   x   )            (          x  )    (        x    )
(x .) (x .)        (x   .)            (x   .) (x .)      (x .) (x   .)
kɔ kɔ  i lɔ → kɔ kɔi lɔ           hɔ vu kɔ  i lɔ → hɔ vu kɔi lɔ
```

Cases such as those in (b) and (c) may appear to contradict the syllabic trochee hypothesis as long as the syllabic trochee is strictly defined as a foot of the (x .) type. In (b) the stress is still penultimate, but a heavy syllable is formed at the left edge of the resulting odd-syllable form. In c) the stress does not move to the left to adjust to the penultimate pattern, thus generating surface words with final stress. However, under the sensible assumption that one content word must consist of at least one foot, word minimality (§2.8) can make predictions about what can constitute a foot in a particular language. Since surface words consisting of a single heavy syllable, such as /bla.u/ →[blau] 'steal', are possible in Blanga, it means that a foot of the (—) type, where the macron symbolises a heavy syllable, is a proper (Hayes 1995:86-87) surface foot in that language, and thus the theory can easily accommodate the illustrated forms. Below is the grid for Example (99), illustrative for situation (b), which shows a heavy syllabic trochee at the end of the parse, as in the Estonian and Zoque examples given by Hayes (1995:103, 104).

(99)

```
(     x     )    (    x    )
(x .) (x     .)        (x)  (x     .)
na u  tho glu  →  nau  thɔ glu
```

The examples referenced under I show that syllabic trochees consisting of a single heavy syllable are not only possible at the end of the parse (the left edge in the Blanga case), but also at the opposite edge, which explains forms such as [da.ˈtau] and [hna.pu.ˈgai]. This time, a left edge unfooted syllable occurs in forms with even (rather than odd) number of syllables.

(98)   (101)

(x   )   (x   )

   (x̠)   (x   .) (x̠)

da tau   hna pu gai

The fact that such surface words are rhythmically well-formed within a syllabic trochee system is also supported by their observing the "Continuous Column Constraint" (Hayes 1995:34), according to which a column with a grid mark on a particular layer must also contain grid marks on all lower layers. In the examples above, the grid mark on the foot containing the main stress is dominated by a grid mark in the word layer. In other words, the main word stress is assigned to the single heavy syllable of that foot.

The Blanga data, therefore, constitute evidence supporting and complementing Hayes' prediction mentioned at the beginning of this section. When formulating his prediction, Hayes first took word minimality in some available languages as a clue that (—) can constitute a proper syllabic trochee, then assumed that "prosodic structure is created maximally" (Hayes 1995:102) and concluded that such a foot type is possible provided that only one long syllable is available, which explains forms such as [da.ˈtau] (98). If not at the edge, the heavy syllable would be parsed in the same foot as the preceding one (in the Blanga case from right to left) due to maximality, which justifies forms such as [kɔ.ˈkɔi.lɔ] (100).

Another important consequence of this analysis of Blanga stress is that it clearly shows that statements concerning the position of the stressed syllable within the word (final, penultimate etc.) are not enough to account for the assignment of stress in a given language. Blanga stress assignment is based on the relation between word minima, foot structure, and higher-level constraints. Stress assignment happens, naturally, at an earlier stage, prior to surface phenomena. Different surface manifestations are then allowed as long as they do not interfere with the already established rhythmic pattern. Surface glide formation (§3.1), for instance, is blocked if it would generate a light monosyllab, since a single light syllable cannot form a foot.
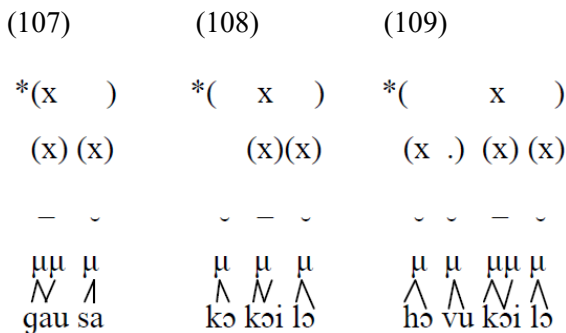
More evidence that the syllabic trochee analysis is the appropriate one for Blanga can be found if one assumes for a moment that the language actually counts moras instead of syllables and, while this is obscured by the one-mora-to-one-syllable equivalence in underlying forms, it is nevertheless revealed at the surface, where diphthong formation generates heavy syllables. Such analysis will treat the forms [dɔ.ˈve.le] 'tuber' and [da.ˈtau] 'chief' as equivalent for the purpose of stress assignment, the proposed foot type being the moraic trochee this time. Here and in the following examples, the macron symbolises a heavy syllable and the breve a light syllable. A proper moraic trochee (Hayes 1995:69) can consist of two light syllables or one heavy syllable: (x̠ ˘) or (x). Rhythmically, [dɔ.ˈve.le] (103) and [da.ˈtau] (104) would be the same, both consisting of a moraic trochee and an unfooted light syllable at the left edge.

(103)   (104)

(x   )   (x)

  (x .)   (x)

˘ ˘ ˘   ˘   —

μ μ μ   μ μ μ

dɔ ve le   da tau

Similarly, the form [hna.pu.ˈgai] (105) would be treated as rhythmically identical with the form [ma.za.ˈɣa.ni] (106), both consisting of two moraic trochees, with prominence on the rightmost one.

(105)   (106)

(x   )   (x)

(x   .) (x   .)   (x   .)   (x)

˘   ˘   ˘   ˘   ˘   ˘   ˘   ‾

μ   μ   μ   μ   μ   μ   μ μ

ma za ɣa ni   hna pu gai
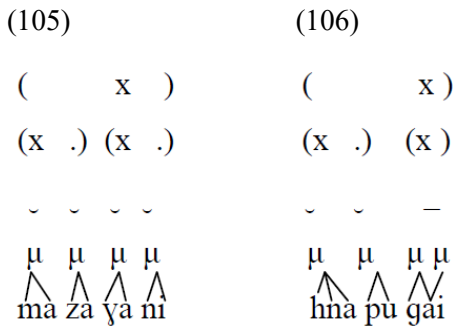
The forms above would still show feet constructed from right to left, while prominence at word level would still be assigned by End Rule Right. However, under the moraic trochee hypothesis, the parsing of forms such as [ˈgau.sa] (107), [kɔ.ˈkɔi.lɔ] (108) and [hɔ.vu.ˈkɔi.lɔ] (109) will require us to assume that the language allows degenerate feet, defined as "the smallest logically possible feet" in a given system (Hayes 1995:86) and thus consisting of a single light syllable. Degenerate feet are either allowed or not on a language-specific basis. In languages that allow them, they can appear "only in strong position, i.e. when dominated by another grid mark" (Heyes 1995:87) since they are tolerated as a means of avoiding the violation of the Continuous Column Constraint (Hayes 1995:34). The examples below are ill-parsed because the grid mark on the degenerate foot is not dominated by a grid mark in the word layer.

(107)   (108)   (109)

*(x   )   *(x   )   *(x   )

  (x) (x)   (x)(x)   (x   .) (x) (x)

  ‾   ˘   ˘   ‾   ˘   ˘   ˘   ‾   ˘

  μμ   μ   μ   μ   μ   μ   μ   μμ   μ

  gau sa   kɔ kɔi lɔ   hɔ vu kɔi lɔ

The moraic trochee hypothesis can, therefore, be easily dismissed based solely on violations of the Strong Position Constraint. It can then be noted that Blanga minimal (content) words cannot consist of a single light syllable.

4.3 Surface forms with final-vowel deletion, enclitics and stress

Surface word-final vowel deletion is widespread in Blanga and can occur either after another consonant or after a vowel (§2.5), as in the examples below.

> (110) /ˋma.ne ˈdɔ.u/ 'big man' → [man.ˈdɔ.u]

> (111) /hna.ˋga.re ˈdɔ.u/ 'big garden' → [ˋhna.gar.ˈdɔ.u]

> (112) /fa.ˈka.e=ni/ 'see=3SG.AGR' → [ˈfa.ka=ni]

> (113) /fa.ˋka.e=ˈniɣɔ/ 'see=2SG.AGR' → [ˋfa.ka=ˈniɣɔ]

However, deletion is not possible in phrase-final position and the reduced form will always be part of a larger phonological word, *i.e.* followed by more metrical material to the right. Thus, if a heavy CVC syllable is generated, this will either create a well-formed foot by itself at the end of the parse in odd-syllabled forms (114), or will become the stressless syllable of the weaker previous foot in even-syllable forms (115).

(114)

```
(     x   )    (     x   )
(x   .) (x   .)    (x̲)  (x  .)
ma ne  dɔ u  → man dɔ u
```

(115)

```
(         x   )  (         x   )
        (x   .) (x   .)    (x      .) (x   .)
hna ga re  dɔ u  → hna gar  dɔ u
```

If a V syllable is syncopated, the feet will be adjusted accordingly. Syllables between < > are extrametrical, *i.e.* not seen by the rules of rhythmic stress assignment (Hayes 1995:56-60, 105-110).

(116)

```
(  x  )          (x  .)
  (x  .)         (x  .)
fa ka e=<ni> → fa ka=<ni>
```

(117)

```
(      x  )  (      x  )
(x  .) (x  .)    (x  .) (x  .)
fa ka e=ni ɣɔ → fa ka=ni ɣɔ
```

The extrametricality of =*ni* is due to its enclitic nature. Both =*ni* and =*niɣɔ* are enclitics. Monosyllabic clitics cannot project stress, hence the extrametrical character of =*ni*, while disyllabic clitics can and are thus seen by the stress assignment rules.

4.4 Suffixes and stress

Only a handful of suffixes have been identified in the language. They are all realised as monosyllabic at the surface, but do not show a unitary pattern as far as their interaction with stress is concerned. Normally, monosyllabic suffixes add an extra syllable to the right edge of the word. This is illustrated by the forms [a.re.ˈlau] 'those particular ones' (118) and [ˈa.ra.hi] 'myself' (119). They consist of the specifying suffix -*lau* attached to the plural distal demonstrative *are* and the emphatic suffix -*hi* attached to the first person singular personal pronoun *ara* respectively. The former clearly attracts stress and can be easily parsed into syllabic trochees thanks to its heavy syllable.

(118)

```
(x   )  (      x)
(x  .)   (x  .) (x̲)
a re → a re  -lau
```

'those' 'those particular ones'

The latter consists of a light syllable, which cannot be analysed as a degenerate foot, as we have shown that Blanga allows no degenerate feet. As this extra light syllable does not provide enough metrical material for the creation of a foot, it seems to be extrametrical.

(119)

```
(x  )  (x  )
(x .)  (x .)
a ra → a ra -<hi>
```

Under such analysis, suffixes consisting of a single light syllable would apparently behave like monosyllabic enclitics (4.3), which cannot attract stress. However, the problem with -*hi* is that this suffix is many times perceived, at least by myself, as prominent, suggesting that in reality the surface form should be rendered as [a.ra.ˈhi]. This may be problematic for the analysis unless, as one anonymous reviewer suggested, acoustic measurements can prove that some compensatory vocalic lengthening is involved. Further research is needed in order to elucidate this aspect.

In both (118) and (119) above, End Rule Right has assigned word stress to the rightmost available foot. A similar situation is represented by the series of polarity, aspect and tense suffixes *-ti* 'NEG', *-ke* 'PERF' and *-ge* 'PRES'. These can only be attached to a bound base representing either the modal category realis (*ne-*) or irrealis mood/habitual aspect (*e-*). These attach as in (120):

(120) MOD/ASP + (NEG) + (PERF) + (PRES)

The minimal shape of such a form is thus disyllabic (121) and offers just enough material for the creation of a proper trochee. When there are two suffixes in a row (122), the third syllable is extrametrical.

(121)   (122)

(x .)   (x .)

e -ke   e -ti -<ke>

'IRR-PERF'   'IRR-NEG-PERF'

A different example is that of the transitivising suffix *-i* (123), which always replaces the last vowel of an intransitive stem and thus does not create an extra syllable of its own. No extra material is added in this case.

(123)

(x   )   (x   )

(x .)   (x   .)

kɔ hrɔ   →   kɔ hr-i

'pull (v.i.)' 'pull (v.t)'

It may be the case that the behaviour of this suffix is due to prosodic constraints, *i.e.* an attempt to avoid generating additional metrical material and thus to preserve the stress pattern. A similar analysis was recently proposed for the so called "final vowels" in the Bantu languages (Good 2020).

As suggested by an anonymous reviewer, the behavioural differences between Blanga suffixes may be explained by their reflecting different stages in the process of unbound Oceanic particles becoming bound morphemes or clitics. The historical understanding of Blanga and other Isabel languages is, however, very limited at this stage and further research is needed to account for such phenomena.

4.5 Pre-stem morphology and stress

Pre-stem morphology, including echo syllables of partially reduplicated forms, prefixes or combinations of both, does not affect the rhythmic pattern and the main stress position. Thus, a monosyllabic prefix or an echo syllable attached to a disyllabic stem will result in a three-syllable word with an unfooted syllable at the left edge, as in *na.ˈfri.hŋe* 'work (n.)' ← *ˈfri.hŋe* 'work (v.)' (124) and *za.ˈza.hɔ* 'walk (v.)' ← *ˈza.hɔ* 'go' (125), the pattern being the same as with underived three-syllable words.

(124)   (125)

(x   )   (x   )   (x) (x   )

(x .)   (x .)   (x .)   (x .)

fri hŋe → na fri hŋe   za hɔ → za za hɔ

Disyllabic prefixes have not been attested but a combination of monosyllabic prefix and echo syllable will offer enough metrical material for a new foot to be parsed to the left, according to the four-syllable word

pattern, as in the case of *fa.ka.ˈkra.ŋɔ* 'dry (v.)' ← *ˈkra.ŋɔ* 'be.dry' (126) (by means of the causative prefix *fa-* combined with partial reduplication).

(126)

```
(x   .)     (      x    )

(x   .)     (x  .) (x   .)

kra  ŋɔ  →  fa  ka  kra  ŋɔ
```

4.6 Compounds, full reduplication and stress

With the exception of some three-member constructions involving the purposive particle *mala*, all the compounds that have been identified so far in Blanga consist of two elements. For most of these, both elements are disyllabic, but cases in which one element has three syllables can be found. At the same time, all of the attested fully reduplicated forms copy a disyllabic base. Both compounds and fully reduplicated forms are phonologically right strong: /ˈva.ka ˈfla.lɔ/ 'airplane' ← /ˈva.ka/ 'boat' + /ˈfla.lɔ/ 'fly' (127), /ˈka.la meˈmeha/ 'feather' ← /ˈkʰa.la/ 'hair' + /meˈmeha/ 'bird' (128), /ˈde.ke.ˈde.ke/ 'toe-walkinkg' ← /ˈde.ke/ 'step' (129). Full reduplications and compounds with disyllabic elements can be parsed in the same way as underived four-syllable words.

(127)   (129)

```
(x   )  (x   )  (      x    )      (x   )  (      x    )
(x   .)  (x   .)  (x   .) (x   .)      (x   .)  (x   .) (x   .)
va  ka  +  fla  lɔ → va  ka  fla  lɔ     de  ke → de  ke  de  ke
```

In compounds with an odd-syllable second element, such as /ˈka.la meˈmeha/, the secondary stress remains on the first syllable of the first element instead of moving one step to the right to accommodate the trochaic pattern. Apparently, when metrical structure is assigned to this derived word, the unfooted syllable of the second element will need to be redistributed to the foot to its left, which would create a dactyl (130).

(130)

```
(x   )  (      x    )  ?(            x    )
(x   .)       (x   .)   (x   .    .) (x   .)
ka  la  +  me  me  ha → ka  la  me  me  ha
```

However, as pointed out at the beginning of §4, this version of the metrical stress theory allows only binary feet to be created. Dactyls are thus excluded. The inconsistency is solved by applying what Hayes (1995:95) "the Priority Clause". As stated above, Blanga does not allow degenerate feet. But even in languages that do allow them, degenerate feet are only allowed at the end of the parse. The Priority Clause states that "if at any stage in foot parsing the portion of the string being scanned would yield a degenerate foot, the parse scans further along the string to construct a proper foot where possible". This would allow the first syllable of *memeha* to remain unfooted (131).

(131)

```
(x   )  (      x    )  (            x    )
(x   .)       (x   .)   (x   .)   (x   .)
ka  la  +  me  me  ha → ka  la   me  me  ha
```

4.7 Loanwords and stress

Like many Solomon Islanders, most Blanga people, and especially the younger ones, are now multilingual. There are two main sources of borrowings into Blanga: the autochthonous languages of Isabel Island (especially Bughotu and Cheke Holo) and Melanesian Pidgin in its Solomon Islands version, which is usually referred to as Pijin. The influence of Bughotu is mainly due to its cultural prestige, as the language of the first Christian missionaries and the first Bible translations and is manifested mostly in the lexicon. Cheke Holo and Pijin loanwords are capable of increasing the Blanga consonant inventory, while Pijin loanwords also affect Blanga phonotactics and syllable structure.

As far as stress is concerned, loanwords from Cheke Holo and other Isabel languages (and as a matter of fact from Oceanic languages in general) do not trigger changes in the Blanga pattern. They either display the same penultimate stress or are easily adjusted. Pijin loanwords, which normally preserve their source English stress, may behave differently. The tendency is to to adjust them to the penultimate pattern, but sometimes they retain the Pijin stress on the original syllable, thus altering the Blanga pattern when it does not happen to fall on the penultimate syllable, e.g. ˈsa.ra.re 'Saturday'. In some instances, coda avoidance triggers the addition of a word-final vowel, increasing the number of syllables. This process does not affect the position of stress and may thus turn disyllabic Pijin words with penultimate stress into three-syllable Blanga words with irregular antepenultimate stress: ˈle.mɔ.ne 'lemon', ˈpetrɔlɔ 'petrol'. This seems to happen mostly when Blanga-Cheke Holo code-switching is intense (e.g. in situations with mixed audience). Further research is needed to show if this is restricted to code-switching situations or we are actually witnessing a change in progress that may eventually affect the Blanga stress pattern.

5 Conclusion

Provided that there is evidence of a rhythmical organisation of prosodic units, a metrical stress theory is capable of elucidating stress assignment in languages like Blanga, in which the underlying syllable structure and stress pattern seem to conflict with surface manifestations if the analysis is simplistically based on statements regarding solely the position of prominent syllables. Surface processes subsequent to stress assignment may generate structures that appear to contradict the established pattern and such statements risk resulting in paradoxical conclusions.

More than checking the validity of the assumptions, constraints and predictions made in Hayes (1995), the analysis of the data from Blanga, a previously undescribed and undocumented endangered Austronesian language, has shown that, naturally, once assigned underlyingly, metrical structure is preserved at the surface, despite of any subsequent phenomena that may occur. Surface processes can take place as long as they do not affect the already assigned metrical structure, otherwise they are blocked. No underlying heavy syllables being present in Blanga and stress being always penultimate, the language clearly uses syllabic trochees as minimal metric units (constructed from right to left in this case). However, as a consequence of surface processes, heavy syllables are formed in word-initial, word-medial and word-final position and can bear stress if final. When the stressed vowel of the underlying form becomes the first element of the surface diphthong (which, in turn, is conditioned by constraints on diphthong formation) the forms may suggest the employment of moraic, rather than syllabic, trochees. The moraic trochee hypothesis would require the postulation of degenerate feet and is easily dismissed by noticing that the language does not tolerate such feet, as they would violate the Strong Position Constraint. On the other hand, surface words with final stress are rhythmically well formed, as proved by their observing the Continuous Column Constraint, which, together with clues from word minima, proves that in a syllabic trochee language with no segmental length contrast *a heavy syllable at one edge of the parse constitutes a well-formed syllabic trochee as long as it is the only heavy syllable available at word level*, a prediction so far considered difficult to check in the absence of relevant data. The theory also accommodates seemingly problematic enclitics, suffixes and compounds by applying the principal of extrametricality and the Priority Clause.

Sources
https://elar.soas.ac.uk/Collection/MPI1029725
https://catalog.paradisec.org.au/collections/RV1

Abbreviations

.	stressless syllable in bracketed grid representation
˘	light syllable
—	heavy syllable
1	first person
2	second person
3	third person
μ	mora
σ	syllable
ω	prosodic word
AGR	agreement marker
ASP	aspect
C	consonant
Cd	coda (of syllable)
DEM	demonstrative
DL	dual
EXCL	exclusive (pronominal category)
FUT	future
IRR	irrealis
MOD	modality
N	nucleus (of syllable)
N	nearby (demonstrative category)
n	noun
NEG	negative
O	onset (of syllable)
PERF	perfective
PL	plural
PRES	present
PV	potentially visible (demonstrative category)
S	strong metric constituent
V	vowel
v	verb
vi	intransitive verb
vt	transitive verb
W	weak metric constituent
X	timing tier mark in tree syllable representation
x	prominent constituent in bracketed grid representation

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