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0. Introduction

This paper gives a comprehensive description of the phonological system of Irabu (with an exclusive focus on the Nagahama dialect), a sub-variety of Miyako Ryukyuan, a Southern Ryukyuan language of the Japonic language group¹.

1. Irabu phonology: overview

1.1. Typological summary

Irabu phonology is characterised by rather complex syllable structures which are dependent on their position in phonological words (Section 2, 3, 4, and 5), gemination and length contrasts sensitive to the notion mora (Section 6), a pitch accent system (Section 7), and foot-based phrase-level prosody (Section 8). Throughout these sections, especially in Sections 2, 7, and 8, we will note that Irabu is a language where a grammatically defined word and a phonologically defined word do not always define the same unit, in such a way that a clitic (an independent grammatical word) may form a single phonological word with another grammatical word, and polymoraic affixes are independent phonological words though they are internal components of a grammatical word. Section 9 deals with several phonological processes which are effectively described by referring to the underlying (morphemic/morphophonemic) and the surface ('classical' or taxonomic phonemic) levels of the phonological system.

This paper employs the following symbols for different representational levels:

- Square brackets '[]': phonetic representation
- Slashes '/ /': surface phonemic representation
- Double slashes '// //' underlying phonemic representation (where necessary)

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1.2. Classes of phonemes

Irabu phonemes can be divided into three classes based on their distribution in larger phonological structures and their behaviours in (morpho-)phonological processes: **Consonants**, **Glides**, and **Vowels**.

1.2.1. Consonants

Table 1 below shows the inventory of consonant phonemes. As is shown below, there are three phonemic places of articulation (labial, alveolar, velar(/glottal)) and three phonemic manners of articulation (stop, fricative, resonant).

Table 1. Inventory of consonant phonemes

		Labial	Alveolar	Velar (/Glottal)
Stops	vl	p	t	k
	vd	b	d	g
Fricatives	vl	f	s ts	(h)
	vd		dz	
Resonants (short/long)	nasal	m/m:	n/n:	
	approx	ʋ/v:	ɹ/ɹ:	
	lateral		l/l:	

- Stops and fricatives have voice opposition: (voiceless: vl) vs. (voiced: vd).
- /ts/ and /dz/ are phonemically classified as fricatives because of their phonotactic and morphophonemic behaviours, as noted in 5.2.3.
- Resonants may be syllabic mostly in a special type of syllable, or the presyllable (see 3.1), and may be short or long in this structural position.
- The phonetic symbol [ɹ], the major allophone of /ɹ/, is meant to represent a [z] with a less friction, or a [z]-like approximant.

1.2.2. Glides

Glide phonemes consist of /w/ and /j/. /j/ plays a major role in the syllable onset G slot. /w/ is peripheral in Irabu phonology, occurring syllable-initially only in the syllable /wa(V)/ (e.g. /wai.si/ [waiʃi] ‘onomatopaeic expression’, /ni.wa:/ [niwa:] ‘garden’), and only occasionally, between the stops /k/ and /g/ and a vowel, e.g. /kwa:.si/ [kʷa:si] ‘snack’. The complex onset CG (e.g. /pj/ as in /pja:/ (CGVV) [pʲa:] ‘early’) is phonetically realised as a single palatalised phone (e.g. [pʲ]) rather than a consonant plus glide phone ([pj]). The phonological justification for assuming a

complex onset CG rather than a single palatal consonant is noted in 5.3.

1.2.3. Vowels

The inventory of vowel phonemes of Irabu is given in **Table 2** below.

Table 2. Inventory of vowel phonemes (short/long)

i/i:	ɨ/ɨ:	ʊ/ʊ:
(e)/((e:))	(o)/((o:))	
	a/a:	

- short mid vowels are rare, and long mid vowels rarer still.
- /i/ and /ɨ/ only combine with the fricative onset; short /ɨ/ is underlyingly absent, and is predictably inserted as an epenthetic segment to break up the prohibited phonotactic pattern of phonological word (e.g. //sta// > /sita/ [sita] ‘tongue’; //pʊs// > /pʊsi/ [pʊsi] ‘star’). See 9.2.

1.3. Minimal or quasi-minimal contrasts

Here I list minimal or quasi-minimal pairs to justify the setting of the phonemes. Long segments are collectively noted in 6.3.1.

1.3.1. Consonants (stops, fricatives, and resonants)

- /p/ vs. /t/ vs. /k/: /pʊsi/ [pʊsi] ‘star’, /tʊsi/ [tʊsi] ‘year’, /kʊsi/ [kʊsi] ‘belly’
- /p/ vs. /b/: /pʊ:/ [pʊ:] ‘spike’, /bʊ:/ [bʊ:] ‘thread’
- /t/ vs. /d/: /tʊsi/ [tʊsi] ‘year’, /dʊsi/ [dʊsi] ‘friend’
- /k/ vs. /g/: /kʊ:/ [kʊ:] ‘powder’, /gʊ:/ [gʊ:] ‘cave’
- /f/ vs. /s/ vs. /dz/: /faʊ/ [faʊ] ‘eat’, /saʊ/ [saʊ] ‘pole’, /dzaʊ/ [dzaʊ] ‘gate’
- /ts/ vs. /dz/: /tsi:/ [tsi:] ‘breast’, /dzi:/ [dzi:] ‘ground’
- /p/ vs. /h/: /pi|a/ [pira] ‘tailcutter’, /hi|a/ [çira] ‘hey’
- /m/ vs. /n/: /kam/ [kam] ‘god’, /kan/ [kaŋ] ‘crab’
- /v/ vs. /ʒ/ vs. /ʎ/: /pav/ [pav] ‘snake’, /paʒ/ [paʒ] ‘fly’, /pa|/ [pa|] ‘needle’

1.3.2. Glides

- /j/ vs. /w/: /ja:/ [ja:] ‘house’, /wa:/ [wa:] ‘pig’

1.3.3. Vowels

- /a/ vs. /i/ vs. /ʊ/: /pa|/ [pa|] ‘needle’, /pi|/ [pi|] ‘garlic’, /pʊ|/ [pʊ|] ‘dig’
- /i/ vs. /e/: /=i/ [i] (tag), /=e/ [e] (interrogative)
- /ʊ/ vs. /o/: /kʊma/ [kʊma] ‘here’, /koma/ [koma] ‘spinning top’ (< Japanese)
- /a/ vs. /ɨ/: /sata/ [sata] ‘sugar’, /sita/ [sita] ‘tongue’

2. Segmentation

In describing Irabu phonology, packaging a string of phonemes into a phonologically defined unit, or a phonological word, is the most important procedure to present segmental and supersegmental phenomena. Also, it is very important in describing Irabu to recognise both phonological word and grammatical word (see below), since the two notions do not always define the same unit in Irabu, and the mismatch is sometimes conspicuous, as will be demonstrated in Section 8.

Phonological word is a word in terms of segmental and supersegmental delimitation. The segmental characterisation of the phonological word is dealt with in Sections 3 to 6, and the supersegmental characterisation in Sections 7 and 8.

Grammatical word is a word in terms of morphological delimitation. Grammatical words are units of parts-of-speech, and Irabu has such grammatical words as nominals, verbs, adverbs, post-nominal/post-verb particles, conjunctions, and interjections. Note that this study presents example sentences by inserting spaces between each grammatical word (abbreviations for inter-linear glosses in example sentences are listed at the end of this paper):

- a. mata hi|a ma:su-nagi =u mai siti-simi-t-ta| do:i.
 and hey salt -DUB =ACC too throw -CAUS -NEG -PAST EMP
 CNJ INTJ Nominal Pn.PART Pn.PART Verb Pv.PART
 ‘And, what I tell you, (they) didn’t let us waste salt and so on.’

- b. apa|agi-midom =nu =du ju: u-ta-i-ba =i,
 beautiful -woman =NOM =FOC very exist -PAST -STM -CVB:CSL =TAG
 Nominal Pn.PART Pn.PART Adverb Verb Pv.PART
 ‘Because there were many beautiful women, you know,’

Shimoji (*in.prep.*) lists the following criteria for defining grammatical word in Irabu, following Dixon and Aikhenvald’s (2002: 19) two criteria for grammatical word:

- A grammatical word consists of a number of grammatical elements which:
 (A) always occur together, rather than scattering through the clause.
 (B) occur in a fixed order.

In Irabu a grammatical word must have an obligatory component, or *base* (nominal base: base_N, verb base: base_V, adverb base: base_{ADV}, conjunction base: base_{CNJ}, interjection base: base_{INTJ}, and particle base: base_{PART}). The base may be a single root or a class-changed stem, or a compound stem (as in the nominal

/apa[agi-midom/ ‘beautiful women’ in the **b** example above). The major word classes, nominals and verbs, can also carry various optional components unique to either base, or *postbase*². The postbase consists of various derivational/inflectional affixes (thus in the **a** example above, the verb consists of the base /siti/ ‘throw; waste’ and its postbase suffixes /-simi/ (causative), /-t/ (negative), and /-ta]/ (past)). On the other hand, the minor word classes such as adverbs and particles have base only, and syntactic criteria distinguish among them.

As defined in **(A)** and **(B)** above, a grammatical word must have a coherent and rigid internal structure if it is morphologically complex, where the order of the base and the postbase and of each postbase suffix is fixed, and cannot be changed otherwise. For example, a nominal word must consist of base_N and optionally the postbase suffixes (-DIMinutive)(-PLural)(-DUBiative), and no other elements than defined here can intervene (in the light of **(A)**), or no other ordering of components (relative order of base and postbase, or within postbase suffixes) is allowed (in the light of **(B)**).

All nominal roots, some verb stems (e.g. participle stems; 9.4.1), all adverb stems, all polymoraic particles (e.g. /mai/ ‘too’ and /do:i/ (emphasis) above), etc., are separate phonological words. As will be noted in 8.2 and in 9.4 below, Irabu is such a language where most polymoraic affixes (e.g. /-nagi/ (dubiative), /-simi/ (causative), and /-ta]/ (past) in the example above) or compound stems (/apa[agi/ ‘beautiful’ and /midom/ ‘woman’) commence phonological words by themselves. Thus a single grammatical word may consist of several phonological words.

3. The structure of the phonological word

In this section I give an overview of the structure of phonological word. Note that the generalisations here apply to monomorphemic phonological words, but mostly apply to morphologically complex phonological words as well. Some divergences are noted in Shimoji (*in.prep.*).

3.1. Word template

For the descriptive purposes it is effective to divide the structure of phonological words into three portions, i.e. presyllable, initial syllable, and non-initial syllable(s):

Phonological word template:

(presyllable +) initial syllable (+ non-initial syllable_{1...n})

² Irabu is a suffixing language, with virtually no prefixes. Thus it is safe to say that the internal structure of a grammatical word is schematised as base(+postbase).

Presyllable is meant to represent a special type of syllable in terms of phonotactics and structure, which deserves a different descriptive treatment than more regular syllables (**initial syllable** and **non-initial syllable**).

The following generalisations, followed by exceptions to them, obtain as to the structure of the phonological word:

- (A) a presyllable is a syllabic resonant:

(**R_i**)**R_i** e.g. /m.ta/ [m̥ta] ‘mud’; /m̥.ta/ [m̥:ta] ‘k.o.tree’

Presyllables are mostly found in roots, and are found in a very limited number of particles (e.g. /n.kai/ (allative case)), but not found in affixes.

- (B) an initial syllable has an optional onset and coda:

((**C_i**) **C_i**) (**G**) **V₁** (**V₂**) (**C_{coda}**) e.g. /ssam/ [ssam] ‘lice’ (CCVC)

The CC cluster must be a geminate voiceless fricative or resonant.

- (C) a non-initial syllable has an obligatory onset and optional coda:

C (**G**) **V₁** (**V₂**) (**C_{coda}**) e.g. /jv̥:.lja/ [jv̥:r̥ja] ‘season’ (GVV.CGV)

or **G** **V₁** (**V₂**) (**C_{coda}**) e.g. /ma.jv̥/ [majv̥] ‘cat’ (CV.GV)

- (D) a presyllable + initial syllable produces consonant clusters R.C (e.g. /n.dza/ [ɳdza] ‘where’), RR.C (e.g. /n̥:.di/ [ɳ̥:di] ‘Yes’), or in very rare cases R.CC (e.g. /v̥.ts̥sa/ [v̥ts̥sa] ‘squirrel’), but not RR.CC.

- (E) in polysyllabic words, the structure of a final syllable is as for a non-initial syllable as in (C), i.e. with an obligatory onset and optional coda.

- (F) the coda of a final syllable is always a single resonant, and all resonants are attested in this position:

e.g. /pa.sam/ [pasam] ‘sissors’ /sa.kv̥n/ [sakv̥ŋ] ‘soap’

/i.lav/ [irav] ‘Irabu’ /paʒ/ [paʒ] ‘fly’

/ka.na.ma/ [kanama] ‘head’

- (G) there are occasions when the nucleus of a regular syllable is filled by an alveolar non-nasal resonant /ʒ(:)/ or /l(:)/. The onset is always a bilabial stop or nasal /p/, /b/ and /m/, e.g. /pʒ:/ [pʒ:] ‘day’, /pʒ.tv̥/ [pʒtv̥] ‘man’, /na.b:l/ [nab:l] ‘slippery’. See 3.2.

(H) Exceptions

- (H-1)** though an initial syllable is obligatory by definition, in rare cases presyllable-only words do exist (e.g. /m:/ [m:] ‘potato’).
- (H-2)** there are very rare instances of /V:.V/ in roots, i.e. the onset of the non-initial syllable is exceptionally missing, e.g. /a:.i/ [a:i] ‘No’ and /jv:.i/ [jv:.i] ‘preparation’. Such instances always involve /a:.i/ or /v:.i/, and are mostly found in interjections and in loans.
- (H-3)** /t/ may be exceptionally geminated in initial clusters, though there are very few attested examples: /ttja:/ [ʔttja:] ‘then’; /ttiga:/ [ʔttiga:] ‘then’.

3.2. Consonant carrying onset

Alveolar non-nasal resonants /ʒ(:)/ and /ʎ(:)/ may appear in V slots of initial syllables and of non-initial syllables. The onset must be a labial, and mostly the labial stops /p/ and /b/, and only in rare cases the labial nasal /m/. This indicates that there is a tendency towards maximising the feature difference between the onset phoneme (labial and stop) and the nucleus phoneme (alveolar and resonant).

/ʒ(:)/ Initial syllable

/pʒ.tʊ/ [pʂtʊ] ‘man’ CV.CV
 /pʒ:/ [pʂʒ:] ‘day’ CVV
 /bʒ.da/ [bʂda] ‘low’ CV.CV
 /bʒ:/ [bʂ:] ‘sit’ CVV
 /mʒ:/ [mʂ:] ‘flesh’ CVV

Non-initial syllable

/sʊ.kʊ.bʒ/ [sʊkʊbʂ] ‘belt’ CV.CV.CV
 /ka.bʒ:/ [kabʂ:] ‘paper’ CV.CVV

/ʎ(:)/ Initial syllable

/pʎ:.ma/ [pʎ:ma] ‘daytime’ CVV.CV
 /bʎ.bʎ:/ [bʎ.bʎ:] ‘alocasia odora’ CV.CVV
 /mʎ:.na/ [mʎ:na] ‘green chive’ CVV.CV

Non-initial syllable

/na.bʎ:/ [nabʎ:] ‘slippery’ CV.CVV

The tendency towards maximising feature difference also holds in presyllable plus initial syllable non-geminate clusters (such as /m.ta/ [m̥ta] ‘mud’ R.CV), where the cluster involves labial nasal resonant plus alveolar non-resonant (see 4.5.3)

One strong motivation for analysing the /ʒ(:)/ and /ʎ(:)/ here as resonant consonants exceptionally filling V slots rather than as vowels is that they are morphophonemically treated as consonants, as will be noted in 9.1.

3.3. Heavy structures

Monosyllables of the structure $((C_i)C_i)(G)V_1V_2C_{coda}$ are rare in roots: among the attested words are /aʊ/ [aʊ] ‘still’, /sa:/ [sa:] ‘take’, /da:v/ [da:v] ‘tool’, etc. The ‘fully-loaded’ monosyllable $C_iC_iGV_1V_2C_{coda}$ is not attested in the monomorphemic phonological word. The codaless but otherwise fully-loaded monosyllable structure is attested though scarce: $C_iC_iGV_1V_2$ (e.g. /ttja:/ [ʔttja:] ‘then’).

3.4. Examples of word structures

In this section I give some illustrative examples of the word structure step by step. The focus is first on the initial syllable (3.4.1 and 3.4.2), then non-initial syllable (3.4.3), and finally the presyllable (3.4.4 and 3.4.5). The phonotactic details involved in each structural position will be covered in depth in Section 4.

3.4.1. Examples of words with an initial syllable only

Here, an onset consisting of a single C may be filled by a stop (**S**), fricative (**F**), or a resonant (**R**), while an onset of two consonants CC is filled by identical segments, either a fricative or a resonant (exceptionally stop /tt/). The coda is a resonant.

	# ((C _i)	C _i)	(G)	V ₁	(V ₂)	(C _{coda}) #
	R	R				R
	F	F				
	(S)	S				
/a:/ [a:] ‘foxtail millet’				a	a	
/ai/ [ai] ‘like that’				a	i	
/ja:/ [ja:] ‘house’			j	a	a	
/am/ [am] ‘net’				a		m
/jam/ [jam] ‘disease’			j	a		m
/kam/ [kam] ‘god’		k		a		m
/maz̥/ [maz̥] ‘rice’		m		a		z̥
/aʊ/ [aʊ] ‘still’				a	ʊ	l
/pja/ [pja] ‘leave’		p	j	a		l
/ffa/ [ffa] ‘child’	f	f		a		
/ssam/ [ssam] ‘lice’	s	s		a		m
/tstsi/ [ʔtʃi] ‘pipe’	ts	ts		i		l
/ttja:/ [ʔttja:] ‘then’	t	t	j	a	a	
/mmja/ [mmja] ‘well’	m	m	j	a		
/vva/ [vva] ‘you’	v	v		a		
/z̥za/ [z̥za] ‘father’	z̥	z̥		a		

/l̥a/ [l̥a] ‘placenta’	l̥	l̥	a
/p̥z̥:/ [p̥z̥:] ‘day’	p̥	z̥	z̥

3.4.2. Examples of words with an initial and a non-initial syllable, showing the structure of the initial syllable

Here, it is noted that the set of consonants which may fill the coda of the word medial position is larger than for the word final coda (cf. 3.4.1), allowing fricatives and stops in addition to resonants. However, a coda fricative or stop must be identical with the onset of the following syllable.

#	((C _i)C _i)	(G)	V ₁	(V ₂)	(C _{coda})\$	C ₁ ...
	R	R			R	
	F	F			F	
	(S)	S			S	
/an.na/ [anna] ‘mother’			a		n	na
/av.va/ [avva] ‘oil’			a		v	va
/ja.ma/ [jama] ‘mountain’		j	a			ma
/ka.gi/ [kagi] ‘beautiful’	k		a			gi
/kaː.gi/ [kaːgi] ‘smell’	k		a	a		gi
/bat.ta/ [batta] ‘armpit’	b		a		t	ta
/bas.si/ [baʃʃi] ‘forget’	b		a		s	si
/pin.dza/ [pindza] ‘goat’	p		i		n	dza
/kiv.si/ [kivsi] ‘haze’	k		i		v	si
/mjaː.kʊ/ [mʲaːkʊ] ‘Miyako’	m	j	a	a		kʊ
/kjav.dai/ [kʲavdai] ‘brother’	k	j	a		v	dai
/nna.ma/ [nnama] ‘now’	n	n	a			ma
/p̥z̥.tʊ/ [p̥ʂtʊ] ‘man’	p̥		z̥			tʊ

3.4.3. Examples of words with an initial and a non-initial syllable, showing the structure of the non-initial syllable

Here the focus is on the non-initial syllable (of the word final position below). The onset of the non-initial syllable is obligatory (exceptions being mentioned in 3.1 (H-2)), and it must be a single consonant (plus glide) or a single glide.

	\$	C _i (G)	V ₁	(V ₂)	(C _{coda}) #
/mjaː.kʊ/ [mʲaːkʊ] ‘Miyako’	mjaː	k	ʊ		
/an.na/ [anna] ‘mother’	an	n	a		
/av.va/ [avva] ‘oil’	av	v	a		

/kjav.dai/ [kʲavdai] ‘brother’	kjav	d	a	i
/jʊ:.lja/ [jʊ:.ɾja] ‘season’	jʊ:	ɭ j	a	
/tɔn.bjan/ [tɔmbʲaŋ] ‘k.o. vegetable’	tɔn	b j	a	n
/ta.ja/ [taja] ‘power’	ta	j	a	
/na.bɭ:/ [nabɭ:] ‘slippery’	na	b	ɭ	ɭ

The /nb/ found in roots, such as /tɔn.bjan/ [tɔmbʲaŋ] ‘k.o. vegetable’ should not be analysed as /mb/, nor as a neutralisation of /n/ and /m/. The /nb/ analysis is preferable in terms of the phonotactic patterns of nasal consonant clusters (see 5.2.4).

3.4.4. Examples of words with a presyllable plus initial syllable

Here, the consonant clusters R.C, RR.C (where the RR is a long resonant phoneme), or in very rare cases R.CC, are attested.

#	((R _i)	R _i)	\$(C _i)	C _i)	(G)	V ₁	(V ₂)	(C _{coda})#
	R	R	R	R				R
			F	F				
				S				
/m.ta/ [m̥ta] ‘mud’		m		t		a		
/m.sʊ/ [m̥sʊ] ‘miso’		m		s		ʊ		
/m.na/ [m̥na] ‘shellfish’		m		n		a		
/v.ta/ [v̥ta] ‘song’		v		t		a		
/v.tstsa/ [v̥ttsa] ‘squirrel’		v	ts	ts		a		
/n.gja/ [ŋgʲa] ‘spike’		ŋ		g	j	a		
/n.biɭ/ [m̥biɭ] ‘stretch’		n		b		i		ɭ
/n.fi/ [ŋfu] ‘warm’		n		f		i		
/n.kom/ [ŋk̥om] ‘strain’		n		k		ʊ		m
/m:ta/ [m̥:ta] ‘k.o. tree’	m	m		t		a		
/n:di/ [ŋ:di] ‘yes’	n	n		d		i		
/n:ko/ [ŋ:k̥o] ‘pus’	n	n		k		ʊ		

3.4.5. Examples of words consisting only of a presyllable (a syllabic resonant)

This structure involves a phonological rule where an underlyingly single resonant root is obligatorily lengthened to meet a minimal word requirement for phonological words (see 9.4).

	#	R _i	R _i #
/m:/ [m:] ‘potato’ (/m/ > /m:/)		R	R
/n:/ [n:] ‘yes’ (/n/ > /n:/)		n	n
/v:/ [v:] ‘sell’ (participle stem) (/v/ > /v:/)		v	v
/z:/ [z:] ‘scold’ (participle stem) (/z/ > /z:/)		z	z
/l:/ [l:] ‘(the sun) sets’ (participle stem) (/l/ > /l:/)		l	l

4. Phonotactics

This section describes the phonotactics of monomorphemic phonological words. The phonotactics of morphologically complex phonological words mostly follows what is stated in this section. Some divergences are noted in Shimoji (*in.prep.*).

The phonotactics of Irabu words are summarised as follows:

(A) Basic phonotactic schema (S: stops; F: fricatives; R: resonants)

#Presyllable	Initial syllable			Non-initial syllable _{1...n} #		
((R _i) R _i)	((C _i) C _i)(G)V ₁ (V ₂)	(C _{coda})		C (G)V ₁ (V ₂)	(C _{coda})...	(C _{coda})
R R	R R	R		R	R	R
	F F	F		F	F	
	(S) S	S		S	S	

(B) V₁V₂ may be a long vowel or a (mostly rising) diphthong. See 4.1.

(C) the single onset in an initial syllable can be filled by any consonant but /v/, /z/, and /l/. See 4.2.

(D) initial syllable onset clusters involve geminates only, of any resonants or of fricatives other than /dz/ and /h/ (also /t/ exceptionally). See 4.3.

(E) non-initial cluster, i.e. coda plus onset clusters are **a**) geminates, **b**) partial geminates (homorganic /n/ + C), or **c**) restricted non-geminates. See 4.4.

(F) presyllable plus initial syllable onset clusters are mostly of the type **b**) and **c**) above. See 4.5.

(G) Word initial geminates are more common than geminates across syllable boundaries. See 4.6.

As an initial approximation, it is noted that there is an overwhelming tendency for Irabu consonant clusters to be geminates or partial geminates (involving homorganic /n/ + C) in consonant clusters within/across syllables. This generalisation holds for Miyako Ryukyuan as a whole.

4.1. Long vowels and diphthongs

The table below shows the attested combinations of V_1 and V_2 in monomorphemic phonological words. Diphthongs are mostly rising diphthongs. In rare cases a falling diphthong /iʊ/ (phonetically [jʊ:]) occurs, as a result of what I call ‘v lenition’ (/v/ > /ʊ/; thus /iʊ/ VC > /iʊ/ VV; see also 4.5).

Table 3: Long vowels and diphthong

	V_2	/a/	/ʊ/	/i/	/i/	(/e/)	(/o/)
V_1							
/a/		a:	aʊ	ai			
/ʊ/			ʊ:	ʊi			
/i/			(iʊ)	i:			
/i/					i:		
(/e/)						(e:)	
(/o/)							(o:)

With onset

/ka:/ [ka:] ‘skin’
 /naʊ/ [naʊ] ‘what’
 /kai/ [kai] ‘like that’
 /mʊ:/ [mʊ:] ‘sea weed’
 /kʊi/ [kʊi] ‘voice’
 /kiʊsi/ [kʰʊ:si] ‘haze’ (< /kiʊsi/ [kiʊsi])
 /ki:/ [ki:] ‘tree’
 /si:/ [si:] ‘nest’
 Not attested
 /do:/ [do:] (emphatic)

Without onset (initial only)

/a:/ [a:] ‘foxtail millet’
 /aʊ/ [aʊ] ‘blue’
 /ai/ [ai] ‘like that’
 /ʊ:/ [ʊ:] ‘Hare’
 /ʊi/ [ʊi] ‘that’
 Not attested
 /i:/ [i:] ‘stomach’
 None by definition (see 5.1)
 /e:/ [e:] ‘Yest’ (informal)
 /o:/ [o:] ‘Yes’ (formal)

4.2. Single onset of initial and non-initial syllables

All consonants but /v/, /ɹ/, /l/ may appear in the single onset of an initial syllable. All consonants but /v/ and /ɹ/ may appear in the single onset of non-initial syllables.

4.3. Initial syllable onset cluster: geminate

All resonants and fricatives other than /dz/ and /h/ may be geminated. As noted in 3.1 (H-3), /tt/ is also found in a very limited number of roots.

Resonants	Fricatives	Stop: /t/ only; rare
/mmi/ [mmi] ‘crowd’	/ffa/ [ffa] ‘child’	/ttja:/ [ʔttja:] ‘then’
/nnotsi/ [nnotsi] ‘life’	/ssø/ [ssø] ‘white’	/ttiga:/ [ʔttiga:] ‘then’
/vva/ [vva] ‘2SG’	/ttsi/ [ʔttsi] ‘pipe’	
/zzv/ [zzv] ‘fish’		
/lla/ [lla] ‘placenta’		

4.4. Non-initial cluster

Non-initial clusters, i.e. clusters of coda plus onset across syllable boundaries, are geminates (of any consonant other than voiced stop, voiced fricative, or /h/), partial geminates involving a homorganic nasal, phonemically /n/, plus another consonant (other than resonants), or non-geminates (a resonant plus (mostly) alveolar consonant). Non-geminates are apparently rare in monomorphemic words.

4.4.1. Geminates

Resonants	Fricatives	Stops
/døm.ma/ [dømma] (onm.)	/maf.fa/ [maffa] ‘pillow’	/ip.pai/ [ippai] ‘many’
/an.na/ [anna] ‘mother’	/ømis.si/ [ømiʃʃi] ‘funny’	/bat.ta/ [batta] ‘armpit’
/av.va/ [avva] ‘oil’	/ats.tsa/ [attsa] ‘over there’	/øk.ka/ [økka] ‘debt’
/taʒ.ʒasi/ [tazzasi] ‘bind’	(/fidz.dza/ [fuuddza] ‘whale’)	
/jv̥.v̥/ [jv̥v̥] ‘k.o.fish’		

4.4.2. Partial geminates (homorganic /n/ + C of any place of articulation)

C: Labial	C: Alveolar	C: Velar/glottal
/jv̥.n.pv̥:/ [jv̥:mpv̥:] ‘firefly’	/pin.dza/ [pindza] ‘goat’	/min.kv̥/ [min̥kv̥] ‘deaf’

4.4.3. Non-geminates (rare)

/am.di/ [amdi] ‘a fish-carrying bag’ (< /am/ ‘net’ + /di/ ‘?’)
 /kiv.si/ [kivsi] ‘haze’ (~ /kiv̥si/ [kʲv̥si])
 /paʒ.gi/ [paʒgi] ‘rash/swelling’
 /a[fi/ [a[fu] ‘walk’ (participle stem)
 /v̥l.dzin/ [v̥ldzin] ‘early summer season’

4.5. Presyllable plus initial syllable onset

This type of cluster basically follows non-initial clusters in 4.4, except that:

- 1) geminates are very rare, and
- 2) non-geminates are rather common.

With regard to **1)**, the only kind of geminate here is the initial syllable onset of the $R.C_iC_i$ cluster (see 4.5.1. below), and geminates across presyllable and initial syllable (e.g. $R_iR_i.C_iV$) are not found in monomorphemic words. From the few attested examples of type **1)** a generalisation obtains that the R is a labial resonant, and a geminate CC is alveolar. This combination of labial resonant and alveolar is also true in **2)**: non-geminates here show a clear tendency towards labial (and in particular nasal) resonant plus alveolar consonant.

4.5.1. Geminate (rare): only of the structure $R.C_iC_i$

/v.tstsa/ [ʋttsa] ‘squirrel’

/m.ssi:/ [mssi:] ‘miso soup’ (< a fossilised compound: //msʊ// ‘miso’ + //si:/ ‘soup’)

4.5.2. Partial geminates (homorganic /n(:)/ + C of any place of articulation)

C: Labial

C: Alveolar

C: Velar/glottal

/n.bi/ [m̥bi] ‘stretch’

/n.si/ [ʒsi] ‘north’

/n.kai/ [ŋkai] ‘welcome’

/n:.bʊ/ [m̥:bʊ] ‘navel’

/n:.di/ [ŋ:di] ‘yes’

/n:.kʊ/ [ŋ:kʊ] ‘pus’

4.5.3. Non-geminates (labial resonant plus alveolar consonant)

Labial: /m/

(/v/: lenition is pervasive)

/m.ta/ [m̥ta] ‘mud’

/v.ta/ [ʋta]~ /ʊ.ta/ [ʊta] ‘song’

/m.sʊ/ [m̥sʊ] ‘miso’

/v.si/ [ʋsi]~ /ʊ.si/ [ʊsi] ‘rice mortar’

/m.na/ [m̥na] ‘shellfish’

/v.da/ [ʋda]~ /ʊ.da/ [ʊda] ‘thick; fat’

/m:.ta/ [m̥:ta] ‘a kind of tree’

/m:.sa/ [m̥:sa] ‘similar’

/m:.na/ [m̥:na] ‘all’

The /v/ lenition (/v/ > /ʊ/) is pervasive in non-geminates here, especially among the middle-aged/younger speakers (age 50-60 or younger). The result is a substantial rearrangement of syllable structures: the cluster $R.CV$ is broken down to $V.CV$ (e.g. /v.ta/ $R.CV$ > /ʊ.ta/ $V.CV$), where the presyllable R resolves into the initial syllable V . It is an emerging phonotactic pattern, then, that in the presyllable plus initial onset clusters, the presyllable must be a nasal (short /m/ and /n/ or long /m:/ and

/n:/), excluding the possibility of the other labial resonant, i.e. /v/.

4.6. Frequency-based account of root structures

Here it is helpful to give a statistical account of Irabu phonological word structure, showing that some structures are more frequently found than others. This allows us to have a basic idea of what is an unmarked/marked structure/phonotactic pattern in Irabu. The database here is of 600 native free roots (mostly nominal and adjectival, together with some participle stem forms (zero affix forms) of verb roots; 9.4.1).

The top ten list of most frequently occurring root structures is as follows.

Table 4. Top ten list of most frequently occurring root structures in 600 roots

Rank	Structure	Tokens	Example
1.	CV.CV	180	/pʊ.ni/ [pʊni] ‘bone’
2.	CVV	66	/ka:/ [ka:] ‘skin’; /kʊi/ [kʊi] ‘voice’
3.	CV.CV.CV	54	/ka.ta.na/ [katana] ‘knife’
4.	V.CV	40	/ʊ.tʊ/ [ʊtʊ] ‘sound’
5.	CVC	38	/paʒ/ [paʒ] ‘fly’
6.	R.CV	32	/n.dza/ [ɳdza] ‘where’; /m.sʊ/ [ɲsʊ] ‘miso’
7.	CV.CVC	30	/pa.sam/ [pasam] ‘scissors’
8.	GV.CV	16	/jʊ.da/ [jʊda] ‘branch’
9.	CCV.CV	14	/nna.ma/ [ɲnama] ‘now’
10.	CVC.CV	12	/kʊv.va/ [kʊvva] ‘calf of leg’
	CCV	12	/mma/ [mma] ‘mother’

This list tells us much about the general tendency of root structures, of which the most important points to note are:

- 1) most frequently occurring roots are di- or trisyllabic. Next comes monosyllabic structures, of the Rank 2 (CVV), 5 (CVC), and 10 (CCV).
- 2) the most typical root structure is CV.CV with the open syllable CV.
- 3) Neither initial clusters nor medial clusters are popular in the most frequently occurring root structures. Initial clusters are more common than non-initial clusters in roots.

In association with 1), we will see in 6.2 that Irabu phonological words must have at least two moras. Thus the monosyllabic words in the Rank 2, 5, and 10 have heavy syllable structures. The definition of mora is given in 6.1.

With regard to 2), it is noted that the top 3 structure CV.CV.CV is also built

from the CV syllables. Thus in Irabu roots, CV syllables constitute the most basic structural type in terms of frequency, even though the possible structure of phonological words is much more complex (as defined in 3.1).

With regard to **3)**, it is noted that the presyllable plus initial onset cluster R.CV (as found in the Rank 6; 32 tokens) is slightly more frequent than the initial syllable onset cluster CCV (as found in Rank 9 and 10, accounting for 26 tokens), and there is no R.CGV or CCGV in the most frequently occurring patterns. Also, the root structures containing non-initial clusters are fairly rare in the top ten list, only appearing at the Rank 10.

5. Distribution of phonemes

This section notes allophonic variation found in each phoneme as well as the phonotactic patterns in terms of each phoneme class. Here, a number of segmental issues, major and minor, will be addressed as listed below:

- Phonotactic patterns of high central vowels /i/ and /i:/: see 5.1.
- /ts/ and /dz/ as phonemic fricatives: see 5.2.3.
- Phonetic [m(:)] plus labial [p] or [b] as /n(:)p/ or /n(:)b/: see 5.2.4.
- Palatal(ised) phones as phonemically complex onsets (C plus G): see 5.3.

5.1. Vowel phonotactics: the phoneme /i/

The high central vowels /i/ and /i:/ cannot occur without a preceding onset and occurs only with fricative onsets, e.g. /fi.sa/ [fusa] ‘plant’, /tsi.na/ [tsina] ‘rope’, /dzi.mi.dzi/ [dzimidzi] ‘warm’, /ʊ.si/ [ʊsi] ‘cattle’. The short /i/ is undernlyngly absent and is inserted at the surface level (see 9.2 for a detailed account).

5.2. Consonants

5.2.1. Allophonic variation of consonants

Now that we have a clear picture of the structure of phonological word, we can set out to describe allophonic variation of consonants, which is heavily dependent on syllable structures and the position of a syllable in a phonological word.

So far we have established the following word template with a basic phonotactic annotation (**R**: resonant; **F**: fricative; **S**: stop). For descriptive convenience, let us number segmental slots as follows, corresponding to the numbers in **Table 5**:

#Presyllable	Initial syllable			Non-initial syllable _{1...n} #		
((R _i) R _i)	((C ₂)C ₁) (G)V _I (V ₂) (C ₃)			C ₄ (G)V _I (V ₂) (C ₃)... (C ₅)		
	<i>onset</i>		<i>coda</i>	<i>onset</i>	<i>coda</i>	<i>coda</i>
R	R	R	R	R	R	R
	F	F	F	F	F	
	(S)	S	S	S	S	

Table 5. Consonant allophony (S: stops; F: fricatives; R: resonants)

		#RR#	#(R)R	#C ₂ C ₁	#C ₁	C ₃ C ₄	C ₄	C ₅
S	/p/	*	*	*	[p]	[pp]	[p]	*
	/t/	*	*	([^ʔ tt])	[t]	[tt]	[t]	*
	/k/	*	*	*	[k]	[kk]	[k]	*
	/b/	*	*	*	[b]	*	[b]	*
	/d/	*	*	*	[d]	*	[d]	*
	/g/	*	*	*	[g]	*	[g]	*
F	/f/	*	*	[ff]	[f]	[ff]	[f]	*
	/s/	*	*	[ss]	[ʃ/s]	[ʃʃ/ss]	[ʃ/s]	*
	/ts/	*	*	([^ʔ tts])	[tʃ/ts]	[ttʃ/tts]	[tʃ/ts]	*
	/dz/	*	*	*	[dʒ/dz]	([ddʒ/ddz])	[dʒ/dz]	*
	(/h/)	*	*	*	([ç/h])	*	([ç/h])	*
R	/m/	[m̥:]	[m̥(:)]	[mm]	[m]	[mm] _{gem} [mC] _{non.gem}	[m]	[m]
	/n/	[ŋ:]	[N(:)]	[nn]	[ɲ/n]	[ɲɲ/nn] _{gem} [NC] _{p.gem}	[ɲ/n]	[ŋ]
	/v/	[v̥:]	[v̥(:)]	[vv]	*	[vv] _{gem} [vC] _{non.gem}	*	[v]
	/z/	[z̥:]	[z̥(:)]	[zz]	*	[ʒʒ/zz] _{gem} [z̥C] _{non.gem}	*	[z̥]
	/ʃ/	[ʃ̥:]	[ʃ̥(:)]	[ʃʃ]	*	[ʃʃ] _{gem} [ʃC] _{non.gem}	[r]	[ʃ̥]

NOTE: [N]: homorganic nasal; [x/y]: [x] before i / [y] elsewhere

 (x): x is rare in roots; **gem**: geminates; **non.gem**: non-geminates

p.gem: partial geminates (homorganic /n/ plus a consonant)

[xC]: x followed by a non-x consonant

*: non applicable (the phoneme cannot fill the slot marked by *)

5.2.2. Stops

Voiced stops cannot form geminates in any position in phonological word. Voiceless stops may form geminates unless in the initial syllable onset; exceptionally, however, /t/ may form a geminate in the initial syllable.

5.2.3. Fricatives

The voiceless /h/ cannot form a geminate in any position in phonological word, and its lexical distribution is mostly restricted to non-native words (note also that it is the only phoneme whose place of articulation does not form a natural class with other phonemes). Thus /h/ is not systemic in Irabu phonology. The other ‘regular’ fricatives, /f/, /s/, /ts/, and /dz/, share the phonotactic patterns summarised below, which justifies classifying the phonetic affricates phonemically as fricatives, except that /dz/ cannot form geminate initially.

- fricatives can form geminates in initial syllable onset and across syllables.
- fricatives can serve as the onset of /i/ and /i:/
- fricatives involve a shared morphophonemic process called Lengthening rule (see 9.4; Strategy 2)

The geminate /dz.dz/ in non-initial syllables (i.e. coda plus onset) seems to be on a diachronic way towards /ts.ts/ (cf. initial /dzdz/ is absent in Irabu). For example, while some very old speakers do distinguish /fidz.dza/ [fuuddza] ‘whale’ and /fits.tsa/ [fuuttsa] ‘mouth’ (topic),³ many others do not distinguish them, pronouncing both as [fuuttsa]. This and the strong ban on voiced stop geminates indicate that there is a clear tendency in Irabu to disfavour phonemically voiced (i.e. non-resonant /b, d, g, dz/) geminate. In association with this, /dzdz/ in morpheme boundaries, as in /adz=dza/ (/adz/ ‘taste’ plus /=a/ topic marker), involves neutralisation with /tsts/ [tts] in many speakers’ speech, where the phonetic realisation of /dzdz/ as well as /tsts/ is [tts], as in /adz=dza/ [attsa] (~[addza]).

5.2.4. Nasal resonants

Of all the consonants, nasal resonants have the widest distributional range in a phonological word. They may appear in presyllables (short or long) and in initial and non-initial syllables (short only). In the latter syllable type, nasals may be a

³ Nakama (1983) also reports that his consultant (female; born in 1922) had a phonetic [ddz] in /fidzdza/ ‘whale’. My consultants who do have this voiced geminate, and who do distinguish it phonemically from voiceless [tts], were all over 80 years old at the time of research, i.e. in 2007 (thus they were born before 1927).

single onset, a coda (non-final or final), or a geminate in the initial syllable onset or across syllables.

The phonemic treatment of phonetic partial geminates [m(:)p] and [m(:)b] occurring in monomorphemic phonological words requires careful discussion. Irabu has both nasal /m(:)/ and /n(:)/, both of which may form a nasal plus consonant cluster. Note that /n(:)C/ clusters are phonetically partial geminates, where the place of articulation of homorganic /n/ assimilates to that of the following C. Thus there emerge three analytical possibilities for [m(:)p] and [m(:)b], of which the first is my current analysis: **1)** the phonetic partial geminates are analysed as /n(:)p/ and /n(:)b/, where the homorganic /n(:)/ is realised as [m(:)]; **2)** the phonetic partial geminates are analysed as /m(:)p/ and /m(:)b/; and **3)** there is a neutralisation of /n(:)/ and /m(:)/ before [p]/[b].

The Analysis **1)** allows us to have the systematic phonotactic pattern in 4.4 (non-initial cluster C.C) and in 4.5 (presyllable plus initial onset (R)R.C). First, aside from phonetic [m(:)p] and [m(:)b], two generalisations obtain with regard to the above mentioned clusters:

Generalisation 1. /n(:)C/ partial geminate involves all places of articulation *but bilabial*.

Generalisation 2. /m(:)C/ involves /m(:)/ + *alveolar* consonant.

Now, if we take Analysis **1)**, i.e. if we assume [m(:)p] and [m(:)b] as /n(:)p/ and /n(:)b/, we can have a full set of places of articulation in /n(:)C/ partial geminates, making **Generalisation 1** complete. Also, we do not harm **Generalisation 2** for non-geminates.

If we alternatively take Analysis **2)**, i.e. if we assume that [m(:)p] and [m(:)b] are /m(:)p/ and /m(:)b/ respectively, then the odd gap still occurs in **Generalisation 1**, and we even harm **Generalisation 2**, where the odd exception appears in the combinations of /m(:)C/, where /m(:)/ combines with a labial, but otherwise it only combines with alveolar consonants.

Finally, Analysis **3)** just keeps the status quo, with no positive effect on either Generalisation, since this analysis only says that [m(:)p] and [m(:)b] are phonemically ambiguous. Thus it is best to take Analysis **1)** (resulting in positive effects on Generalisations 1 and 2), as opposed to **2)** (resulting in negative effects on Generalisations 1 and 2) and **3)** (with no positive effect on either).

5.2.5. Non-nasal resonants

Non-nasal resonants, i.e. approximants /v(:)/ and /z(:)/ and lateral /l(:)/, show a

narrower distributional range than nasal resonants.

- In presyllables, long /v:/, /z:/, and /ɭ:/ do occur, but they are not underlying. That is, they are morphophonemically lengthened stem forms of the underlyingly monoconsonant roots (/v/, /z/, and /ɭ/; see 9.3.1).
- In presyllables, the short resonant /v/ may appear if it is followed by an initial syllable, as in /vtsi/ [vtsi] (R.CV) ‘inside’, but short /z/ and /ɭ/ cannot fill the presyllable slot. Note also that the short /v/ in the presyllable shows instability, frequently involving lenition (e.g. /vtsi/ R.CV > /vtsi/ V.CV: see 4.5.3). Thus, the presyllable slot is not easily accessible to short resonants.
- In the onset, /v/ and /z/ only appear as geminates, as a result of a predictable rule, Geminate copy insertion rule (see 9.1).

5.3. Glides

5.3.1. General remarks

As is shown below, I treat glide phones, i.e. [C^w] (e.g. [k^w]) and [C^j] (e.g. [p^j] and [ʃ]), as two phoneme sequences (non-glide consonant plus /w/ or /j/), rather than single consonant unit-phonemes. Thus [k^w] is treated as /k/ plus /w/, while [p^j] and [ʃ] are treated as /p/ plus /j/ and /s/ plus /j/ respectively.

Glides and their phonemic treatment

General treatment	Example		
[C ^w] --> /C/ + /w/	[k ^w a:si] ‘snack’	-->	/kwa:si/ CGVV.CV
[C ^j] --> /C/ + /j/	[ʃa:ka] ‘late midnight’	-->	/sja:ka/ CGVV.CV

The main reasons for assuming the complex onset CG are twofold. First, it allows a straightforward description of such morphological processes where a sequence of C and G produces a phonetic [C^w] or [C^j] (e.g. stem-final C plus suffix initial -G > C-G; as in /kak-/ [kak] ‘write’ + /-ja/ (agent nominal suffix) > /kakja/ [kakja] (CV.CGV) ‘writer’). Second, it minimises the consonant phoneme inventory. These are addressed in the following sections.

It must be noted that the labio-velar glide /Cw/ is very restricted and peripheral in Irabu. It is only found in a handful of words and affixes, and the /C/ must be /k/ or /g/. Attested examples are:

- a. /kwa:si/ [k^wa:si] ‘snack’
- b. /kwa:ja/ [k^wa:ɾja] (Place name)
- c. /ʊkwa:sa/ [ʊk^wa:sa] ‘many’
- d. /jakkwan/ [jak^waŋ] ‘kettle’
- e. /jʊkwa:la/ [jʊk^wa:ra] ‘side’
- f. /jʊkwai/ [jʊk^waira] ‘four times’
- g. /gwatsi/ [g^watsi] ‘month’ (a suffix as in /sitsi-gwatsi/ [ʃitʃig^watsi] ‘July (lit. seventh-month)’).

In **c** and **e** /kw/ is suspected to reflect //ʊ// + //a// (**c** < //ʊkʊ// ‘big’ + //asa// ‘?’; **e** < //jʊkʊ// ‘side’ + //a// ‘left-over’). Furthermore, according to many speakers, **c**, **d**, **e**, **f**, and **g** are in free variation with /ʊka:sa/, /jakkan/, /jʊka:la/, /jʊkai/ and /gatsi/ respectively, where /w/ is dropped. Thus the /Cw/ is lexicalised and unstable, and at best peripheral in Irabu phonology.

Hence the discussion that follows focuses on /Cj/, which is well attested in Irabu phonology.

5.3.2. Advantages in assuming a complex onset CG

At the phonetic level, Irabu has the full set of palatal(ised) phones corresponding to non-palatal(ised) phones which are the major allophones of the consonant phonemes. That is, a given non-palatal [C] (/C/) has its palatal counterpart [Cʲ]. The non-palatal and palatal phones contrast phonemically. Examples are listed below:

(1) Palatals in Irabu: some examples

a. Root-internal ((quasi) minimal contrasts are given)

/pa:/ [pa:] ‘teeth’	vs.	/pja:/ [pʲa:] ‘old days’
/ʊnta/ [ʊnta] ‘frog’	vs.	/ʊntja/ [ʊntʲa] ‘3PL’
/ʊkʊgan/ [ʊkʊgaŋ] ‘big crab’	vs.	/ʊkʊgjam/ [ʊkʊgʲam] ‘millet’
/sabi/ [sabi] ‘rust’	vs.	/sjabi/ [ʃabi] ‘Shabi (name)’
/itsa/ [itsa] ‘board’	vs.	/itsjaga/ [itʃaga] ‘somehow’
/ma:kʊ/ [ma:kʊ] ‘round’	vs.	/mja:kʊ/ [mʲa:kʊ] ‘Miyako Island’
/na:/ [na:] ‘name’	vs.	/nja:n/ [nʲa:n] ‘not exist’

b. Root-final //Ci// plus clitic-initial //a// or //ʊ// > /Cia/ [Cʲa] or /Ciʊ/ [Cʲʊ]

//kʊji/ ‘this’ + //a// (topic) > /kʊji=a/ [kʊɾja:] ‘this’ (topic)

//nabi/ ‘pot’ + //ʊ// (accusative) > /nabi=ʊ/ [nabʲʊ:] ‘pot’ (accusative)

c. Root-final //C// plus suffix-initial //j//

//kak-// ‘write’ + //-ja// (agent nominal) > /kak-ja/ [kakʲa] ‘writer’

//sadʊ-// ‘search’ + //-ja// (agent nominal) > /sadʊ-ja/ [sadʊʲa] ‘searcher’

As is shown in **(1b-c)** above, not all the phonetic palatals are necessarily phonemic ones. First, the palatals of the type **(1b)** are morphophonological resultants, which are produced by the root-final //i// plus the clitic-initial //a// or //ʊ//, giving rise to /ia/ or /iʊ/ (falling vowel sequence; phonetically [ja:] and [jʊ:]). Second, the phonetic palatals of the type **(1c)** are produced by the root-final //C// plus the suffix-initial //-ja// (agent nominaliser suffix), and it is for this morphological process that our complex /CG/ approach, i.e. the separation of /C/ and /j/ for phonetic palatals, works well.

In this latter morphological process, the agent nominaliser suffix //-ja// typically attaches to verb roots, as exemplified in **(2a-b)** below. If it attaches to a root which ends in a vowel, as in **(2a)**, there is no conspicuous morphophonological alternation observed (except in //i// final roots, where //i// tends to drop), displaying a fairly agglutinative pattern.

(2a) Vowel-final root plus //-ja//

//fa-// ‘eat’ + //-ja// > /fa-ja/ [faʲa] ‘person who eats (a lot)’

//ʊbʊi-// ‘memorise’ + //-ja// > /ʊbʊ-ja/ [ʊbʊʲa] ‘person who memorise (well)’

//mi:-// ‘look’ + //-ja// > /mi-ja/ [miʲa] ‘person who stares a lot’

//kagi// ‘beautiful’ + //-ja// > /kag-ja/ [kagʲa] ‘beautiful person’

(2b) Consonant-final root plus //-ja//

//kak-// ‘write’ + //-ja// > /kak-ja/ [kakʲa] ‘writer’

CVC- CVC-GV

//sadʊ-// ‘search’ + //-ja// > /sadʊ-ja/ [sadʊʲa] ‘searcher’

CVCVC- CVCVC-GV

(2b) illustrates consonant-final roots plus //-ja//. Here, the suffix attaches to a consonant which functions to be the onset when the suffix is attached, and the consonant and the //-ja// form a phonetic palatal consonant [Cʲa]. As is suggested in **(2b)**, the most plausible phonemic analysis is to assume a complex onset /C+/j/ for the resultant phonetic [Cʲ]: we do not need to come up with any special morphophonological alternation for such cases as **(2b)**, as the suffix //-ja// is agglutinatively attached to the root ending in onset //C//. If we alternatively assume that the resulting [Cʲ] is phonemically rearranged as a single segment /Cʲ/, we would

introduce an irregular morphophonological rule for such examples as (2b): the root-final consonant //C// is replaced by the surface /Cj/.

There is another obvious advantage in terms of the economy of phoneme inventory. If we analysed each [C] as a single phoneme /Cj/, we would double the consonant inventory, by having /Cj/ corresponding to each /C/. Given that there are 16 non-glide (short segment) consonant phonemes in Irabu, we would add another 16 phonemes to our existing inventory.

6. Mora

This section introduces the phonological unit mora, which is important in describing segmental and supersegmental phenomena in Irabu. In 6.1 I define mora in association with the established syllable structures. In 6.2 minimal word structures (which must have two moras) are described. In 6.3 I note phonemic length contrasts in terms of short segments (e.g. /kagi/ [kagi] ‘beautiful’) vs. long segments (e.g. /ka:gi/ [ka:gi] ‘smell’), and of non-geminates (e.g. /nama/ [nama] ‘raw’) vs. geminates (e.g. /nnama/ [nnama] ‘now’).

6.1. Definition

Moras are counted as follows:

In a syllable

C_i	C_i	G	V_1	V_2	C_{coda}
μ	—	—	μ	μ	μ

In a presyllable

R_i	R_i
μ	μ

6.2. Minimal word

A phonological word is minimally bimoraic. Thus we have the following set of minimal words in terms of syllable structure:

Presyllable only

RR: /m:/ [m:] ‘potato’

Initial syllable only

(C)(G)VV: /pja:/ [pja:] ‘early; fast’	/pa:/ [pa:] ‘tooth’
/ja:/ [ja:] ‘home’	/a:/ [a:] ‘foxtail millet’
(C)(G)VC: /pja/ [pja] ‘leave’	/pa/ [pa] ‘needle’
/ja/ [ja] ‘spear’	/a/ [a] ‘exist’
CC(G)V: /mmja/ [mmja] (emphasis)	/mma/ [mma] ‘mother’

Initial syllable plus non-initial syllable

(C)(G)V.C(G)V: /ma.tsja/ [matʃa] ‘bird’ /ma.ta/ [mata] ‘and’
/ma.jʊ/ [majʊ] ‘cat’

Presyllable plus initial syllable

R.C(G)V: /m.tsi/ [m̥tsi] ‘road’
/n.gja/ [ŋgʲa] ‘person name’

6.3. Length (quantity) contrast

6.3.1. Short vs. long

As is illustrated below (minimal contrasts and quasi-minimal contrasts), there are both phonemically contrastive long vowels and consonants in roots. Long consonants are all resonants, and in principle occur in presyllables (see 3.2, however, for cases where /ɹ:/ and /ɭ:/ do appear in V slots in regular syllables).

Short vowel

/kagi/ [kagi] ‘beautiful’
/kasi/ [kaʃi] ‘a kind of local tree’
/tʊ/ [tʊ] ‘bird’
/sisi/ [sisi] ‘coal’

Long vowel

/ka:gi/ [ka:gi] ‘smell’
/kasi:/ [kaʃi:] ‘help’
/tʊ:/ [tʊ:] ‘cross’
/si:si/ [si:si] ‘meat’

Short consonant

/m.na/ [m̥na] ‘shellfish’
/n.si/ [n̥si] ‘north’

Long consonant

/m:na/ [m̥:na] ‘all’
/n:sa/ [n̥:sa] ‘dumb’

I have not found minimal or quasi-minimal contrasts of /e/ vs. /e:/ or /o/ vs. /o:/ in roots. In fact it is difficult to find /e/ and /o/ in Irabu in the first place. This is simply because the Proto-Ryukyuan */e/ and */o/ are reflected as /i/ and /ʊ/ in Irabu, and so the mid vowels are scarce in the Irabu lexicon.

Nasal resonants /m/ and /n/ show a length contrast in roots as demonstrated above. On the other hand, non-nasal resonants in roots do not show a length contrast, except in the cases where alveolar non-nasal resonants appear in the regular syllable V slots (3.2). In roots, long /v:/, /ɹ:/, and /ɭ:/ in presyllables are not underlyingly long, but result from an obligatory lengthening of underlyingly monomoraic roots (Lengthening rule: //v// ‘sell’ > /v:/, //ɹ// ‘scold’ > /ɹ:/, and //ɭ// ‘(the sun) sets’ > /ɭ:/). As will be noted in 9.4.1, the long /v:/, /ɹ:/, and /ɭ:/ in presyllables mostly appear as participle stems, which are independent phonological words and therefore must have two moras.

6.3.2. Non-geminate vs. geminate

Irabu has geminate /C_iC_i(G)V/ in initial syllable onset and across syllable boundaries. Non-geminate monomoraic /C(G)V/ and geminate bimoraic /C_iC_i(G)V/ are phonemically contrastive. Thus initially /na.ma/ [nama] ‘raw’ and /nna.ma/ [nnama] ‘now’ are distinguished; likewise medially /ba.si/ [bafi] ‘in between’ and /bas.si/ [baʃʃi] ‘forget’ are distinguished. Further examples of contrasts include:

Non-geminate	Geminate
/faʋ/ [faʋ] ‘eat’ CV	/ffaʋ/ [ffaʋ] ‘child’ (accusative) CCVV
/sa.gi/ [sagi] ‘k.o.bird’ CV.CV	/ssa.gi/ [ssagi] ‘bridal’ CCV.CV
/tsi.bi/ [tʃibi] ‘hip’ CV.CV	/tstsi/ [ʔttsi] ‘pipe’ CCVC
/ma:.sɔ/ [ma:sɔ] ‘salt’ CVV.CV	/mma:/ [mma:] ‘No’ CCVV
/na.ma/ [nama] ‘raw’ CV.CV	/nna.ma/ [nnama] ‘now’ CCV.CV
/ba.ta/ [bata] ‘stomach’ CV.CV	/bat.ta/ [batta] ‘armpit’ CVC.CV
/ba.si/ [bafi] ‘edge’ CV.CV	/bas.si/ [baʃʃi] ‘forget’ CVC.CVC
/a.tsa/ [atsa] ‘tomorrow’ V.CV	/ats.tsa/ [attsa] ‘over there’ VC.CV
/ga.ma/ [gama] ‘cave’ CV.CV	/gam.ma/ [gamma] (onom.) CVC.CV
/a.na/ [ana] ‘hole’ V.CV	/an.na/ [anna] ‘mother’ VC.CV

It is noted that two non-nasal resonants, /v/ and /ʒ/, must be geminated in the surface syllable onsets (as in /vva/ [vva] ‘2SG’ and /ʒʒa/ [ʒʒa] ‘father’), and so do not show the contrast in gemination at the surface level. As will be noted in 9.1, these surface geminates are analysed underlyingly as single moraic //C//, and a predictable rule operates to produce the surface /vv/ and /ʒʒ/ from underlyingly moraic //v// and //ʒ// respectively (thus //va// > /vva/, //ʒa// > /ʒʒa/ above).

7. Prosody

The prosodic phenomena in Irabu are correctly described by recognising two distinct levels: word-level and phrase-level:

Word-level prosody: see this section

The citation form of a single phonological word reveals the word-level prosody, characterised as the pitch accent per word.

Phrase-level prosody: see Section 8

- in sentential utterance, there occurs a string of phonological words, where two adjacent phonological words form a foot.
- a foot must contain one and only one pivot, or an accented phonological

word (which means that there is a phonological word that loses accent by rule in the foot)

7.1. General remarks

Word-level prosody in Irabu is of pitch accent system characterised as follows:

(3) Irabu accent system

- a. The citation form of a phonological word is accented.
- b. Accent is lexically non-contrastive, and is completely predictable from the mora length of a phonological word.
- c. The accent is marked on a certain mora of a given phonological word, which is phonetically realised as an abrupt falling pitch after that mora.

(4) Accentuation rule: accent is positioned as follows, depending on the number of moras of a given phonological word.

No of moras:	2	3	4≥
Accented mora:	1 st or 2 nd	2 nd or 3 rd	2 nd
Example:	(5a)	(5b)	(5c)

The examples of bimoraic, trimoraic, and quadromoraic words, each in citation form, are given below. (*) indicates either accented mora must be present, but not both. The alternate possibilities with bi- and trimoraic words are explained below.

(5a) Bimoraic: 1st or 2nd mora

/na(*)da(*)/	/ka(*)n(*)/	/ka(*):(*)/	/pa(*)i(*)/
CV(*)CV(*)	CV(*)C(*)	CV(*)V(*)	CV(*)V(*)
‘tears’	‘crab’	‘skin’	‘field’

(5b) Trimoraic: 2nd or 3rd mora

/uma(*)tsi(*)/	/av(*)va(*)/	/ju:(*)z(*)/	/kai(*)na(*)/
V.CV(*)C(*)	VC(*)CV(*)	GCV(*)C(*)	CVV(*)CV(*)
‘fire’	‘oil’	‘ceremony’	‘arm’

(5c) Four moras: 2nd mora

/kana*ma /	/pam*mai/	/akja*:da/	/basa*udzi/
CV.CV*.CVC	CVC*.CVV	V.CGV*.V.CV	CV.CV*.V.CV
‘head’	‘food’	‘merchant’	‘amulet’

The accentuation rule can be stated more simply by using the term **word medial accent (M)** for the first mora accentuation in bimoraic words or the second mora accentuation in trimoraic or longer words. The term **word final accent (F)** refers to the final mora accentuation in bi-/trimoraic words. Thus the accentuation rule (4) is simply restated as follows:

(4') Accentuation rule (simpler): M: word medial; F: word final

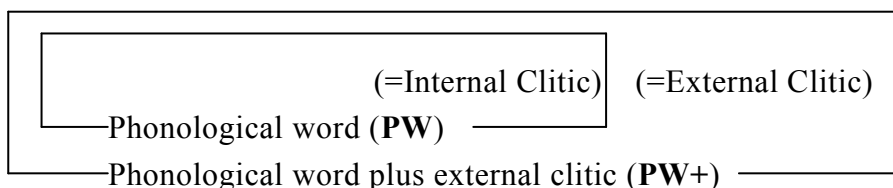
No of moras:	2	3	≥ 4
Position:	M or F	M or F	M
Example:	(5a)	(5b)	(5c)

There are a couple of minor comments on the above general rules. First, although bi-/trimoraic words have either word medial or word final accent, the word final accent is more pervasive. However, a slight tendency obtains for bi-/trimoraic words to bear word medial accent if the final syllable ends in a coda C. Thus /kan/ ‘crab’ and /jɔːz/ ‘celebration’ in the above examples tend to have word medial accent, as in /ka*n/ and /jɔː*z/.

Second, there is some instability among and within speakers as to where they put the accent on words of more than three moras if **1)** the accented mora happens to come within a long vowel, *and* **2)** the long vowel is not in the final syllable, as in /akja*:da/ above. In such examples, many prefer to put accent on the second mora as expected, while some prefer to put accent on the third mora, i.e. on the syllable boundary (/akja:*da/). This is an exception to the accentuation rule. On the other hand, if the accented mora happens to be the second mora of a diphthong as in /ba.sa*ʊ.dzi/ above, the accented mora is invariably the second mora as expected.

7.2. Clitics

For a clear description of accentuation at the word-level, it is necessary here to introduce the notion *clitic*, which is defined as a monomoraic grammatical word (see Section 2 for the definition of grammatical word) and therefore cannot serve as an independent phonological word because it fails to satisfy the minimal word requirement (6.2). Some clitics (*internal clitic* below) become part of the host phonological word, while others (*external clitic* below) do not. Thus Irabu phonological words have the following structure in terms of clitic attachment:



Henceforth, I use the symbol **PW** for a phonological word optionally with internal clitics, and **PW+** for a phonological word plus external clitics. **PW(+)** indicates either domain. Besides supersegmental phenomena, there are several phonological processes which refer to these domains (Section 9).

(6) Clitic and accentuation

- a. *An internal clitic* becomes part of the host PW for accentuation purposes, and a PW containing internal clitics follows the accentuation rule (defined in (4') in 7.1).
- b. *An external clitic* does not become part of the host PW for accentuation purposes. If it attaches to a bimoraic or trimoraic host PW to form a PW+, the host PW (which has two possible accents, i.e. word medial or word final), always has word medial accent.

7.2.1. Internal clitics and accentuation

Internal clitics are grammatically all post-nominal particles (case markers, topic markers, and focus markers, which come post-nominally to mark case relation or information status). In the example below, the nominative case *//=ga//* and the focus marker *//=[v//* are internal clitics.

uva	=ga	=[v	az-ta]?
2SG	=NOM	=FOC	say -PAST

‘(Was it) you (who) said (that)?’

Since the PW containing internal clitic(s) exactly follows the accentuation rule as noted above, we can effectively say that a PW is extended by internal clitics. In the examples below, the whole domain containing the internal clitic */=nʊ/* (nominative/genitive case) is treated as a trimoraic PW (in (7a)) for accentuation, whereas in (7b) the whole domain containing the clitic is treated as a quadromoraic PW for accentuation. Note that the accentuation in both examples exactly follows the rules we established.

(7) Internal clitic /=nʊ/ (nominative/genitive case) and accentuation

a. Trimoraic PW (bimoraic PW + monomoraic /=nʊ/): M or F

/nada(*)=nʊ(*)/	/kan(*)=nʊ(*)/	/ka:(*)=nʊ(*)/	/pai(*)=nʊ(*)/
CV.CV(*)=CV(*)	CVC(*)=CV(*)	CVV(*)=CV(*)	CVV(*)=CV(*)
‘tears’	‘crab’	‘skin’	‘field’

b. Quadromoraic PW (trimoraic PW + monomoraic /=nʊ/): M

/ʊma*tsi=nʊ/	/av*va=nʊ/	/jʊ:*z=nʊ/	/kai*na=nʊ/
V.CV*.CV.=CV	VC*.CV.=CV	GVV*C.=CV	CVV*.CV.=CV
‘fire’	‘oil’	‘ceremony’	‘arm’

The following list is a list of internal clitics that I identified.

Table 6. Internal clitics: the list

Parts of speech	Form (in underlying (i.e. morphemic) representation)
Post-nominal particles	
Case marker	//=ga// (nominative/genitive: more topic worthy)
	//=nʊ// (nominative/genitive: less topic worthy)
	//=ʊ// (accusative)
	//=n// (dative/locative)
Topic marker	//=a// (topic/contrastive)
	//=da// (what about...?)
	//=ba// (object topic; contrastive) (~ PW //ba//: see 8.3.3)
	//=m// (additive ‘too’) (~ PW //mai//: see 8.3.3)
Focus marker	//=dʊ// (focus in declarative)
	//=[ʊ// (focus in yes-no question)
	//=ga// (focus in wh-question)

As is indicated in the table above, two post-nominal particles have alternative forms, an internal clitic form (e.g. //ba//) and an independent PW form (//ba://), the latter of which has two moras. This alternation is phonologically significant, changing the phonological structure of the host-clitic combination into that of PW-PW combination, or vice versa. These will be noted in 8.3.3.

7.2.2. External clitics and accentuation

External clitics are post-verb particles (i.e. particles that follow verbs (or predicate nominals) to mark modal and discourse information), and they tend to come at the

right edge of the main clause, most typically sentence-finally (e.g. //tsa// below).

mja:kv-pztv ukka =v mai tɔ̃-a-da pã-tã =tsa.
 Miyako - man debt =ACC too take -STM -CVB:NEG leave -PAST=HS
 ‘The man from Miyako Island, (he) left without getting the debt back.’

External clitics come outside the PW domain, as an extra element attaching to the completed PW, giving rise to a domain PW+. Though outside the PW domain, external clitics still affect the accentuation of the host PW. This becomes apparent when an external clitic attaches to a bi-/trimoraic PW, which has been shown to have either word final or word medial accent (7.1). Here, all external clitics cause the host PW’s to have word medial accent. In other words, external clitics ‘fix’ the otherwise instable accentuation of bi-/trimoraic PW’s to which they attach.

(8) External clitic and accentuation (M: word medial; F: word final)

	Bimoraic	Trimoraic
PW: M or F	/a(*).tsa(*)/ ‘tomorrow’	/tv.nv(*).ka(*)/ ‘egg’
PW+: M only	/a.*tsa.=tsa/ ‘tomorrow’ (hearsay) /a.*tsa.=jv/ ‘tomorrow’ (corrective)	/tv.nv*.ka.=tsa/ ‘egg’ (hearsay) /tv.nv*.ka.=jv/ ‘egg’ (corrective)

The tag question marker //i// deserves a comment here. It cannot be neatly classified as either an internal clitic or an external clitic on the basis of its accentual behaviour, as illustrated in (9d) below, where the accentuation behaviour of //i// does not really follow that of either type of clitic: //i// causes the host bi-/trimoraic PW to lose the accent altogether. However, there is indirect, morphophonemic evidence that it is not an internal clitic but an external clitic (9.3.2).

(9) Tag question marker /i/ and other clitics

	Bimoraic	Trimoraic
a. PW (in citation)	/a(*).tsa(*)/ ‘tomorrow’	/tv.nv(*).ka(*)/ ‘egg’
b. PW (with //dv//):	/a.tsa(*).=dv(*)/ ‘tomorrow’ (quotative)	/tv.nv*.ka.=dv/ ‘egg’ (quotative)
c. PW+ (with //jv//)	/a.*tsa.=tsa/ ‘tomorrow’ (hearsay)	/tv.nv*.ka.=tsa/ ‘egg’ (hearsay)

d. PW+ (with //i//):	/a.tsa.=i/	/tʊ.nʊ.ka.=i/
	‘tomorrow, eh?’ (tag)	‘egg, eh?’ (tag)

Table 7. External clitics: the list

Parts of speech (post-verb particles)	Form (in underlying (i.e. morphemic) representation)
Discourse marker	//e// (interrogative) //da// (emphatic) //jʊ// (corrective: ‘(not...)but’) //sja// (interrogative) //tsa// (hearsay) //i// (tag)

7.2.3. Clitics and accentuation: summary

In the sections above I introduced the notion clitic, which is defined as a monomoraic grammatical word and cannot appear as an independent PW. They form a PW(+) with the host PW. In terms of accentuation, internal clitics simply extend the PW, while external clitics attach after a PW is formed, as an extra element to it (forming PW+).

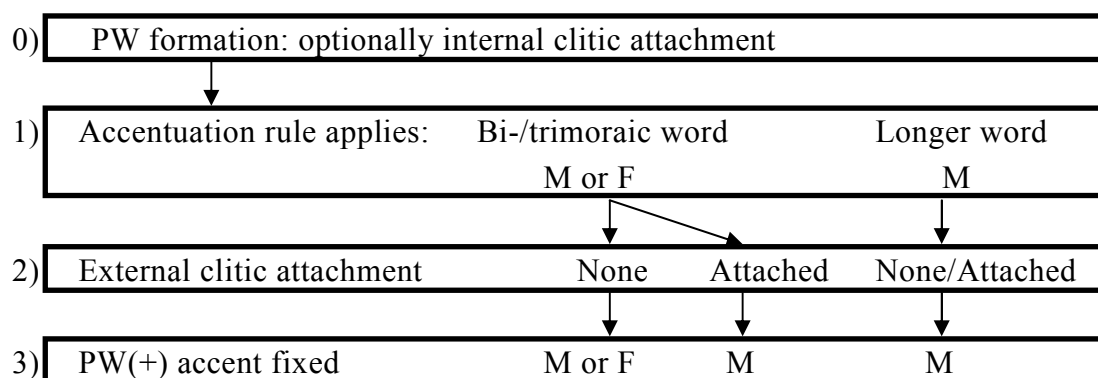


Figure 1. Accentuation of PW(+)
(M: medial accent; F: final accent)

8. Phrase-level prosody

The description in Section 7 dealt with the word-level prosody, with an exclusive focus on the PW(+) domain. One or more PW(+)’s may constitute a phonological phrase. A phonological phrase is basically a unit of utterance. That is, speakers tend

to pause between phonological phrases if they need to. For example, in doing text transcriptions with native speakers, they tend to pause between each phonological phrase, but much less so within it. Significantly, the phonological phrase turns out to be a grammatically well defined and important unit: either a nominal complex or a verb complex. As defined in **Figure 2** below, a nominal complex is minimally a single noun, and a verb complex is minimally a single verb. Maximally, a nominal complex may consist of an NP (modifier NP plus head NP) followed by post-nominal particles, and a verb complex may consist of a VP (main plus auxiliary) followed by post-verb particles.

Nominal complex (NP plus particle) Verb complex (VP plus particle)

(modifier NP) head NP (PART _{L...n})	Verb (AUX) (PART _{L...n})
e.g. ba =ga ffa =nɔ =dɔ 1SG =GEN child =NOM =FOC Nominal complex	ba[-i-i nja:n do:i. break -STM -CVB:SEQ PERF EMP Verb complex
‘(It is) my child (that) has broken (it).’	

Figure 2: phonological phrase and grammatical structure

Nominal complexes and verb complexes are phrases of grammatical words. As noted in Section 2, a grammatical word as well as a phrase of grammatical words may consist of several PW’s. Adjacent PW’s in a phonological phrase (i.e. a nominal/verb complex) bear a definite prosodic pattern as will be described below.

8.1. Phonological phrase: structure

The phonological phrase structure can be schematically shown as follows.

PW1 PW2... PW_n(+)

As noted in Section 7, internal clitics are counted as an internal member of PW here; external clitics mostly appear sentence-finally. Thus in the phrase structure, the PW+ is irrelevant except in the phrase-final position. For the moment, we will not be bothered by PW+ in the phrase prosody rule (we get back to PW+ in 8.3).

8.2. Phonological phrase: phrase prosody rules

The **Phrasal prosody rule** is summarised as follows.

(A) PW's in a phrase are classified into:

PW₂₋₃ (bi-/trimoraic PW) or

PW_{≥4} (longer PW)

(B) Two adjacent PW's form a unit of accent, or a foot (enclosed by brackets below), where the odd numbered PW bears accent (let us call the accented PW the *pivot*; indicated by underline below) and the even numbered PW loses accent. Footing goes from left to right:

(PW1 PW2) (PW3 PW4)... See (10) below.

(C) The **pivot PW in a foot** is accented as follows:

PW₂₋₃: word final accent; **PW_{≥4}: word medial** accent

(D) If an odd numbered PW is left alone at the phrase edge (e.g. **PW5** below), it fails to be footed, and does not receive accent (since accent must be per foot in a phrase).

(PW1 PW2) (PW3 PW4)PW5 See (11) below.

(E) An odd numbered PW_{≥4} forms a foot by itself (unitary footing), and serves as the pivot. Thus if a **PW5** in (D) is a PW_{4≥}, then it is successfully footed, and therefore bears accent:

(PW1 PW2) (PW3 PW4)(PW5) See (12) below.

(F) After a unitary footing applies, the footing is reset and resumes. Thus if **PW1** of (B) is a PW_{4≥} and forms a unitary foot, the footing goes like:

(PW1) (PW1 PW2) PW3... Compare (10) and (13).

(10) (PW1-PW2)(-PW3-PW4)	(11) (PW1-PW2)(-PW3-PW4)	PW5
(HH* -LL) (-HH* -LL)	(HH* -LL) (-HH* -LL)	LL
ffa*-gama-mmi*-nagi	ffa-gama-mmi-nagi	mai
child -DIM -PL -DUB	child -DIM -PL -DUB	too
‘lovely children or suchlike’	‘lovely children or suchlike, too’	

(12) (PW1-PW2)(-PW3-PW4)	(PW5)	(13) (PW1) (PW1 -PW2) -PW3
(HH* -LL) (-HH* -LL)	(HH*LL)	(HH*LL) (-HH* -LL) -LL
ffa*-gama-mmi*-nagi	jal*[ʋ:	akja*:da-gama*-mmi-nagi
child -DIM -PL -DUB	CMPR	merchant -DIM -PL -DUB
‘than lovely children or suchlike’		‘little merchants or suchlike’

As is shown in (10-13) above, polymoraic affixes (e.g. /-gama/ (diminutive suffix), /-mmi/ (plural suffix), /-nagi/ (dubiative suffix)) are PW's by themselves. Thus they bear accent when they serve as the pivot in a foot, just as roots do, exactly following the accentuation rules depending on their mora length. Also, they satisfy all the other requirements for PW's (phonotactics and minimal word requirement).

8.3. Clitics and phrase prosody

8.3.1. Internal clitics

As has been noted in 7.2, internal clitics simply extend a PW. Thus there is no special statement required for a PW containing internal clitics in phrase prosody phenomena. As is shown below, there is no difference in phrase prosody between **a** examples and **b** examples, where **a** examples and **b** examples are minimally contrastive in internal clitic attachment.

(14a) (PW1-PW2)-PW3

ffa*-gama-mmi

child -DIM -PL

'lovely children'

(14b) (PW1-PW2)-PW3

ffa*-gama-mmi =_σ

child -DIM -PL =ACC

'lovely children' (accusative)

(15a) (PW1-PW2)(-PW3-PW4)

ffa*-gama-mmi*-nagi

child -DIM -PL -DUB

'lovely children or like'

(15b) (PW1-PW2)(-PW3-PW4)

ffa*-gama-mmi*-nagi =_σ

child -DIM -PL -DUB =ACC

'lovely children or like' (accusative)

- (16a) (PW1-PW2)-(PW3 PW4)
 ffa*-gama-mmi* mai
 child -DIM -PL too
 ‘lovely children, too’

- (16b) (PW1-PW2)-(PW3 PW4)
 ffa*-gama-mmi =o* mai
 child -DIM -PL =ACC too
 ‘lovely children, too’ (accusative)

8.3.2. External clitics

In describing the phrase prosody phenomena in Irabu, external clitics require a special statement. External clitics come phrase finally, or more specifically, sentence finally (as in (17b) below), forming a PW+ at the phrase edge. On the other hand, as was noted in 8.2, the phrase final PW as in (17a) below has one of the following three prosodic possibilities:

- 1) an even-numbered non-pivot PW in a foot (which may be a PW₂₋₃ or a PW_{≥4}; as in (10))
- 2) an unfooted odd-numbered PW (which must be a PW₂₋₃; as in (11)), or
- 3) an odd-numbered unitary foot (which must be a PW_{≥4}; as in (12) above and (17a) below).

A phrase-final PW+ of any length is treated prosodically as either 1) or 3). That is, a PW+ behaves like a PW_{≥4} in terms of phrase prosody.

- | | | | |
|--|----------|--|----------|
| (17a) Phrase-final odd-number PW_{≥4} | | (17b) Phrase-final odd-number PW+ | |
| (PW1-PW2)(-PW3-PW4) | (PW5) | (PW1-PW2)(-PW3-PW4) | (PW+) |
| (HH* -LL) (-HH*-LL) | (HH*LL) | (HH*-LL)(-HH*-LL) | (H*L=L) |
| ffa*-gama-mmi*-nagi | jal*[o:] | ffa*-gama-mmi*-nagi | ma*i=tsa |
| child -DIM -PL -DUB | CMPR | child -DIM -PL -DUB | too =HS |
| ‘than lovely children or suchlike’ | | ‘lovely children or like, too (hearsay)’ | |

8.3.3. From a clitic to an independent PW: Clitic promotion

As was noted in 7.2.1, some post-nominal particles have either monomoraic internal clitic forms or bimoraic PW forms. When they appear as PW forms, the host-clitic combination is rearranged prosodically as a PW-PW combination, i.e. a phonological phrase. Thus in the following sets of examples, a examples involve a

single PW, where a host PW is extended by internal clitic(s), while **b** examples involve two PW's which form a phonological phrase.

(18a)	PW	(18b)	(PW1	PW2)
	o i*		o i	ba:
	=o		=o*	
	=ba			
	3SG		3SG	TOP
	=ACC		=ACC	
	=TOP			
	'that' (accusative:object topic)		'that' (accusative:object topic)	

(19a)	PW	(19b)	(PW1	PW2)
	ik-a*-ba		ik-a-ba*	mai
	=m			
	go -STM -CVB:CND		go -STM -CVB:CND	too
	=too			
	'even if (x) goes'		'even if (x) goes'	

8.4. Irabu phrase-level prosody: summary

The phrase prosody phenomena in Irabu are summarised as follows:

- (20a)** there is a foot-based alternant rhythm structure, where a foot consists of an accented PW and an unaccented PW.
- (20b)** a longer PW can form a unitary foot.
- (20c)** at least two moras are kept low pitch phrase-finally.

(20a) is evident in the phrase prosody rule **(B)**. Here, what is important is the fact that within a foot, whether unitary or not, there is an alternation of H pitch portions and L portions. In non-unitary foots as in **(B)**, where the pivot is a PW₂₋₃, the pivot always bears accent word-finally (H pitch throughout), then the non-pivot PW follows it without bearing accent (thus it has L pitch throughout). In a unitary foot, which must be a PW_{≥4}, it always has word medial accent, keeping low pitch for at least two moras (HH*LL(...)). In either case, then, we observe an alternation of H pitch and L pitch within a foot. As long as a phrase sustains, this alternation also sustains, until the end of the phrase.

(20b) is denoted in **(E)** which denotes that a PW_{≥4} can form a unitary foot.

(20c) is implicit in **(D)**, **(E)**, and what we noted in 8.3.2 for PW+: first, it is noted that the phrase-final PW(+) has one of the following prosodical possibilities: an even-numbered (i.e. non-pivot) PW(+) in a foot, an odd-numbered PW₂₋₃ which fails to form a foot by **(D)**, an odd-numbered unitary foot PW_{≥4} (or a PW+). In the former two cases, the phrase-final PW does not have accent, thus always with L pitch. On the other hand, the latter case involves unitary footing, serving as pivots by themselves. Here, according to **(C)**, a pivot PW_{≥4} is accented word-medially,

with at least two moras kept L pitch (HH*LL(...)); likewise a pivot PW+ is accented word medially, having at least two moras left low pitch (see also 7.2.2):

Bimoraic PW plus external clitic	> H* <u>L=L</u>	e.g. /pa*v=vjʊ/ snake =COR '(I said it's a) snake'
Trimoraic PW plus external clitic	> HH* <u>L=L</u>	/av*va=njʊ/ oil =COR '(I said it's) oil'
Longer PW plus external clitic	> HH* <u>LL(...)=L</u>	/kana*ma =ljʊ/ head =COR '(I said it's a) head'

9. Phonological alternations

There are a number of phonological processes which involve alternations of phonemes. These are general or limited to specific morphological environments. Here I note the former type, where we see a set of general phonological processes which apply to a wide range of phonological structures. The full set of morpheme-specific morphophonemic alternations is listed in Shimoji (*in.prep.*).

9.1. Geminate copy insertion

The **Geminate copy insertion** is sensitive to moraicity. There is a strict constraint in the domain of PW(+) that a moraic /C/ cannot directly precede a /(G)V/ at the surface level. If a situation emerges (e.g. in morphological processes) where an underlyingly moraic //C// is directly followed by //(G)V//, then the following phonological rule produces a surface /C_iC_i(G)V/:

Geminate copy insertion rule: if underlyingly moraic //C// and //(G)V// are adjacent in PW(+), then a geminate copy of //C// is inserted to produce a surface /C_iC_i(G)V/.

(21)

- a. //va// '2SG' > /vva/ [vva] '2SG'
- b. //ʒa// 'father' > /ʒʒa/ [ʒʒa] 'father'
- c. //pav// 'creep' + //-i// (stem suffix) > /pav-vi/ [pavvi] 'creep' (imperative)
- d. //s// 'know' + //-ja// (agent nominal) > /s-sja/ [ʃʃa] 'one who knows a lot'
- e. //kam// 'god' + //=a// (topic) > /kam=ma/ [kamma] 'god' (topic)
- f. //sʊkʊbz// 'belt' + //=a// (topic) > /sʊkʊbzʒa/ [sʊkʊbzʒa] 'belt' (topic)

(21a) and (21b) are roots, whose underlying forms contain an initial moraic //C// directly followed by //V//. As has been noted in 6.3.2, the surface /v/ and /z/ in the onset position are always geminated. Given this and the phonotactic constraint in Iribu that a moraic //C// cannot directly precedes //(G)V//, it is a reasonable assumption that an underlying structure //va// and //za// (moraic //C// plus //V//) become /vva/ and /zza/ at the surface level, with an obligatory application of the Geminate copy insertion rule.

(21c) to (21f) involve morphophonemics. Note that in (21f), an exceptional resonant consonant /z/ filling V slots (3.2) is sensitive to this rule, thus demonstrating that /z/ belongs to the phoneme class consonant. We can assume that this rule is applicable to consonants as a phoneme class, which has been defined in the Table 1 (2.2.1), rather than to the particular syllable position (coda and onset).

As defined above, the Geminate copy insertion rule operates within PW(+), but never occurs across PW's. Thus (22) and (23) below involve the Geminate copy insertion rule, while in (24), where two PW's are adjacent, the rule does not operate.

(22) PW containing an internal clitic //a// (topic)

- | | |
|-------------|--------------|
| a. /kam=ma/ | b. /tʊl=a/ |
| //kam=a// | //tʊl=a// |
| god=TOP | bird=TOP |
| 'god is...' | 'bird is...' |

(23) PW+: a PW followed by an external clitic //jʊ// (corrective)

- | | |
|-------------------|----------------------|
| a. /kan=njʊ/ | b. /tʊl=jʊ/ |
| //kan=jʊ// | //tʊl=jʊ// |
| crab=COR | bird=COR |
| '(no, it's) god.' | '(no, it's) a bird.' |

(24) Two phonological words /kan/ 'crab' and /ata/ (copular)

- | | | | |
|-----------------|------|-----------------------|------------------|
| /ʊi=a | kan | a-ta/ | (NOT /kan nata/) |
| //ʊi=a | kan | aR-taR// ⁴ | |
| 3SG=TOP | crab | COP-PAST | |
| 'It was a crab' | | | |

⁴ The morphophoneme //R// is found in a certain set of verb roots and affixes, and is realised as /r/ verb-finally, or is deleted elsewhere.

9.2. /i/ insertion

9.2.1. General remarks

One important characteristic of Irabu phonology is the phonemic status of /i/. As has been noted in 5.2.3, this phoneme is preceded only by fricatives /f, s, ts, dz/. The peculiar characteristic of /i/ is that it is *not* underlyingly present, and the surface phonemic /i/ is inserted by the following **/i/ insertion rule**:

/i/ insertion rule: If a fricative occurs other than as an underlyingly onset, then insert /i/ into a fricative onset.

e.g. //kaf// > /kafi/ ‘write’
 //sta// > /sita/ ‘tongue’
 //tsts// > /tsitsi/ ‘moon’
 //padz// > /padzi/ ‘leg’

The /i/ is thus characterised as an epenthetic segment which functions to keep intact the phonotactics of PW (as established in Section 4). In such an underlying form //ssam// ‘lice’ (//C_iC_iVC//), which is already well formed without the epenthesis, the /i/ insertion rule does not occur, and we get 1) //ssam// > /ssam/, rather than 2) //ssam// > /i/ insertion rule > /sisam/.

9.2.2. Morphophonemics and /i/ insertion

There are many pieces of evidence for the analysis that /i/ is best treated as being underlyingly absent, where the surface /Ci/ is underlyingly //C//. In what follows I note one major process which clearly depicts this. This process involves vowel-initial suffixes and clitics, such as the accusative case //=ʊ//:

The morphophonemic rule of the accusative case //=ʊ//

(25a) If a nominal stem ends in a V₁V₂ other than a //Ci:// (C: s, ts, dz),

//=ʊ// is realised as /=jʊ/:

//ka:// ‘skin’	+	//= <u>ʊ</u> //	>	/ka:=jʊ/
//ki:// ‘tree’	+	//= <u>ʊ</u> //	>	/ki:=jʊ/
//kʊ:// ‘powder’	+	//= <u>ʊ</u> //	>	/kʊ:=jʊ/
//kʊi// ‘voice’	+	//= <u>ʊ</u> //	>	/kʊi=jʊ/
//fi:// ‘coming’	+	//= <u>ʊ</u> //	>	/fi:=jʊ/

(25b) If a nominal stem ends in a consonant C, $//\text{=}\text{v}//$ is realised as $/=\text{C}\text{v}/$:

$//\text{kam}//$ ‘god’	+	$//\text{=}\text{v}//$	>	$/\text{kam}=\text{m}\text{v}/$
$//\text{kan}//$ ‘crab’	+	$//\text{=}\text{v}//$	>	$\text{kan}=\text{n}\text{v}/$
$//\text{pav}//$ ‘snake’	+	$//\text{=}\text{v}//$	>	$/\text{pav}=\text{v}\text{v}/$
$//\text{paz}//$ ‘fly’	+	$//\text{=}\text{v}//$	>	$/\text{paz}=\text{z}\text{v}/$
$//\text{pal}//$ ‘needle’	+	$//\text{=}\text{v}//$	>	$/\text{pal}=\text{[}\text{v}]/$

(25c) Otherwise $//\text{=}\text{v}//$ is realised as $/=\text{v}/$:

$//\text{pana}//$ ‘flower’	+	$//\text{=}\text{v}//$	>	$/\text{pana}=\text{v}/$
$//\text{si:}//$ ‘nest’	+	$//\text{=}\text{v}//$	>	$/\text{si:}=\text{v}/$

Our attention now turns to such nominal stems as $/\text{ta}\text{v}\text{fi}/$ [$\text{ta}\text{v}\text{fu}$] ‘tofu’, $/\text{p}\text{v}\text{si}/$ [$\text{p}\text{v}\text{si}$] ‘star’, $/\text{v}\text{matsi}/$ [vmatsi] ‘fire’, and $/\text{m}\text{v}\text{dzi}/$ [$\text{m}\text{v}\text{dzi}$] ‘barley’, all of which end in surface $/\text{i}/$. If the $/\text{i}/$ were underlyingly present, i.e. the nominal stems were underlyingly vowel-final ($//\text{CV}//\text{\#}$), then **(25c)** would apply and we get something like $/\text{ta}\text{v}\text{fi}=\text{v}/$ [$\text{ta}\text{v}\text{fi}\text{v}$], $/\text{p}\text{v}\text{si}=\text{v}/$ [$\text{p}\text{v}\text{si}\text{v}$], and so on. However, what happens is that we get the surface $/\text{ta}\text{v}\text{f}=\text{f}\text{v}/$ [$\text{ta}\text{v}\text{ff}\text{v}$], $/\text{p}\text{v}\text{s}=\text{s}\text{v}/$ [$\text{p}\text{v}\text{ss}\text{v}$], $/\text{v}\text{mats}=\text{ts}\text{v}/$ [umattsv], and $/\text{m}\text{v}\text{dz}=\text{dz}\text{v}/$ [muddzv] ($\sim$ [$\text{m}\text{v}\text{tts}\text{v}$]; cf. 5.2.3), indicating that the underlying forms of the above nominal stems are $//\text{ta}\text{v}\text{f}//$, $//\text{p}\text{v}\text{s}//$, $//\text{v}\text{mats}//$, and $//\text{m}\text{v}\text{dz}//$, and that **(25b)** applies. The short vowel $/\text{i}/$ at the surface is underlyingly absent and the nominal stems listed here are underlyingly consonant-final ($//\text{C}//\text{\#}$).

Thus, as illustrated below $/\text{ta}\text{v}\text{fi}/$ is underlyingly $//\text{ta}\text{v}\text{f}//$, and if it surfaces with $//\text{=}\text{v}//$ the surface form is $/\text{ta}\text{v}\text{f}=\text{f}\text{v}/$, with the rule **(25b)** above; if $//\text{ta}\text{v}\text{f}//$ surfaces with no cliticisation/affixation, then the $/\text{i}/$ is added word finally, producing $/\text{ta}\text{v}\text{fi}/$:

Underlying			/i/ insertion		Surface	Phonetic
//taʊf// ‘tofu’	+ //ʊ//	>	N/A	>	/taʊffʊ/	[taʊffʊ]
	+ no clitic	>	applied	>	/taʊfi/	[taʊfu]

9.3. The $/\text{i}/$ insertion and Geminate copy insertion rule: inter-relationship

9.3.1. Relative orders

The Geminate copy insertion rule operates at the final stage of word formation applying to the largest domain $\text{PW}(+)$, i.e. after both internal and external clitics are attached. Thus in both **a** and **b** examples below, the combination of the root $//\text{t}\text{v}//$ ‘bird’ and the internal clitic $//=\text{a}//$ (topic) or the external clitic $//=\text{j}\text{v}//$ (corrective), which results in the adjacency of a moraic $//\text{C}//$ and a $//(\text{G})\text{V}//$, induces the application of the Geminate copy insertion rule.

On the other hand, the $/\text{i}/$ insertion rule operates within the PW domain, i.e.

before external clitics attach. This is evidenced in **a'** and **b'** examples below, where a consonant-final root //pʊs// 'star' involves different phonological processes in terms of the Geminate copy insertion rule, due to the presence or absence of the application of /i/ insertion rule. Thus in **a'** example, the internal clitic //a// attaches before the /i/ insertion, giving rise to a morpheme sequence //pʊs// + //a//. This requires the Geminate copy insertion rule, producing an appropriate surface form /pʊs=sa/. In **b'** example, the external clitic //jʊ// attaches after the /i/ insertion rule applies, which is evidenced in the fact that the morpheme sequence does not induce the Geminate copy insertion rule: the root here is already vowel-final //pʊsi//, i.e. the form after the /i/ insertion applies, thus //pʊsi// + //jʊ// does not require the Geminate copy insertion.

PW			PW+	Surface
Underlying > Internal clitic > i insertion			External clitic	(±Gem.copy)
a. //tɔ// 'bird'	+ //a// (topic)	N/A	N/A	/tɔl=a/
b. //tɔ// 'bird'	N/A	N/A	+ //jʊ//	/tɔl=jʊ/
a'. //pʊs// 'star'	+ //a//	N/A	N/A	/pʊs=sa/
b'. //pʊs// 'star'	N/A	//pʊsi//	+ //jʊ//	/pʊsi=jʊ/

9.3.2. Revisiting the clitic //i//

The fact that the /i/ insertion rule operates before external clitics are attached serves as an effective morphophonemic test for the correct analysis on the problematic clitic //i// (tag) (see 7.2.2 for discussion), which cannot be classified either as an internal clitic or an external clitic in the light of accentuation criteria.

In terms of the /i/ insertion, this clitic shows an identical behaviour with external clitics (see **b**). That is, //i// attaches to a PW which has undergone the /i/ insertion. This is evidenced by the fact that in **c** below, the combination of the root and the //i// does not involve the Geminate copy insertion rule, just as the external clitic //jʊ// does not. That is, the root here is already vowel-final //pʊsi//, i.e. the form after the /i/ insertion applies. On the other hand, //i// involves the Geminate copy insertion rule if it attaches to a consonant-final PW, e.g. //tɔ// 'bird' (see **c'** below), thus it is safe to say that //i// is really a clitic rather than an independent PW, since the Geminate copy insertion rule does not apply across PW's (9.1). Thus, //i// is analysed as an external clitic with a marked accentual behaviour.

Phonological word formation >			External clitic >	Surface
Underlying > Internal clitic > i insertion				(±Gem.copy)
a. //pʊs// ‘star’	+ //a//	N/A	N/A	/pʊs=sa/
b. //pʊs// ‘star’	N/A	//pʊsi//	+ //jʊ//	/pʊsi=jʊ/
c. //pʊs// ‘star’	N/A	//pʊsi//	+ //i//	/pʊsi=i/
a’.//tɔ̃// ‘bird’	+ //a// (topic)	N/A	N/A	/tɔ̃= a/
b’.//tɔ̃// ‘bird’	N/A	N/A	+ //jʊ//	/tɔ̃= jʊ/
c’.//tɔ̃// ‘bird’	N/A	N/A	+ //i//	/tɔ̃= i/

9.4. Lengthening rule

To satisfy the minimal word requirement (6.2), which says that a PW must be minimally bimoraic, monomoraic roots must undergo an obligatory lengthening or a vowel insertion to appear as a PW.

Lengthening rule: a monomoraic root must be lengthened to appear as a PW, with one of the following three strategies:

Strategy 1. Moraic resonants are lengthened (/C// > /C:/)

e.g. //v// ‘sell’ > /v:/ ‘sell’ (participle stem)

Strategy 2. Moraic fricatives involve re-syllabification, where /i:/ is inserted to be a nucleus (/C// > /CV:/)

e.g. //s// ‘know’ > /si:/ ‘know’ (participle stem)

Strategy 3. //CV// is lengthened (/CV// > /CV:/)

e.g. //jʊ// ‘four’ > /jʊ:/ ‘four’ (when counting isolately)

(cf. /jʊ-ta:/ ‘four persons’ where the numeral root //jʊ// ‘four’ does not undergo lengthening)

This rule typically operates in certain stem formation processes noted in 9.4.1 and 9.4.2, where a stem must be an independent PW, and the stem formation does not involve overt affixation thus requiring the Lengthening rule:

Participle stem formation (**Strategies 1** or **2**): see 9.4.1

Compound stem formation (**Strategies 1, 2, or 3**): see 9.4.2

9.4.1. Participle stem formation

Participle stems are independent PW’s, and the inflectional affixes that follow them, if they have two moras or more, are independent PW’s (e.g. past suffix /-ta/; thus a

verb /jum-ta/ in **a** below is a phonological phrase PW1-PW2). A participle stem formation does not involve any overt affixation, with a root directly functioning as a participle stem. This is illustrated in **a** and **b** below. If a monomoraic root as in **c-h** is to appear as a participle stem, the Lengthening rule **Strategy 1 (c-e)** or **2 (f-h)** applies to produce a bimoraic stem, which satisfies the minimal word requirement.

Root	Participle stem (must be a PW)	Non-past inflection ⁵	Past inflection
a. //jum// ‘read’	/jum/	/jum/	/jum-ta/
b. //m:// ‘ripe’	/m:/	/m:/	/m:-ta/
c. //v// ‘sell’	/v:/	/v:/	/v:-ta/
d. //z:// ‘scold’	/z:/	/z:/	/z:-ta/
e. //l:// ‘(the sun) sets’	/l:/	/l:/	/l:-ta/
f. //f// ‘bite’	/fi:/	/fi:/	/fi:-ta/
g. //s// ‘know’	/si:/	/si:/	/si:-ta/
h. //ts// ‘put on’	/tsi:/	/tsi:/	/tsi:-ta/

The Lengthening rule **Strategy 2** could be dispensed with by assuming long fricative phonemes /f:/ [fu:], /s:/ [si:], /ts:/ [tsi:], rather than fricative onset plus a long vowel /i:/. By this we can replace **Strategy 2** by **Strategy 1** in such a way that in **f-h** above, for example, the underlyingly single fricative phoneme is lengthened.

However, this is not without its cost, and I do not take this solution. The critical disadvantage is that this alternative solution breaches several phonotactic generalisations. For example, such a PW as ‘bridge’ must be analysed as /pas:/ [pasi:] (cf. our current analysis is /pasi:/), which has the structure /CV.C:/, where the long syllabic /C:/ comes word finally, which is impermissible otherwise (see Section 4). Also, this solution adds three long consonant phonemes to the current inventory. Finally, there is one independent piece of evidence whereby the Lengthening rule **Strategy 2** is supported: the participle stem /fi:/ ‘bite’, for example, must be analysed as CV:, given that if it is followed by the accusative //v//, the latter appears as /=jv/, following the general pattern of VV-final stem (see (25a)).

⁵ With zero affixation of non-past affix: /jum/ ‘read:NPST’, for example, is morphologically analysed as the stem /jum/ + -∅ (non-past affix).

9.4.2. Compounding stem formation

In Irabu, compound stems can be (in fact are mostly) independent phonological words. If a stem is monomoraic underlyingly, it undergoes one of the three strategies:

Stem 1 (PW)	Stem 2 (PW)		Surface compound form
//mønʊ// 'thing'	//v// > //v:// (ST1) 'sell'	>	/mønʊ-v:/ 'merchant'
//mønʊ// 'thing'	//s// > //si:// (ST2) 'know'	>	/mønʊ-si:/ 'shaman'
//mi// > //mi:// (ST3) 'child'	//ʊtstsa// 'squirrel'	>	/mi:-ʊtstsa/ 'female squirrel'

NOTE: ST1: Strategy 1; ST2: Strategy 2; ST3: Strategy 3

10. Synchronic and diachronic notes on /i/

As was noted in 9.2, the synchronic peculiarity of /i/ is that it is underlyingly absent. This means that we have two synchronic systems coexistent in Irabu, i.e. the underlying system where /i/ is absent, and the surface system where /i/ is existent. We must assume these two systems in describing Irabu phonology because some phonological processes such as Geminate copy insertion do distinguish, for example, the underlying //s// and the surface /si/, as noted in 9.3.1.

On the other hand, diachronically speaking, this synchronic peculiarity of /i/ is reflected in the fact that a syncope (/i/ > ʊ), or a fusion of /i/ and the fricative onset (giving rise to single segments /f/ (<*/fi/), /s/ (<*/si/), /ts/ (<*/tsi/), /dz/ (<*/dzi/)) seems to be in progress. There are considerably unstable phonetic realisations of /i/, so that /fisa/ 'grass' can be realised as [fusa] or [f^hsa] (with the [v] being a resonant release), or even [f̥sa], /ʊsi/ 'cattle' can be realised as [ʊsi] or [ʊs̺] (with the [z̺] being a resonant release), or even [ʊs̺], and so on.

11. Conclusions

This study has offered a comprehensive description of Irabu phonology. By employing an approach which is independent of the traditional approach in Ryukyuan linguistics, with descriptive tools and concepts accepted in general linguistics, this study has offered a new descriptive model for Miyako Ryukyuan phonology, which is summarised as follows.

I have proposed a new description of syllable structure of Miyako Ryukyuan (of which Irabu exemplifies a typical, a highly complex syllable structure), with one new descriptive tool which are not present in the Ryukyuan literature but are highly useful in describing syllable structures of Miyako Ryukyuan: the presyllable.

I also demonstrated that in dealing with the word-level prosody of Miyako Ryukyuan one must refer to the notion clitic, and to the domain PW (optionally with internal clitics) and the PW+ (with external clitics).

Furthermore, this study has shown that one must recognise, if he describes Miyako Ryukyuan phonology, a larger phonological structure, or a phonological phrase, which has been shown to exhibit a foot-based rhythm structure.

The description of prosodic phenomena has revealed that Irabu is a typologically quite interesting language in that a phonological word and a grammatical word show a conspicuous mismatch, in such a way that polymoraic affixes and compound stems are independent phonological words by themselves, though they are internal components of a grammatical word (cf. this type of languages do exist cross-linguistically, such as Yidiny (Dixon 1977)).

Finally, I have shown that it is effective in phonological processes of Miyako Ryukyuan to assume the underlying level and the surface level of phonological systems. Here, the problematic phoneme /i/ can be described consistently by assuming the two distinct levels.

Though there have been excellent phonetic/phonological studies done in the area of Miyako Ryukyuan (Sakiyama 1963; Sawaki 2000; Karimata 2005; Pellard 2007) they were not comprehensive, or took a bottom-up approach, focusing on specific topics (e.g. syllable structure; phonetic characterisation of segments) of the entire phonological system. Also, prosodic aspects of Miyako Ryukyuan were, though they are highly controversial and typologically of significance, largely beyond the horizon (though Hirayama, Oshima, and Nakamoto (1967) did give a dialectological comparison of accents in each variety of Miyako Ryukyuan). It was the comprehensive or top-down approach, with a detailed description of prosody, that was yet to be done in Miyako Ryukyuan phonology. Thus this study is the first such study which has shown a whole picture of Miyako Ryukyuan segmental and supersegmental phonology, if not in its full detail. Further discussions, elaborations, and criticisms on this study are all future research topics.

ADDENDA: some notes on the notion *word* in Irabu

(a) Two views on the definition of word: dualistic and unitaristic

Here I briefly note some controversial issue whose deeper discussion is open for future researches. This is concerning how we define the word in Irabu, and it turns out to be an important research topic in general linguistics.

So far we have assumed a *dualistic* definition of word, where phonological words and grammatical words are independently defined in Section 2. Here, no serious problem emerges as to the mismatch between the two kinds of words, or such a mismatch is even expected. And the mismatch does occur in Irabu, in such a way that polymoraic affixes are independent phonological words, though they are internal components of a grammatical word. Thus in (26a) below, a single grammatical word, a noun, consists of four phonological words.

- (26a) {PW -PW -PW -PW} *PPhr*
 ffa*-gama-mmi*-nagi
 child -DIM -PL -DUB
 ‘Lovely children or suchlike’

On the other hand, there can also be a *unitaristic* definition of word, where a single unit is defined as a word both in terms of phonology and grammar. Here, the word must be both a phonologically well defined unit and a grammatically well defined unit. The only candidate for such a unitaristically defined word is the nominal/verb complex: it is phonologically well defined in that it is the domain of the foot-based prosody (remember also that it is phonetically a unit of utterance; see Anderson 1985 for the significance of this phonetic evidence for the notion word); it is grammatically well defined in that it has a definite structure, as schematised in **Figure 2** above. It is also noteworthy that the foot-based prosody in Irabu (as summarised in (20a-c)) is parallel to that found in some polysynthetic languages, such as Cup’ik (Woodbury 2002; see Shimoji 2007 for some detail), and the word in these languages is prosodically defined as the unit of this foot-based rhythm.

(b) Nominal/verb complex revisited: is it a word?

The new analysis, which claims that a word in Irabu is a nominal/verb complex, says that (26a) above is analysed as a word, both phonologically and grammatically. This is not controversial: let us consider that each PW in (26a) is something smaller than a word, say, an ‘accent-bearer’ (AB in (26b) below), and that the accent-bearer is a lower-level unit clustering to build a higher prosodic domain, or a word, which is also a grammatically defined word, i.e. the smallest nominal complex (a head

nominal). In (26b), then, a word is analysed as having two accents, just as a word can have a secondary or multiple primary stress in stress languages (e.g. Boumaa Fijian (Dixon 1988), Diyari (Austin 1981), and Cup'ik (Woodbury 2002)).

- (26b) {AB-AB-AB-AB} *Word*
 {ffa*-gama-mmi*-nagi} *Word*
 child -DIM -PL -DUB
 'Lovely children or suchlike'

This apparently means that Irabu exhibits a cross-linguistically highly common pattern that a phonologically defined word and a grammatically defined word equate in principle (Anderson 1985: 153; empirical support of which is found in Woodbury 2002 and many other studies listed in Dixon and Aikhenvald eds. 2002).

The obvious challenge encountered in the unitaristic definition of word is, however, that the word so defined can be a whole nominal or verb complex containing bits of smaller units, as shown in (27).

- (27) {vva =ga* patalatsi =nʊ =dʊ} *Word* {ʊ:*-ka] da]a* ssʊ} *Word*.
 2SG =GEN work =NOM =FOC big -VLZ EMP DSC
 'Your work is (more) significant, I tell you.'

The most controversial point to note is that the word here allows some flexibility of change in order of internal components (e.g. post-verb particles), which is not typical in the unit word especially in terms of grammatical criteria: for example, Dixon and Aikhenvald's (2002) list the 'universal criteria' for grammatical wordhood, which include the fixed order of elements (see Section 2 above).

With the empirical data from Irabu, however, we are induced to ask whether *all* languages necessarily have a grammatically defined word satisfying the 'universal' criteria suggested by Dixon and Aikhenvald (2002). Looking to Irabu, phonological evidence (as the foot-based prosody) and phonetic evidence (as a unit of utterance; a target of pause) unambiguously specify a certain unit, which is also a grammatically well defined unit, a nominal/verb complex. It is one reasonable assumption, then, to assume this unit as a primary unit in Irabu phonology and grammar, or a word in Irabu.

At this stage of description, this study sticks to the current, dualistic definition of word, i.e. there are phonological words and grammatical words in Irabu, as shown in Section 2. I describe that a nominal/verb complex is a phrase of grammatical words, and that a phonological word is as defined in Sections 3 to 7

throughout, which may be a great deal smaller than a grammatical word (e.g. polymoraic affixes). However, it also seems fruitful, and is an important future research topic, to examine the unitaristic definition of word as briefly noted in this section, according to which one identifies a word with a nominal/verb complex. In line with this, it is also an important research topic open for future typological research to reexamine the applicability and validity of grammatical definition of word in various languages as suggested in the typological literature.

Abbreviations

ACC: accusative	CAUS: causative	CNJ: conjunction
COP: copular	COR: corrective	CSL: causal converb
CVB:SEQ: sequential converb	DAT: dative	DIM: diminutive
DSC: discourse marker	DUB: dubiative	EMP: emphatic
FOC: focus	GEN: genitive	HS: hearsay
INTJ: interjection	NEG: negative	NOM: nominative
NPST: non-past	PAST: past	PERF: perfect
Pn.PART: post-nominal particle	PL: plural	PROG: progressive
Pv.PART: post-verb particle	QT: quotative	RLS: realis
STM: stem expander	TAG: tag question	TOP: topic
VLZ: verbaliser		

References

- Anderson, Stephern R. 1985. Inflectional morphology. In Shopen, Timothy, ed. *Language typology and syntactic description (III)*, 150-201, Cambridge: Cambridge University Press.
- Austin, Peter K. 1981. *A grammar of Diyari*. Cambridge: Cambridge University Press.
- Dixon, R.M.W. 1977. *A grammar of Yidiny*. Cambridge: Cambridge University Press.
- Dixon, R.M.W. 1988. *A grammar of Boumaa Fijian*. Chicago: University of Chicago Press.
- Dixon, R.M.W., and Alexandra Y. Aikhenvald. eds. 2002. *Word: a cross-linguistic typology*. Cambridge: Canbridge University Press.
- Dixon, R.M.W., and Alexandra Y. Aikhenvald. 2002. Word: a typological framework. In Dixon, R.M.W., and A.Y.Aikhenvald, eds., *Word: a cross-linguistic typology*, 1-41, Cambridge: Cambridge University Press.

- Hirayama, Teruo, Ichiro Oshima, and Masachie Nakamoto. 1967. *Ryukyu Sakishima hoogen no soogooteiki kenkyuu*. Tokyo: Meiji Shoin.
- Karimata, Shigehisa. 2005. Okinawaken Miyakojima Hiraahoogen no phoneme. *Nihon tooyoobunka ronsyuu* 11: 67-113.
- Nakama, Mitsunari. 1983. Ryukyu Miyako Nagahama hoogen no onin. *Ryuudai kokugo* 2: 198-218.
- Pellard, Thomas. 2007. Miyako syohoogen no onin no mondaiten. Paper read at the second workshop on Ryukyuan languages, held at Kyoto University (available on-line at the author's website):
<http://thomaspellard.ryukyu.googlepages.com/Miyakoonin20070909.pdf>
- Sakiyama, Osamu. 1963. Ryuukyuu miyako syotoo hoogen hikaku oninron. *Kokugogaku* 54.
- Sawaki, Motoei. 2000. Controversial topics on Miyako dialect. *Journal of phonetic society of Japan* 4 (1): 36-41.
- Shimoji, Michinori. 2007. Irabujima hoogen no phonological word. Paper read at the second workshop on Ryukyuan languages, held at Kyoto University (available on-line at the author's website):
http://www.geocities.jp/skippingbird76/workshop_2nd_phonologicalword.pdf
- Shimoji, Michinori. *in.prep.* A grammar of Irabu, a sub-variety of Miyako Ryukyuan, a Southern Ryukyuan language. A PhD thesis in progress at the Department of Linguistics, the Australian National University.
- Woodbury, Anthony C. 2002. The word in Cup'ik. In Dixon, R.M.W., and A.Y.Aikhenvald, eds., *Word: a cross-linguistic typology*, 79-99, Cambridge: Cambridge University Press.

伊良部島方言の音韻論

下地理則

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要旨

本研究の目的は、南琉球語に属する宮古琉球語のうち、伊良部島方言（特に長浜地域の方言）の音韻論を記述することである。これまでの宮古琉球語の研究史においては、特定の音素の音声実質の研究など、ボトムアップ的な研究が中心であったが、本稿では、音素目録、音韻語の音節構造、モーラ構造、韻律構造、クリティック、形態音韻論までを視野に入れた包括的な音韻記述を行う。