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ASPECTS OF MAGA RUKAI PHONOLOGY

Tien-Hsin Hsin, Ph.D.

University of Connecticut, 2000

This dissertation is a study of the phonological aspects of Maga Rukai, one of the Austronesian languages spoken in Taiwan. This language displays a number of intriguing properties. For instance, the syncope process and the stress assignment are built on different prosodic structures; the mid vowels are derived from deleted segments; and the epenthetic vowel shows echoing effect with the stem vowel.

The goal of this thesis is twofold: to present a full-scale description of the prominent issues of Maga phonology, and to look into these topics with current theories, so that adequate explanations can be obtained for the observed phenomena. It is demonstrated in the current research that through a synchronic perspective, we achieve not only

theoretical explanations for individual alternations, but also a unified mechanism that underlies the various processes of the language. Specifically, it is shown in this work that in order to achieve an elegant and adequate analysis of the Maga facts we need to rely on derivations, and in particular on an extrinsic ordering of the different processes.

The dissertation contains five chapters. Chapter one provides the background information of the language and the people, a review of previous literature, and the theoretical framework within which the present study is conducted. Chapters 2 details the phonological inventory and the characteristic phenomena of Maga phonology. In particular, I show the interaction among the processes characterizing this language, and that a proper ordering of them in a derivation is the key to successfully deriving correct output. Chapter 3 demonstrates how these phonological alternations interact with morphological processes such as affixation and reduplication. A cross-linguistic comparison is made in Chapter 4 between Maga and Tsou concerning the difference of their tolerance on homorganic clusters and geminates. It is argued that this difference provides evidence to the syllabification of surface structure of Maga. Chapter 5 illustrates the proposed analyses by demonstrating the interaction of the processes in relevant derivations.

ASPECTS OF MAGA RUKAI PHONOLOGY

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A dissertation

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Doctor of Philosophy Dissertation

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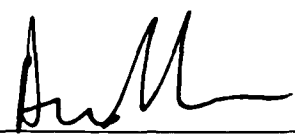
Major Advisor 

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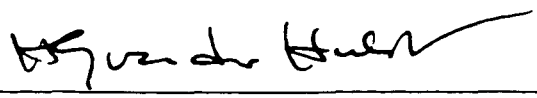
Associate Advisor 

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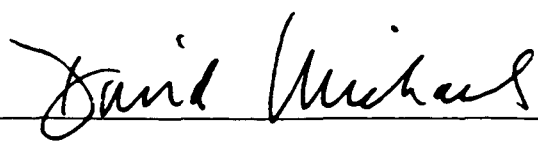
Associate Advisor 

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Chapter 1 Introduction

1.1 An overview

This dissertation is a study of the phonological aspects of Rukai, one of the indigenous languages spoken in Taiwan. The investigation is based on the data from the Maga dialect, concentrating on the aspects of phonology of the language, in particular its phonological and the morphophonemic alternations.

In addition to a detailed description of the phonological features of the language, the current work is also intended to provide theoretical explanations for the phenomena under examination. This study differs from the previous literature in that it takes a synchronic perspective in examining the observed data, which leads to innovative findings that may shed light on our understanding of the language.

This thesis consists of five chapters. Chapter 1 contains an introduction to the language and the people, a review of previous literature and the theoretical framework within which the present study is conducted.

Chapters 2 details the phonological inventory and the characteristic phenomena of Maga phonology such as vowel / zero alternations, mid vowel formations, echo vowel insertions. In particular, I demonstrate the interactions among the processes, and that their proper ordering is the key to successfully deriving correct outputs. The

significance of this chapter lies in that, through the synchronic approach adopted in this study, it provides a coherent and unified account of these phenomena. In dealing with each process, different solutions such as historical derivations are discussed in comparison to the proposed analysis.

Chapter 3 demonstrates how the phonological alternations interact with morphological contexts, especially in the two major processes, affixation and reduplication.

In Chapter 4 a cross-linguistic comparison is made between Maga and Tsou. In particular, the difference of their tolerance for homorganic clusters and geminates is investigated. Some hypotheses are entertained to account for this cross-language difference.

Chapter 5 summarizes the proposed analyses by demonstrating the processes in various derivations.

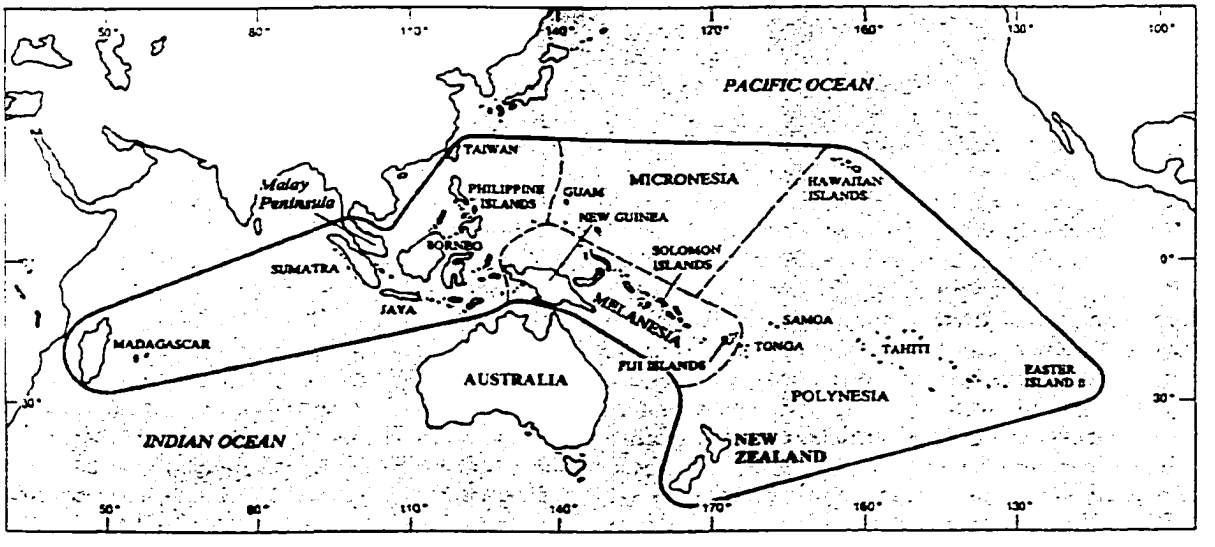
The remainder of this chapter is organized as follows. In 1.2, I first provide background information on the Rukai language — its geographical and linguistic environments. The focus is on Maga, the dialect under study. 1.3 describes the project and the informants. 1.4 reviews works in the past literature regarding Rukai dialects. In 1.5 I lay out the theoretical framework in which the present study is couched.

1.2. General background information

1.2.1. The Formosan languages

Rukai is one of the languages spoken by the indigenous people in Taiwan. These indigenous languages, traditionally referred to as 'Formosan languages', are part of the Austronesian language family, which consists of a diverse group of several hundred of languages,[1] extending from South Asia (Madagascar, Indonesia, the Philippines) to the Pacific islands of Melanesia, Micronesia and Polynesia. Taiwan is located at the north rim of this vast territory (see Map 1).

MAP 1. *Major Divisions of Austronesian Languages*



(From International Encyclopedia of Linguistics 1992, vol. 1, p. 143)

[1] According to Li 1997b (p. 221), more than 900 Austronesian languages are known to exist.

The linguistic position of the Formosan language in the Austronesian language family has been controversial. One hypothesis (Dyen 1963 and Tsuchida 1976) assumes that the Formosan languages are subgrouped with the Philippine languages. Another hypothesis (Dahl 1973 and Blust 1977) argues that the Formosan languages are the first offshoot of the Austronesian family. The latter hypothesis is widely held as it is substantiated by evidence from phonological, grammatical and lexical aspects.

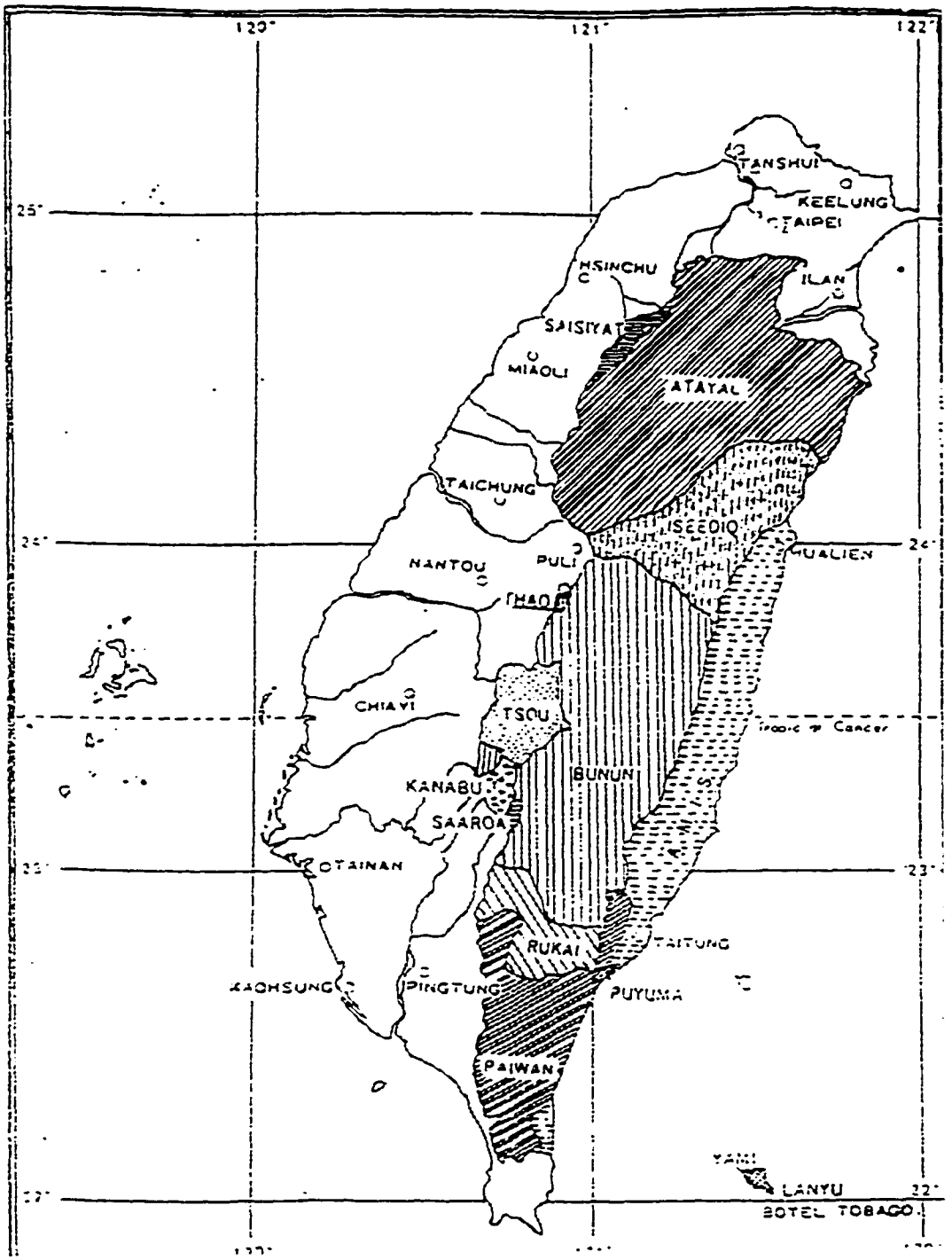
The aboriginal groups of Taiwan are administratively divided into the 'plains tribes' and the 'mountain tribes'. The former includes Kavalan, Pazeh, Thao, Ketaglan, Taokas, Papora, Babuza, Hoanya and Siraya, and the latter include Atayal (further divided into Atayal proper and Sedeq), Saisiyat, Bunun, Tsou (including two south-Tsou dialects, Kanakanavu and Saaroa), Rukai, Paiwan, Puyuma and Amis.[2] These indigenous languages are disappearing rapidly, especially those of the plains tribes. Except for Kavalan, Pazeh and Thao whose native speakers, though indeed very few, can still be found, the rest of plains tribe languages are almost extinct. The major cause of their vanishing is the sinicization of the aboriginal tribes since the annexation of Taiwan by the Chinese in the late seventeenth century. After the continued settlement from the

---

[2] Another aboriginal language, Yami, is spoken in the Orchid Island in the south of Taiwan. Yami is said to be different from the other indigenous languages spoken in Taiwan, but more closely related to the Ivatan languages of the Philippines.

mainland, the indigenous groups, being a small minority of the population, have been subject to cultural and linguistic assimilation to the Han people.

Another factor that has played a role in the extinction of some of the languages comes from the influence of other aboriginal languages. Migration of populations plus interaction among different tribes sometimes cause one language/dialect to be replaced by a more prestigious language of that area. For example, Kanakanavu and Saaroa are being replaced by Isbukun Bunun as a result of the inhabitance of a large Bunun population in these villages (see Zeitoun 1995).



Map 2: Distribution of the Formosan languages (from Zeitoun 1995: 22)

1.2.2. Rukai dialects

Rukai is mainly distributed in southern Taiwan (see Map 2), with a population estimated of about 12,000.[3] The position of Rukai language in the classification of the Formosan language family, or more broadly, in the Austronesian language family, has triggered many debates, and still remains an unsettled issue. In general, scholars agree with the tripartite classification of Dyen (1965: 287) and Ferrell (1969: 25) which divides the Formosan languages into three major groups: Atayal in the north, Tsouic in the center, and Paiwanic in the south and the east. Under such a system, Rukai is considered a division of the Paiwanic branch, mainly based on evidence from lexical comparisons. This subgrouping is further supported by later scholars such as Ho (1983) based on phonological and syntactic evidence.

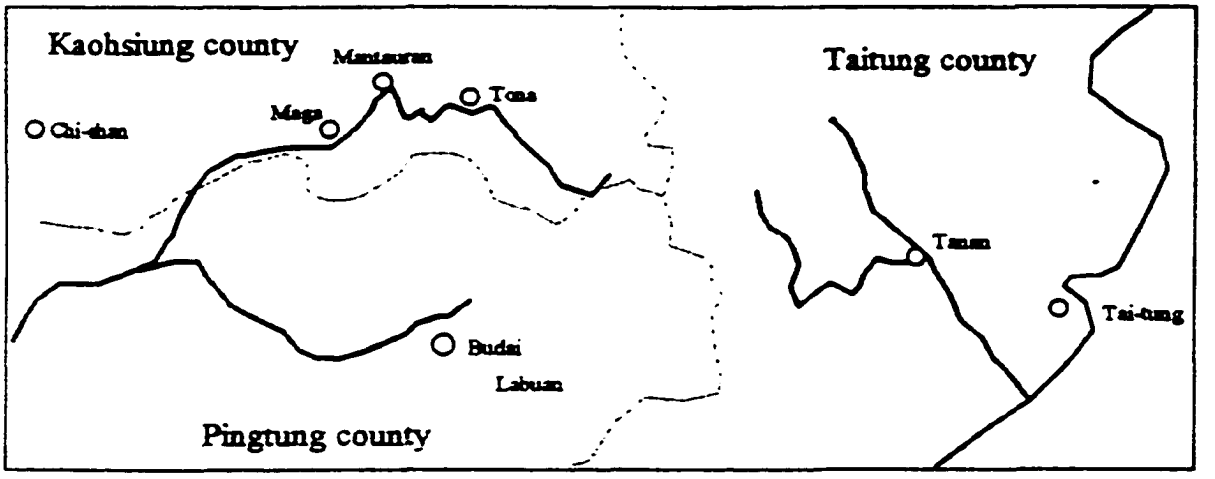
However, as Ferrell points out, Rukai poses problems in the classification of Taiwan linguistics since it also shares a number of common features, both in syntax and phonology, with the Tsouic family. For example, echo vowels (see Section 2.4) are developed in Rukai as well as Tsouic dialects, but not attested in any other Formosan languages. Syntactically, Li identifies several characteristics shared by both Rukai and

---

[3] The actual number as of 1997 is 12,304, according to the information obtained from the web site of the Council of Aborigine Affair of Executive Yuan of Taiwan.

Tsou, such as inflection and determiners (see Li 1973: 4). Therefore, based on evidence from phonological features and shared cognates, Tsuchida (1976) argues that Rukai should belong to the Tsouic family. More recently, Starosta (1995: 695) proposes a radical change in grouping. He hypothesizes, based on shared innovations in grammar rather than phonology, that Rukai is in fact the first off-shoot of the Proto-Formosan languages.

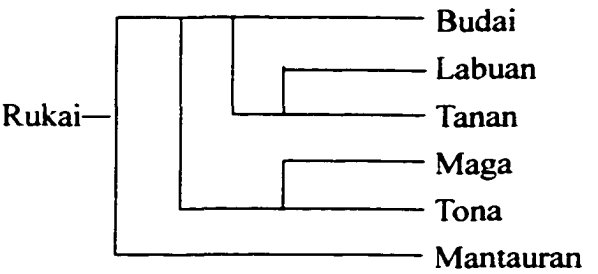
Not only is its external classification controversial, but also the internal relationships among Rukai dialects are under debate. Rukai is divided into six dialects, which are geographically distributed in three areas in the south and southeast part of Taiwan. Tanan is located in Taitung prefecture in the east, Budai and Labuan are situated in Pintung prefecture in the south, while Maga, Tona and Mantauran are in Kaohsiung prefecture, in the north (see Map 3). The last three are also known as the 'Lower three villages'. It has been reported that these three subgroups differ not only geographically, but also culturally (see Chen 1955). Linguistically, the northern dialects of the lower three villages on the one hand, and the south-eastern one -- Tanan, Budai and Labuan -- on the other, are said to be mutually unintelligible to some extent (see Zeitoun 1995). The speakers of each dialect tend to identify themselves with their local communities, rather than with all other speakers of the same language.



Map 3: Distribution of the Rukai dialects (from Zeitoun 1995: 102)

Among the dialects of the lower three villages, Maga and Tona, bearing much resemblance in every aspect, have been generally accepted as a subgroup. The controversy, however, lies with the position of Mantauran in the internal relationships of Rukai dialects. Mantauran is peculiar in that it displays many drastic differences in both phonology and syntax that diverge not only from Maga and Tona, but also from the south-eastern dialects (see Li 1977a, Zeitoun 1995). Debates and various hypotheses have evolved around this topic (cf. Li 1977a, Zeitoun 1995, Tu and Cheng 1991, among others). The latest consensus seems to be that Mantauran is the first branch that broke away from Proto Rukai, while the other branch was later divided into the rest of the dialects, as illustrated in (1) from Li 1997b (p. 99).

(1)



1.2.3. Maga

The study presented here is based on the Maga dialect. Given the diversity described above among the dialects, it is obvious that the findings in this dissertation do not necessarily apply to any of the other Rukai dialects.

The Maga dialect is spoken in the Maolin village of the Maolin township of the Kaohsiung prefecture, which has a population of 787 people (220 families) according to the census as of March 2000.[4] The source indicates that roughly 90 percent of the population is aboriginal,[5] but this number includes also non-Rukai aborigines, mostly through marriage partners from tribes around Rukai, such as Paiwan and Bunun. The local community identify themselves, their village and language by the name *tilɖika*.

---

[4] The information was provided by Ms. Guei-Hua Hsieh of the census administration office of Maolin Township.

[5] This figure is calculated based on the population of the three villages: 1,587 out of 1,751. The source did not provide the number in each individual village.

The name 'Maga' is only used by the Chinese (Han people) and Japanese.[6] However, in order to be consistent with the previous literature, I will refer to the village and the language as Maga.

Like most of the Formosan languages, Maga faces extinction. In spite of the moderate population of the village, there are not many fluent speakers remaining, and most of these are over 60 years old. Even within this generation, their conversation, though normally in Maga, is sometimes mixed with vocabulary from Japanese, the language they learned in their youth. As for the younger generation, since Mandarin is acquired as the first language, most of them have lost command of Maga. The common language used for communication in the village is Mandarin. Within a family, it is necessary for the elderly to understand and, to some extent, speak Mandarin, in order to communicate with their grandchildren, who speak or understand little Maga. Another factor that contributes to the diminishing of Maga is the external influence from Bunun and Paiwan, two bigger tribes around the village.

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[6] 'Maga', according to my consultants, means 'people from outside' in the local language. It is possible that the name was given after their relocation by Japanese to the present site in 1945.

1.3. Previous literature

The linguistic descriptions of Rukai languages can be traced back to the work of Ogawa and Asai (1935). Their study gives a brief description of each dialect, including phonetics and lexical comparisons, and 32 stories. Their work contains many mistakes in transcriptions, and hence is seldom used in later studies.

Shelley (1979) mainly discusses the geographical relation and cultural information of the Budai dialect, but it also presents some description of the phonological and morphological structure of this dialect.

Kuo (1979) discusses the structure of the complementary clauses in the Budai dialect.

Zeitoun (1995: part 2) presents a research on the cross-dialectal variations found in the lexicon, phonological and morpho-syntax of the Rukai dialects, which aims to provide evidence for reconstructing Proto Rukai syntax in order to clarify the internal relationships among the dialects. In Zeitoun 1997a and b, she focuses on some syntactic aspects of the Mantauran dialect and makes a comparison between this dialect and the Budai dialect.

Chen (1999) explores the interrogatives in the Budai dialect, in particular in the *Hocapoŋan* area.

However, without any doubt, the series of works by Li has contributed most to our knowledge of Rukai, and has had tremendous influence on subsequent investigations, including the current one. His studies not only cover individual dialects, but also comprise dialectal comparison and internal classifications. Li 1973 examines the grammar of the Tanan dialect, including its phonology, morphology, and syntax. The collected texts, including 26 stories, of the Tanan dialect are published in Li 1975a. Li 1977a contains a list of nearly 500 cognates from the various dialects of Rukai. Based on these data, he reconstructs the phonological system of Proto-Rukai. Through the reconstructed system, he traces the historical phonological derivations of each individual dialect, and determines the internal relationship among the dialects. Li 1995 describes the phonemic system and morphology of the Budai dialect. Li 1996 compares the pronominal systems among the Rukai dialects. As can be seen in the following chapters, the current work draws heavily on Li's previous studies, in particular, his analyses from the historical point of view.

The studies specifically devoted to the Maga dialect include Li 1975b, which mainly describes the phonemic system and morphophonemic alternations, and Saillard 1997, which compiles information regarding morphological constructions and morphophonemic alternations. Although there are a number of places (e.g. Li 1974,

1977b) which mention sporadically various phenomena of Maga, it is fair to say that Maga phonology has not received proper treatment to date. Thus, the current study is intended for two goals: to give a detailed description of the phonological features of the language, and to provide theoretical explanations for the phenomena under examination.

1.4. The project

The discussions in this dissertation are mainly based on the data collected by the author during the period between August 1999 and April 2000, including a few trips to the village, with each trip lasting for two or three weeks. In the preparation for data collection, I have consulted the vocabulary listed in Li 1977a and 1997a, and the morphological list by Zeitoun (manuscript).

1.4.1. The informants

During the period of the project, I have interviewed a few speakers in Maga. But the data were mainly collected from two informants, Parupo Lavausu (Chinese name Fan Zhu-mei) and Palәlai Mumuni (Chinese name Liu Liang Mei-ing). Both were born in 1925 and raised in Maga, and were 74 years old during my visits. Ninaa[7] Mumuni has

[7] 'ninaa' is the term used to refer to older females, and 'naoo' is used to address them.

always lived in Maga, doing farming. Ninaa Lavausu used to work as the nurse of the village and was stationed in neighboring villages as well. They both speak some Japanese, due to the primary Japanese education received when they were young. Ninaa Mumuni speaks limited Mandarin, but is good at communication. Ninaa Lavausu is fairly fluent in Mandarin, and also speaks the neighboring dialects, due to her early experience.

1.5. Theoretical Framework

The primary goal of my work on Maga has been to capture the basic generalizations in the phonological system and describe them in a theoretically explicit manner. Thus, the point of departure has not been to settle any current theoretical debates, even though, of course, by adopting a certain framework, it is inevitable that one makes an implicit commitment. My choice of the framework has been mainly determined by what, to my opinion, are widely known and accepted concepts and notations. In the following I provide key references to the frameworks adopted in the current work.

In general, this study adopts the model of nonlinear phonology (cf. Goldsmith 1976, Clements and Keyser 1983, among others) in representing the phonological segments and processes of Maga. In particular, the X-slot theory of the skeleton (cf. McCarthy 1979,

1981, Clements and Keyser 1983, Kaye and Lowenstamm 1984, Halle and Vergnaud 1980, and Levin 1985) is applied in segmental representations. The syllable structure advocated in studies like Selkirk 1982 is used here when syllabic representations are concerned. Under this theory, the syllable is divided into onset and rhyme, which are hierarchically organized. In describing the processes proposed for various alternations, I apply the Feature Geometry laid out in works such as Calabrese 1988 and 1995.

The metrical theory is implemented for deriving the prosodic structure of Maga in connection with vowel / zero alternations and stress placement. More precisely, I adopt the formal algorithm developed in Idsardi 1992 and Halle and Idsardi 1995.

In discussing the reduplication processes of morphology, I adopt the theory argued for in Steriade 1988. The central idea of this theory is that 1) reduplication always begins with a full reduplication, which copies both the prosodic structure and the segmental substance of the base, and 2) a partial reduplication results from subsequent operations.

Chapter 2 Phonology

This chapter deals with the phonological properties of Maga, including its segments and phonological processes. The discussion starts with the segmental inventory of Maga -- the phonetic description, distinctive features and distributions of the segments. It then introduces various theoretical issues of Maga phonology, such as vowel deletions built on the prosodic structure, the development of mid vowels, the distribution of echo vowels, final vowel lengthening, and glide formation.

As noted in the previous literature, Maga phonology exhibits many interesting morphophonemic alternations. There are a number of reasons for taking up these issues in our discussion of Maga phonology, in spite of the fact that some of them have been discussed in the previous literature (e.g. Li 1975b, 1977a, b). First, these are the most salient, recurrent processes of the language. Compared to other relatively smaller data sets that may include only a few words, these phenomena appear repeatedly, generally covering the language as a whole. Thus, a comprehension of these phenomena will shed light on the overall picture of our understanding of the language. Second, unlike most works on this dialect which have stressed the historical aspect, the discussions in this chapter re-examine these phenomena from a synchronic perspective. And as will be shown throughout the discussion, the synchronic approach provides insights into each

topic individually. It also demonstrates the close interactions of these processes as a whole, thus depicting a clear picture of the phonology of the language.

This chapter is organized as follows. Section 2.1 introduces the inventory of segments; first the consonants, then the vowels. Section 2.2. discusses the vowel / zero alternations; 2.3., the mid vowel formation; 2.4., echo vowel insertion; 2.5., glide formation, and 2.6., vowel lengthening. Issues concerning the surface syllable structure and stress resulting from the phonological processes are presented in 2.7. Section 2.8. summarizes and concludes the discussion of this chapter.

Unless indicated otherwise, the examples in the text are in phonemic representation. Furthermore, as stress in Maga regularly falls on the penultimate syllable in the surface forms, it will generally be omitted in the examples, unless such indication is relevant for our discussions.

2.1. Segment Inventory

Maga contains eighteen consonants and seven vowels. introduced in Sections 2.1.1. and 2.1.2. respectively. These two sections basically provide general descriptions and observations of these segments. while theoretical discussions regarding their specific properties will be presented in the other sections of this chapter.

2.1.1. Consonants

2.1.1.1. Phonetic Description and Distinct Features

The eighteen consonants of Maga are listed in (1).[1] Detailed descriptions and examples of the segments are given in the following.

---

[1] The chart (1) differs from that in Zeitoun 1995 which includes two glides /y/ and /w/. In the current analysis, the glides are assumed to be the allophones of the high vocoids /i/ and /u/ in prevocalic positions respectively, thus are not phonemic. This coincides with Li's (1977a) dialectal comparison in which /y, w/ are not treated as phonemic.

(1) Consonants:

	Labial	Dental	Alveolar	Retroflex	Dorsal
Stop	p b		t d	ɖ	k g
Affricate			c		
Fricative	v	θ (ð)	s (z)		
Nasal	m		n		ŋ
Lateral			l		
Trill			r		

Stops

Maga has three voiceless stops, /p/, /t/, /k/, and four voiced stops, /b/, /d/, /ɖ/, and /g/. The voiceless stops are all unaspirated. /ɖ/ is a retroflex. Contrast between the homorganic consonants is evidenced by the examples in (2).

(2)

p : *b*	*piki*	'navel'	*biki*	'pig'
	praŋi	'spouse'	*braŋi*	'belly'
t : *d*	*taturu*	'three people'	*dani*	'house'
	atee	'taro'	*idee*	'hundred'
d : *ɖ*	*adoo*	'dirt'	*maɖoo*	'many'
	maduu	'cooked'	*meɖuu*	'thirsty'
t : *ɖ*	*turu*	'three'	*ɖusa*	'two'
	taturu	'three people'	*ɖaɖoŋu*	'monkey'
k : *g*	*kaka*	'elder sibling'	*gaga*	'trachea'
	kuku	'leg'	*guŋu*	'duck'
	kiki	'I'	*gigi*	'intestine'

Some comments are in order concerning the glottal stop [ʔ]. As (1) shows, there is no glottal stop in Maga, although it appears in both of the neighboring dialects (Tona and Mantauran; see Li 1977a, Zeitoun 1995). Li (1975b) includes the glottal stop in Maga's system, but places it in parentheses. Li remarks that he did not elicit any Maga word with a glottal stop, but found in Tsuchida's (1970) unpublished fieldnotes the word *ʔiu* 'goat' and its derivative *saŋiʔiu* 'smell of goat, body odor'. Li considers it dubious 'if a phoneme should occur in only one word' (p.17) and that this particular form has no cognates in other dialects. He therefore conjectures that the word *ʔiu* is probably a borrowing from Taiwanese *ʔiu* 'goat'. And after checking with his informants, Li concludes that glottal stop does not make any distinction of meaning, thus is not a phoneme in Maga, hence *ʔiu* must be a borrowing from Taiwanese. My own investigation agrees with Li's conclusion. Furthermore, in a later work of his, Tsuchida (1976) also excludes glottal stop from the phonemic inventory of Maga. Thus, it seems a consensus that the glottal stop is not a part of the inventory of Maga.

Tsuchida's transcription can be therefore interpreted as including the insertion of a phonetic glottal stop before word-initial vowels. A glottal stop is in fact detected in the initial position of words such as *apuru* [ʔapuru] 'fire', *abuu* [ʔabuu] 'ash',

ubərə [ʔubərə] 'smoke', *ikivi* [ʔikivi] 'tail'.[2] Based on this observation, I assume that the glottal stop is phonologically determined. Namely, it is predictable before a word-initial vowel.

Fricatives

There are two voiceless fricatives /θ/ and /s/, and three voiced fricatives /v/, /ð/ and /z/. /v/ is labial-dental. /θ/ and /ð/ are interdental.

/s/, according to Tsuchida (1976), is an alveolar fricative. My impression is that phonetically [s] of Maga has the tip of tongue further front, touching the front teeth, not as far back as the alveolar ridge as [s] in English in *see* and *set*. When preceding the high front vowel /i/, /s/ is palatalized and becomes palato-alveolar [ʃ], as shown in the following words.

(3)	sisaa	[sisaa]	'today'
	masusu	[masusu]	'cough'
	sito	[ʃito]	'peanut'
	aḍisi	[aḍiʃi]	'crested hawk'

[2] I am grateful for the judgment provided by Lin Hui-juen, whose native language, Mantauran dialect of Rukai, treats the glottal stop as phonemic.

Two of the voiced fricatives -- the interdental /ð/ and alveolar /z/ -- were not listed in Tsuchida 1976, but appear in the system of Li 1975b. Li places them both in parentheses as he speculates that these two consonants are borrowings given the fact that their distributions differ from those of the other consonants: First, /ð/ and /z/ do not appear in word-initial position. Second, they are very rare in Maga words, found in only a handful of words, e.g., *vnəəðə* 'plum', ***kvaðni*** 'a type of bamboo', ***kzulu*** 'thousand'[3] and *mkatonozozo* 'a type of mushroom', which Li suspects to be loan words. However, these borrowings, as Li also notes, can be considered part of the Maga lexicon since they manifest the special phonological features of Maga, such as consonant clustering in the same syllable. In other words, they have been integrated in the morphological processes of Maga. I adopt Li's opinion and treat both fricatives as segments of Maga. (4) shows the evidence of contrast for /s/ vs. /θ/ and /v/ vs. /p/ and /b/.

(4)					
	s : *θ*	*ma-susu*	'cough'	*θuθu*	'breast'
		spaa	'mat'	*θpati*	'four'
		u-θiθi	'boil'	*u-sisi*	'urinate'
	v : *p*	*isivi*	'hair'	*isipi*	'shoulder'
	v : *b*	*avee*	'sun'	*abee*	'rice cake'

[3] Li (1975b, note 1) considers that *kzulu* 'thousand' may be a loanword *(/ta-kuzul/)* from Paiwan which is another aboriginal tribe that had close interaction with Rukai.

Affricate

There is only one affricate /c/, the equivalent of the IPA [ts],[4] which is voiceless and unaspirated. /c/ undergoes palatalization before the high front vowel /i/ and is realized as [tʃ] in this context.[5]

(5)			
	icoo	[itsoo]	'human'
	gacu	[gatsu]	'louse'
	i-ci-coo	[i-tʃi-tsoo]	'human (pl.)'
	amici	[amitʃi]	'root'

/c/ is shown contrastive to /s/ and /t/ in the following pairs.

(6)					
	c : *s*	*cacŋali*	'star'	*salqu*	'knife'
		bcuu	'male organ'	*bsuu*	'bow'
		uvaci	'vein'	*apasi*	'crab'
	c : *t*	*cacŋali*	'star'	*tatmolo*	'mosquito'

[4] The symbol [c] is used for a palatal stop in the alphabet of the International Phonetic Association. The affricate is represented as /c/ here in order to distinguish it from the consonant sequence t+s.

[5] There are some variations, however. For example, one informant is not always consistent in having palatalized [tʃ].

Nasals

The three nasals /m/, /n/ and /ŋ/ are labial, alveolar and velar respectively. Contrast of the three segments is given in (7).

(7)	*n* : *ŋ*	*nana*	'pus'	*aŋatu*	'tree'
		tecini	'police'	*pciŋi*	'skin'
		tovnaa	'hut'	*tavŋaa*	'window'
	n : *m*	*nana*	'pus'	*mama*	'poisonous caterpillar'

Liquids

Maga has two liquids, /l/ and /r/. /l/ is a voiced lateral. Tsuchida describes /r/ as a voiced retroflex frictionless continuant (1976: 112), and Li (1975b), as a voiced retroflex or a trill. To me, /r/ is a retroflex, without trill. Evidence for contrast of the two liquids is shown in (8).

(8)	*l* : *r*	*loŋu*	'horn'	*roḍu*	'down'
		lalmi	'ginger'	*rarami*	'bird'
		alii	'friend'	*arima*	'hand'
		maplee	'lame'	*mapree*	'tired'

(9) Distinctive features:[6]

	LABIAL				CORONAL											DORSAL		
	p	b	m	v	θ	ð	t	d	n	c	s	z	l	r	ɖ	k	g	ŋ
cons	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
son	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	-	-	+
cont	-	-	-	+	+	+	-	-	-	±	+	+	+	+	-	-	-	-
strid	-	-	-	-	-	-	-	-	-	±	+	+	-	-	-	-	-	-
ant					+	+	+	+	+	+	+	+	+	-	-			
dist					-	-	-	-	-	+	-	-	-	-	-			
nasal	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+
stiff	+	-	-	-	+	-	+	-	-	+	+	-	-	-	-	+	-	-

2.1.1.2. Surface distribution and Consonant Clusters

The surface distributions of the consonants are generally free, except that no consonant appears word-finally, since words in Maga all end with open syllables. Most of the consonants can appear both at word-initial position and between vowels, except /ð/ and /z/, which, as mentioned above, are not found word-initially. Moreover, as shown in (10), the consonants can be followed by almost any vowel.[7]

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[6] The format of this chart is adopted from Vaux 1994. The abbreviations are as follows: cons 'consonantal', son 'sonorant', cont 'continuant', strid 'strident', ant 'anterior', dist 'distributed', stiff 'stiff vocal fold', which is equivalent to [-voice].

[7] This chart is mainly based on Li 1975b, with some additions from my own fieldnotes.

(10)

	_i	_e	_u	_o	_ɨ	_ə	V_V
p	x	x	x	x	x	x	x
b	x	x	x	x	x	x	x
t	x	x	x	x	x	x	x
d	x	x	x	x	x		x
ɖ	x		x	x	x		x
k	x	x	x	x	x		x
g	x	x	x	x	x		x
m	x	x	x	x	x		x
n	x	x	x	x	x		x
ŋ	x	x	x	x	x	x	x
c		x	x	x	x		x
tʃ	x						
v	x	x	x	x	x		x
θ	x	x	x	x	x		x
s		x	x	x	x	x	x
ʃ	x						
l	x	x	x	x	x	x	x
r	x	x	x	x	x	x	x

A number of gaps in (10), especially as regards the central vowel /ə/, seem to require some explanation, and one may speculate whether certain cooccurrence restrictions exist in these cases. There seems no reason to assume a cooccurrence restriction since the consonants that do not cooccur with /ə/ cannot be grouped into any natural class. I suspect that their absence is due to the following reasons: the infrequent appearance of /ə/ in Maga words, or the close resemblance of the two central vowels /ɨ/ and /ə/, which will

be discussed in the next section. Or it may simply be the result of insufficient data, which requires further investigation.

Consonants also appear in sequences, which are found in both word-initial and -medial positions. This feature is a unique property of Maga, since in the other dialects there are no consonant clusters (see Li 1975b). The attested consonant sequences shown in table (11) indicate a wide range of combinatory possibilities.

(11) Attested consonant clusters

x = initial- and medial-positions
(x) = medial-position only

C2 / C1	p	b	t	d	ɖ	k	g	m	n	ŋ	c	v	θ	s	l	r
p	(x)	(x)	x	(x)	x	x	x		x	x	x	x	(x)	(x)	x	x
b			x			x			(x)	x	x	x	x	x	x	x
t	x	x	(x)		x	x	x	x	x	x		x		x	x	x
d				(x)		x		x		(x)		x			x	x
ɖ	x				(x)	x	(x)	x		x				x	x	x
k	x	x	x	x	x	(x)	(x)	(x)	x		x	x	x	x	x	x
g		(x)	(x)					x	x	x	x		x	(x)	x	x
m				(x)	(x)	x		(x)	(x)	x	x			x		x
n			(x)					(x)	(x)		(x)	(x)				
ŋ			x	x		(x)			(x)		(x)	(x)			(x)	x
c	x	x				x		x	(x)	x	(x)	x		x	(x)	(x)
v				(x)	x	x	(x)		x	x	(x)		(x)		x	x
θ	x	x	x	x	x	x	x	(x)	x	(x)		x	(x)		x	x
s	x	x	x	x	x	x	x	x	x	(x)	x	x		(x)	x	x
l	x	x			(x)	(x)		x		(x)	x	x		(x)	(x)	x
r	x	(x)	x	(x)	x	x	x	x	x	x	(x)	x	(x)	x	(x)	(x)

As illustrated in (11), the combinations of consonants are rather free; almost any consonant can occur as the first or the second segment in a sequence. In spite of the apparent freedom of combinations, there remain certain restrictions observed on the possible clusters of consonants. I summarize these constraints in (12).

(12) i. A cluster contains two and only two consonants, except when followed by a glide resulting from a high vocoid, e.g. [tɖyulu], [tkyarɨ] and [tliskwaa].

ii. There are no clusters of both voiceless fricatives, i.e., *θs and *sθ, whereas the combinations of voiceless fricative + voiced fricative, sv, θv, are found.[8]

iii. Homorganic sequences of labial and dorsal stops are restricted to word-medial positions.

iv. Geminates only appear in word-medial position, not word-initially.

(11) contains one divergence between my observation and those in the previous literature. Li (1975b), for example, reports, based on word-initial clusters, that homorganic stop sequences are only found with alveolar consonants such as *td, tɖ,* but

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[8] The combination of voiced fricative + voiceless fricative, vθ and vs, is not found, either. It remains to be seen if this is an actual prohibition of this language, or an accidental gap, as *v* is the only voiced fricative that often appears in Maga (recall that *ð* and *z* have restricted occurrence).

not with labial or dorsal ones. In my notes, these clusters are found in word-medial positions, for example, *apbaka* 'to speak', or through affixation as in *i-k-guŋuu* (cf. *guŋu* 'duck'), *i-k-gagaa* (cf *gaga* 'trachea'). This fact indicates that Maga clusters are not subject to homorganic cooccurrence restrictions.[9] Furthermore, there are many geminates in Maga words. Some examples are listed in (13).[10]

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[9] Li (personal communication) points out that the tolerance of homorganic clusters in word-medial position may indicate the fact that medial consonant sequences are in fact heterosyllabic. That is, they are analyzed as coda and onset of different syllables. This hypothesis will be further discussed in Chapter 4.

[10] More examples of geminates from Tsuchida's (1970) unpublished notes are cited in Li 1975b (p. 26), as listed in (i).

(i) *dd*: *meddali* 'near'
ɖɖ: *oɖɖasi* 'hold',
kk: *ma-kkule* 'narrow',
ss: *lmausse* 'brothers',
ll: *lmallii* 'sisters',
rr: *matorruu* 'wash (hair)'.

And Li recorded the following words:

(ii) *pp*: *ki-ippaa* 'steal',
tt: *uttaa* 'vomit',
ɖɖ: *ma-ɖɖisi* 'meet'.

These are not included in (13) since my own transcriptions of these words indicate no geminates. Such disparities may result from several reasons. First, they may be the idiosyncratic discrepancies of the speakers. My two consultants were in general consistent with each other with respect to the geminates, but there are cases where they were not, for example, *tpullu* / *tpulu* 'gourd'. But they would acknowledge that it is 'another' way of saying the word. In such cases, I counted the word as one instance of a geminate. Second, stylistic differences: geminates may arise in fast speech which tends to have more

(13) *tt*: *buttu*, 'squirrel', *ma-ttilki* 'cold'

dd: *meddavli* 'further, far away'

ɖɖ: *apakɖiɖɖimi* 'think'

kk: *tikkili* 'carry things with hand(s)'

cc: *bruccu*, 'egg'

θθ: *aθθiti* 'drawn'

mm: *tomma* 'dry field'

nn: *donnə* 'hemp fiber', *tekanni*, 'cook meals', *manniki* 'breathe'

ll: *tpullu* 'gourd'

In these words, if the geminate is voiced, it shows a longer duration than that of the single counterparts; if the geminate is voiceless stops, the preceding closure phase of the stops is conspicuously longer than that before a single consonant in the same context.[11] Contrast of geminates versus single consonants is found in the following pairs.

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vowel deletions, such as *lmausse* 'brothers' *lmallii* 'sisters' in the above, where my recording shows *lmaususe* and *lmalilii* instead.

[11] When being asked specifically, the informants also indicated the lengthening of consonants in this context. And in deliberate speech, they would 'spell out' the geminate by dividing the identical consonants with a vowel, for example, *tomuma* for *tomma* 'dry field'.

(14)

tt : *t*	*buttu* 'squirrel'	:	*u-butu* 'blow'
ss : *s*	*sisaa* 'today'	:	*sissaa* 'one'
cc : *c*	*bruccu* 'egg'	:	*gacu* 'louse'
nn : *n*	*ukanni* 'eat'	:	*dani* 'house'
θθ : *θ*	*aθθiti* 'drawn'	:	*upiθi* 'to fart'

It should be noted that geminates, like the homorganic clusters, only appear in word-medial position, not word-initially.[12]

As is shown in the following sections, consonant clusters are derived from the syncope process of Maga, and bear relevance on other issues such as syllabification and constraints on vowel deletions. Furthermore, the tolerance of geminates and homorganic clusters of Maga offers an interesting contrast to Tsou, a language that also exhibits a wide range of consonantal clusters but disallows geminates, or homorganic

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[12] One exception to this is noted by Tsuchida (cited in Li 1975b: 20):

(i) *lloro* '(flesh of) buttock'

But to me it does not appear to be contrastive with words like *loŋu* 'horn' with respect to the initial consonant. And Li's transcriptions of this word (e.g. 1977a) do not contain a geminate, either. Furthermore, when I specifically pointed out the pair *loro* 'buttock' vs. *loŋu* 'horn', both of my consultants detected no difference in the length of initial /l/'s.

clusters in general. A comparison of these two languages with respect to this specific character is discussed in Chapter 4.

2.1.2 Vowels

2.1.2.1 Description and distinct features

Unlike the other Rukai dialects, the Maga vowel inventory displays a contrast between high and mid vowels. With this distinction, Maga has developed two mid vowels /e/ and /o/, and one central high vowel /ɨ/, in addition to the four vowels (i, u, ə, a) that are common to the other dialects. These seven vowels are listed in (15) and described in the following paragraph. However, it should be noted at the outset that the descriptions are based on the surface forms. As will be shown later, the distinction between high and mid vowels is only a surface phenomenon. Specifically, I will argue in Section 2.3. that the mid vowels are variants of the high vowels, derived from synchronic processes. Thus, Maga in fact conforms to the vocalic systems of the other Rukai dialects in having the four vowels -- *i, u, a*, plus the central vowel with differentiated height -- in the underlying inventory.

(15) Vowels

i	ɨ	u
e	ə	o
	a	

/a/: low central unrounded, as in

abee 'rice cake',

varo 'eight',

mcaa 'eye'.

/i/: high front unrounded, as in

icoo 'human',

sito 'peanut',

vlii 'leech'.

/u/: high back rounded, as in

upuu 'to chew',

turu 'three',

bsuu 'bow'.

/e/:[13] mid front unrounded, as in

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[13] Tsuchida (1976) states that /e/ is realized as [ɛ], while for Li, it is phonetically [e] or [ɛ] (Li 1975b: 18). It is also mentioned by Li (1975b) that /e/ can be realized as [æ]. But to me and Elizabeth Zeitoun (personal communication), /e/ does not appear as low as [æ].

epkɨpkɨ 'airplane',

pesu 'money',

pnee 'wild pigeon'.

/o/:[14] mid back rounded, as in

okoko 'to call someone',

lobsi 'guava',

vloo 'bee'.

/ɨ/: high central unrounded, as in

ɨdee 'hundred',

pɨkɨ 'navel',

rsɨɨ 'tears'.

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[14] According to Tsuchida (1976), /o/ is realized as [ɔ], and for Li, /o/ is also phonetically [o] in addition to [ɔ]. To me, however, /o/ is not realized as low as [ɔ]. Further, Li (1975b) mentions that before high vowels, such as the context __*Ci*, the tongue position of the mid vowels is higher and /e, o/ are realized as [e, o], while at word-final position, the tongue position is relatively lower for these two vowels. My impression does not indicate such distinction in pairs like *slelibu* 'deer' vs. *vlese* 'tooth' and *loŋu* 'horn' vs. *loro* 'buttock'. This may result from speakers' variations. Or if it does exist, it can be explained as an anticipatory raising of the tongue height of the mid vowel.

/ə/: central mid vowel, as in

lcəŋə 'vegetable.

bləblə 'bamboo'.

According to Li (1977b), Maga /ɨ/ is phonetically [i] or [ə], similar to the /ə/ in the other dialects, while Maga /ə/ is phonetically [ʌ] or [ɐ], that is, lower than [ə] in the usual sense. To me, /ə/ of Maga is phonetically lower and further back than that found in English words such as *terrain* [təren].[15] These characteristics tend to be intensified by the speakers when they contrast these two central vowels.

It should also be noted that, in spite of the fact that /ɨ/ and /ə/ are established as different phonemes by minimal pairs (see (16)), yet the distinction between the two central vowels remains perceptually unclear. Except in minimal pairs where the contrastiveness is distinctly exhibited by the same context, it is usually difficult to distinguish these two vowels, even for the native speakers in many cases. It is thus not surprising that discrepancies of transcription among researchers (e.g. Li 1975a, 1977a,

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[15] Li (personal communication) suspects that the lowness quality of /ə/ may reflect the effect of the low vowel /a/ in the preceding syllable. Li (1977a) states that the mid central /ə/ has historically developed in contrast to the high central vowel /ɨ/ due to the loss of vowels. Following Li's insight, I argue in Section 2.3. from a synchronic perspective that the mid central vowel /ə/ evolves from the coalescence of /a/ and the high central vowel /ɨ/.

Saillard 1997, Zeitoun 1995, and my own fieldnotes) tend to occur with respect to these two segments. More discussion of the two central vowels is in Section 2.3.3.

Evidence of surface contrast of these vowels is shown by the pairs in (16).

(16)

i : *e*	*pi̱tu*	'seven'	*pe̱su*	'money'
	itili̱	'male organ'	*acile̱*	'water'
ɨ : *ə*	*bi̱ki*	'pig'	*bə̱ki*	'nose running'
	bli̱bli̱	'banana'	*blə̱blə̱*	'bamboo'
u : *o*	*ku̱ku̱*	'foot'	*o-ko̱ko̱*	'call'
	pitu̱	'seven'	*sito̱*	'peanut'
o : *a*	*tesboko̱*	'egret (black)'	*troka̱*	'chicken'
	odgoso̱	'flood'	*tbosbosa̱*	'calf of leg'

(17) Distinctive features:

	i	ɨ	u	e	ə	o	a
high	+	+	+	-	-	-	-
low	-	-	-	-	-	-	+
back	-	+	+	-	+	+	+
round	-	-	+	-	-	+	-

2.1.2.2. Distribution and Vowel Sequences

Almost every vowel can appear in word-initial, -medial and -final positions, as illustrated by the examples given in the above. The only exception is /ə/ which is not

found word-initially.[16] This gap could be accidental because overall /ə/ appears much less frequently than the other vowels in Maga words.

Vowels also appear in clusters. The most frequently found vowel sequences are comprised of two members. They can be further divided into two types: geminates and clusters of two different vowels. The former appears much more often than the latter, in particular in word-final position. The two types of vowel sequences are discussed in turn in the following.

In a geminate, that is, a cluster of two identical vowels, the sequence is pronounced not as two separate units, but as one single long vowel, whose duration is longer than that of a single vowel. This distinction is demonstrated by the underlined parts of the pairs in (18). Following the convention of most Formosan linguists, I represent a long vowel as two short vowels, rather than with a colon (a:) or the macron (ā).

(18) *bo<u>vaa</u>* 'new' : *θleva<u>va</u>* 'rainbow'

<u>isii</u> 'urine' : *usi<u>si</u>* 'urinate'

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[16] It is mentioned in Li 1975b that all vowels, including /ə/, appear word-initially. However, there is no ə-initial word found in the word list in the relevant works, nor did Elizabeth Zeitoun (personal communication) and I ever obtain any such word in our respective fieldwork.

In addition to phonetic duration, vowel length can also be distinguished by the placement of stress, especially in word-final position. Stress of Maga is regularly found on the penultimate vowel in the surface forms. Thus, *bovaa* and *isii* in (18) are pronounced as [bo.vá:] and [i.sí:] respectively, with the final part being stressed, whereas in *θlevava* and *usisi*, the vowel preceding the final syllable receives stress as in [θleváva] and [usísi].

Long vowels are abundant at word-final position, such as *atee* 'taro', *tovnaa* 'hut', *glii* 'younger siblings', *sroo* 'grass', *rmuu* 'feather', *cpii* 'fruit pit', to list just a few. But they are never found word-initially, and appear only rarely in word-medial position. Li (1975b) mentions that he found only six instances in which a long vowel appears after an initial consonant.[17] In addition, I also recorded one other word, *səərŋi* 'fruit'.

Although I agree with Li's observation that long vowels rarely occur word-medially, an important discrepancy needs to be addressed. For instance, Li's examples of word-medial long vowels include the word *makauglugleeŋaa* 'animal' (p. 19). My transcription, however, differs from Li's for this particular word. In my notes, there is a

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[17] A number of words in Li 1977a differ from my own transcriptions, as well as a word list provided in Li 1997a. For example, *bo:va* 'new', *kpa:ri* 'palm, sole', *ksi:si* 'goat', etc., where I did not find the medial vowels to be long. Further investigation may be necessary on this aspect. There is another discrepancy which is to be mentioned in the text below.

final long vowel in *ugluglee* 'wild animal' as a single word; but when it is suffixed with *-ŋaa*, there is no word-medial long [e], i.e. *u-glugle-ŋaa*. As there are many examples of vowel length alternations of this type, I argue that this is the result of a process which lengthens vowels in word-final position. If this hypothesis is correct, then the instances of word-medial long vowels may be even less than Li's estimation.

In the past literature, it has been generally assumed that long and short vowels are non-contrastive in Maga, mainly based on the observation that there are no words found contrastive with respect to vowel length.[18] However, a contradiction seems to arise from this claim. That is, given this assumption, it is implied that the distribution of long vowels should be predictable. Nonetheless, as just mentioned above, the distribution of long vowels appears to be unpredictable, since they appear word-finally as well as word-medially, just like short vowels. Moreover, the occurrence of word-medial long vowels does not appear to be conditioned by any specific context. It thus seems, in order to accommodate these facts, we need to abandon the previous claim and to

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[18] Li also pointed out (personal communication) that native speakers do not seem to be sensitive to the length distinction of vowels in medial positions. My own experience confirms this observation. It usually took several repetitions and/or explicit comparison with vowels in similar contexts in order to bring to the attention of the informants the differences of vowel length. According to Pike (1947), for native speakers, sounds which are phonemically distinct are more easily distinguished than predictable phonetic variants of a phoneme. This feature can thus be regarded as a piece of external evidence for the lack of length distinction in Maga.

postulate instead two separate sets of vowels which contrast in length for the phonemic inventory of Maga.

However, as mentioned, a general process is observed in which vowel length varies depending on the position in a word. This is demonstrated by the alternations of *ugluglee* 'wild animal' vs. *u-glugle-ŋaa*. Examples of this type also include the intensification of stative verbs, which is indicated by reduplication, and, optionally, the suffix *-ŋaa*.[19] For example, *ma-loo* means 'dry' and *ma-lo-loo* or *ma-lo-lo-ŋaa* means 'very dry'. Noteworthy in these derived forms is that the final long vowel *loo* becomes short *lo* when it is not word-finally.

Given the above observation, I assume that the word-medial long vowels are differentiated from the word-final ones in their representations, rather than postulating that there are two separate sets of vowels contrasting for length. More specifically, I propose that the word-medial long vowels are represented in the same manner as sequences of different vowels, that is, as two consecutive syllables. In contrast, the word-final long vowels are derived from their short counterparts by a lengthening process.

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[19] The specific meaning of the suffix *-ŋa(a)* is unclear yet. It often attaches to verbs and stresses the aspect of 'already', e.g., *u-kanni-ŋa kiki* 'I ate already.' But *-ŋa* also indicates the superlative meaning when attaching to an adjective (i.e. a stative verb). And as shown in the example *makaugugleŋaa*, this suffix appears with nouns as well.

In the latter representation, these lengthened vowels consist of two vocoids dominated by a single nucleus.[20] The issues of long vowel representations and lengthening processes will be discussed in Section 2.6.

The other type of vowel sequences are clusters of two different vowels. The attested sequences are shown in (19) and some examples of each combination are given in (20).

(19)

V2→ V1↓	i	e	ɨ	ə	u	o	a
i				x	x		x
e							x
ɨ							
ə							
u	x			x		x	x
o							
a	x		x		x	x	

[20] Moreover, it has been noticed that there is a tendency of the speakers to lengthen the final vowel of a word, as in the examples *guŋu / gŋuu* 'duck, goose', and *musu / msuu* 'you, sg.' (provided by Elizabeth Zeitoun, personal communication). The two forms seem to be variants, as the speakers interchange one with the other. My impression is that one is the citation form, while the other is used in fast speech. They generally do not cause the meaning shift, except with numbers; for example, *turu* and *ʈusa* are the cardinals 'two' and 'three', but *truu* and *ʈsaa* are used for counting items.

(20)

ua	sbua	'powder'		
uə	nuəŋə	'cow'	mumuələ	'snail'
uo	tramuoro	'dragonfly'		
ui	tlapui	'firefly'		
ia	iapɨ	'rice seed'	bia	'plant name'
iu	aliu	'friend (f.)'		
iə	iəla	'snow'		
ea	kamea	'mango'		
ai	aidi	'blood'		
aɨ	aɨla	'move'		
au	ausu	'plant name'	ləmause	'two brothers'
ao	aoru	'head'		

The vowel sequences can be further divided into three groups, depending on the sonority contrast of the two vocoids. These sequences behave in different manners, as illustrated in the following categories. The symbols within the brackets are in phonetic representation.

(21) Rising sonority: ua, ia, uə, iə, uo, ea; the first vowel is less sonorous than the second.[21]

ua	a.	tmuθua	[tmuθwáa]	'mouse'
	b.	surua	[surwáa]	'soup'
	c.	slabua	[slabwáa]	'toad'
ia	d.	kcarsia	[kcarʃyáa]	'aborigine'
	e.	tpupulia	[tpupulyáa]	'white, blank'
	f.	bia	[byáa]	'plant name'
uə	g.	mumuələ	[mumwə́lə]	'snail'
	h.	nuəŋə	[nwə́ŋə]	'cow'
uo	i.	tramuoro	[tramwóro]	'dragonfly'
iə	j.	iəla	[yə́la]	'snow'
ea	k.	kamea	[kaméya]	'mango'

The preceding high vowel is realized as a prevocalic glide. As indicated in the phonetic transcriptions in (21a-j), this glide is incorporated as the onset of the following vowel.[22] But in certain contexts, as listed in (22), the high vocoid tends to remain as the nucleus of the first syllable, and a glide is inserted between the two vocoids.

(22) a. in deliberate speech;

b. when the vowel sequence is in word-initial position, e.g., (21i) *iəla* [ʔiyə́la];

c. when the sequence consists of the only vocoids of the word, such as (21f) *bia* [bíya].

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[21] I assume the hierarchy of vowel sonority as the following: low V> mid V> high V.

In the only case of the non-high vowel /e/ followed by a low vowel as in *kamea*, glide insertion always takes place and yields the surface form [kaméya].[23]

(23) Falling sonority: ai, au, ao, ai; the first vowel is more sonorous than the second.

ai	a.	aiḍi	[ʔayíḍi]	'blood'
au	b.	ausu	[ʔawúsu]	'plant name'
	c.	ləmause	[ləmawúse]	'two brothers'
ai	d.	aila	[ʔaɪ̯ila][24]	'move'
ao	e.	aoru	[ʔawóru]	'head'

In these sequences, the second vowel, whether high or non-high, does not turn into an offglide following the low vowel, hence the two vowels in these sequences are nuclei of two distinctive syllables. This is also indicated by the stress that falls on the non-low vocoid as in (23b) [ʔawúsu] As in the other vowel sequences, a glide is inserted between the two vocoids.

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[22] I will leave the issue of how glide formation is formally represented until Section 2.5.

[23] This word has a variant [kamáya] which results from the non-application of Nucleus Incorporation. This will also be discussed in Section 2.5.

[24] i̯ indicates a glide (following Li 1973).

(24) Equal sonority: iu, ui; the two vowels are equally sonorous.

iu	a.	iula	[yúla] or [iyúla]	'snow'
	b.	aliu	[alyúu]	'friend'
ui	c.	tlapui	[tlapwíi]	'firefly'

Only high vowels are found in this type of sequences, and they behave basically as those in (21), i.e., the preceding high vocoid in the cluster is realized as a glide and forms the onset of the following vowel.

As may be noticed, there are some gaps in (19). For example, there is no sequence of *oa*. As exemplified in (25), the mid vowel *o* is systematically realized as *v* in this position.

(25)	toto	'Toto (Nom.)	toto-na / totv-a-na	'Toto (Obl.)'
	vakao	'Vakao (Nom.)	vakao-na / vakav-a-na	'Vakao (Obl.)

This alternation will be discussed in Section 2.5. together with the derivations of *e* ~ *r*, which, I argue, result from the fortition of a glide that is realized from a high vowel.

Clusters of more than two vowels are much rarer, and the number of vocoids contained in such sequences is limited to three. The list in (26) are the few words of three vowel sequences found so far.

(26)	a.	ciua	[ciyúva] / [cíwa] / [cíva]/ [cyúva]	'bamboo shoot'
	b.	kuoo	[kuwó:]	'eagle'
	c.	abeaa	[abeyá:] / [abayá:]	'girl, female'

To summarize, this section introduced the segments of Maga, and described some properties of vowels and consonants, such as the restrictions on consonant clusters and the behavior of vowel sequences. These characteristic features are of particular interest since they illustrate the phonological derivations that take place in the language, which will be demonstrated in the remaining of this chapter. In the following sections, I will discuss the phonological alternations, and show how they can improve our understanding of Maga. I will demonstrate, most relevant to this section, that there are no mid vowels underlyingly, but they are derived through phonological processes such as Syncope and Vowel Coalescence. By resolving this matter, we not only are able to obtain a simpler vocalic inventory that conforms to the systems of the other Rukai dialects, but also many issues, such as Echo Vowel Insertion, follow naturally from this analysis.

2.2. Vowel / zero alternations

Maga is characterized by five phonological processes: vowel/zero alternations (resulting from Syncope), Vowel Lengthening, Mid Vowel Formation (from Nucleus Incorporation and Vowel Coalescence), Echo Vowel Insertion, and Glide Formation. Although each is seemingly independent, I propose that these five processes are in fact intertwined, and their properties can be nicely accounted for if they are applied according to an appropriate ordering. Specifically, I propose the following ordering:

(27) Glide Formation > Nucleus Incorporation > Syncope > Vowel Coalescence > Echo Vowel Insertion > Vowel Lengthening.

Our discussion starts with one of the most prominent issues in Maga phonology, the alternations between vowel and zero, which are commonly found in morphologically related forms. As a sample, we can examine the alternations between positive and negative forms in (28).[25] The negative forms denote 'not X', where X can be a noun, an

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[25] Some examples in (28) are adopted from Li (1977b: 397). Li (1977b: 399) further demonstrates vowel / zero alternations by comparing Maga words with the Budai dialect which does not contain the syncope process, as shown in (i).

(i)	Maga	Budai	
a.	kcarsía	kacaʃisianə	'aboriginal'

adjective (stative verb), or a verb (dynamic verb).

(28)		Positive	Negative	Gloss	UR
	a.	tbalŋani	i-k-tablaŋnii	'arm'	/tabalaŋani/
	b.	rgirgi	i-k-rigrigii	'mountain'	/rigirigi/
	c.	tmalsiksiki	i-k-tamliskiskii	'blue'	/tamalisikisiki/
	d.	tmusu	i-k-timsuu	'salt'	/timusu/
	e.	ŋdivi	i-k-ŋidvii	'mouth'	/ŋidivi/
	f.	mcaa	i-k-macaa	'eye'	/maca/
	g.	si-ptaa	i-sputaa	'burn'	/-puta/
	h.	ma-ŋtaa	i-k-ŋitaa	'raw'	/-ŋata/
	i.	ma-rbiki	i-k-rubkii	'rotten'	/-rubiki/
	j.	ma-ɖlipsi	i-k-ɖilpisii	'thin'	/-ɖilipisi/
	k.	u-spii	i-supii	'dream (v.)'	/-sipi/
	l.	u-skulu	i-sukluu	'pick up'	/-sukulu/
	m.	u-θlibi	i-θilbii	'fly'	/-θilibi/
	n.	u-lŋilŋi	i-liŋliŋii	'aim'	/-liŋiliŋi/

The derivation of negative forms involves a number of morphological processes. First, a negative morpheme *i-* is prefixed to the stem. Second, the final vowel of the stem is uniformly lengthened. Third, nouns (28a-f) and stative verbs (28g-j) are prefixed with *-ka-* (*-ka-* replaces the prefix *ma-* in the case of stative verbs) after *i-*. What is of

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b.	tbalŋáni	tabalaŋa:nə	'arm, shoulder'
c.	bláblə	baləbalə	'bamboo (generic)'
d.	blíbli	bələbələ	'banana'
e.	rlée	ɭulay	'baby, child'
f.	tábŋə	a-ta-tabaŋə	'cockroach'
g.	masrimsími	masaɭəməsəmə	'dusk'

interest in these examples is the variations in the vowels which show up in the positive and negative forms. For example, in (28g) the root vowel /u/ appears in the negative form, but not in the positive form. Given the fact that the vowels showing alternations are not identical in these words, they do not appear to be the result of an insertion rule that is used to break up consonant clusters. Instead, I propose, following Li (1977b), that the alternation between vowel and zero is caused by a syncope process which deletes vowels in certain positions in a word.

2.2.1. Previous account: Li 1977b

Li (1977b) proposes a general rule of vowel deletion for Maga: "the vowels in the even number of syllables from the stress get deleted" (p. 398),[26] except for the final vowel after stress. Given this rule, Li further suggests that vowel deletions are determined by two major factors: (i) stress and (ii) affixation, since stress in Maga shifts following affixation.

At first glance, Li's statement seems observationally accurate, as illustrated by the two words, *tbalŋáni* and *rgírgi*, from (28a) and (28b). With the assumed underlying

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[26] Tsuchida (1976) proposes a similar account for the vowel/zero alternations of Tsou. It is shown in Hsin (to appear) that Tsuchida's account faces the same problems raised here for Li's analysis.

representations /tabalaŋani/ and /rigirigi/, (29) demonstrates how the output forms are derived under this account.

(29) a. t a_4 b a_3 l a_2 ŋ $á_1$ n i_2 b. r i_2 g $í_1$ r i_2 g i_3

ø ø ø ø

tbalŋáni rgírgi

The operations in (29) seem fairly straightforward: First, mark the stressed vowel as V_1, and number the rest of the vowels from V_1 in both directions. Second, delete the vowels marked with even numbers, except the final vowel. We thus obtain the desired output *tbalŋáni* and *rgírgi*. However, closer scrutiny reveals certain problems with this account. As can be seen in (29), the success of the operation crucially hinges on the placement of the stress in the input. Notice that in (29a), stress is assigned to the penult syllable of the underlying representation, whereas in (29b) it falls on the antepenult syllable. It appears that, if vowel deletions are determined by the position of the stress, the underlying representations must bear the stress, namely, stress has to be lexically specified in Maga. This contradicts the general view (Li 1977b: 398) that stress is non-phonemic in Maga since it is regularly assigned to the penult syllable.

Alternatively, we may assume that stress is assigned by rule, rather than placed in the underlying forms, and see if the above account can be salvaged. A point to be noticed first is that Rukai words may contain an echo vowel in word-final position, which is inserted when a word ends in a consonant.[27] Adopting Li's suggestion (e.g. 1977a: 26) that echo vowels are part of the underlying representations of Maga words, we reexamine the words in (29). As shown in (30), with the final vowel present in the underlying form of (29a), stress is placed on the penult syllable, which complies with the general stress pattern of Maga. Syncope then deletes every other vowel preceding the stressed syllable, generating the correct output *tbalŋáni*.

(30)

	t	a	b	a	l	a	ŋ	a	n	-	i
Stress						á					
Deletion	ø		ø								
Output			tbalŋáni								

However, the representation in (29b), shown in (31), cannot be made to follow the regular stress assignment rule if the final vowel is included in the input form: stress would fall on the penult syllable *ri* in this case, and the subsequent syncope rule would

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[27] The echo vowel is usually identical to the preceding stem vowel. More discussion of echo vowels is in Section 2.4.

apply and yield the incorrect output ***rigrîgi*** instead of ***rgîrgi***.

(31)

	r i g i r i g - i
Stress	î
Deletion	ø
Output	*rigrîgi

One may suggest to exclude the final vowel from the underlying representation, e.g., /rigirig-/, and stress would then fall on ***gi***, which is now the penult syllable. This alternative, however, contradicts directly the stress assignment in (30), which requires the final vowel to be present in the input.

Another possible solution is to differentiate a real final vowel and an echo vowel. The former is like /i/ in /tabalaŋani/ that is included in the input, while an echo vowel, like /i/ in /rigirig/-i, is only inserted later in the derivation. This hypothesis indeed would produce the desired output forms, but it also raises a new question: how do we decide which word-final /i/ is lexically present, and which is inserted later? Or more generally, is the Maga lexicon divided into two groups: one ends with a consonant, the other with a vowel, and how are they distinguished? It appears that, no matter whether the final vowel is represented in the underlying forms or not, a dilemma arises.

Li (1977b) also proposes that the placement of pitch is responsible for the fact that different vowels surface in positive and negative forms. He suggests that vowels with high pitch, just like stressed vowels, are not deletable. Furthermore, he assumes that in positive forms both stress and pitch fall on the same syllable (i.e. penult), while in negative forms, pitch starts on the vowel immediately preceding the stressed syllable,[28] and the counting of vowel deletions starts from the vowel with high pitch (i.e. antepenult). Due to this mismatch of stress and pitch, the deletion applies to different vowels and results in the surface variations in the related forms. To illustrate, we apply Li's system to the negative forms of (28a-b).[29]

(32) (28a) UR /tabalaŋani + NEG/

	i - k - t	a	b	a	l	aŋ	a	n	i - i
Stress									ˆi
Pitch						a˥			
Deletion		ø		ø					
Output	* i k	t	b	a	l	aŋa˥		n	ˆii

[28] The actual statement is that "pitch starts on the vowel immediately preceding the stressed syllable *in the surface phonetic forms*" (p. 398, emphasis added [TH]). Although this may be descriptively accurate, it is in contradiction with Li's hypothesis that the position of the pitch (together with stress) determines the vowel deletions, which must take place before the surface forms. Thus, for argument sake, I overlook this remark here.

[29] Pitch is indicated by ' ˥ ' in the derivations.

(33) (28b) UR /~~rigirigi~~ + NEG /

	i	-	k	-	r	i	g	i	r	i	g	i	-	i
Stress														ˆ
Pitch												ˈ		
Deletion								ø						
Output	i		k		r	i	g	ˈ		g		~~i~~		

Although this account successfully generates the negative form of /~~rigirigi~~/ in (33), it fails in (32), since the vowel on which the high pitch falls (i.e., the antepenult) undergoes deletion in the correct output form. Thus, unlike the prediction, high pitch does not keep the vowel from deletion.

Due to these problems, there appears to be no alternative that we can apply to improve the above account. Furthermore, the problems in this account imply that vowel deletions in Maga cannot be tied in a direct relationship with the placement of stress or pitch.

2.2.2. Proposed analysis

Before considering an alternative analysis, let us first examine the general patterns of stress and vowel alternations in words of various forms.

(34) a. In di-syllabic words, the first vowel is deleted, the word-final vowel is lengthened, and the stress falls on this long vowel;

e.g., *mcáa* (/maca/) 'face', *cpíi* (/cipi/) 'kernel of fruit', *bsúu* (/busu/) 'bow;

b. In odd-numbered multi-syllabic words, vowels in the odd-numbered syllables are deleted from left to right, and the stress is placed on the penult vowel of the underlying form;

e.g., *bcíŋi* (/biciŋi/) 'millet', *ŋdívi* (/ŋidivi/) 'mouth', *tkúsu* (/tukusu/) 'chest', *tbalŋání* (/tabalaŋani/) 'arm', and *tkaslúqu* (/takasuluqu/)'shrimp';

c. In even-numbered multi-syllabic words, vowels in odd-numbered syllables are deleted from left to right, and the stress is assigned to the antepenult syllable of the underlying representation;

e.g. *rgírgi* (/rigirigi/) 'mountain', *gθígθi* (/giθigiθi/) 'board', *klúbŋu* (/kulubuŋu/) 'tortoise', and *o-kratpi* (/-karatipi/) 'pinch'.

To generalize from the above regular patterns, it appears that the deletion process of Maga applies to iambic feet which are built from left to right, deleting the left or unstressed vowel of each foot, while the stress applies to the final trochaic foot constructed from right to left. Based on these generalizations, I will propose in the

following discussion a metrical analysis which makes use of the prosodic structure of the language.

As can be concluded from the discussion of the previous account, pitch and stress cannot be considered as the underlying, determining factors for the vowel deletions, but rather simply manifestations of surface phonetic forms. Furthermore, as illustrated by the general patterns in (34), both the vowel deletions and stress assignment of Maga follow from the prosodic structure of the language. It thus appears that only through the metrical structure can we correctly capture the observed facts.

The analysis proposed here, stated simply, is the following: the syllables of Maga words are grouped into right-headed binary constituents from left to right (iambic feet), and Syncope applies to any vowel that is not the head of a constituent. After the vowel deletions, the final two syllables of the word are grouped from right to left to form one trochaic foot, and the primary stress falls on the left head of this constituent.

For the construction of the metrical structure of Maga, I adopt the formal algorithm developed in Idsardi 1992 and Halle and Idsardi 1995 (hereafter HI). In this theory, the distribution of stress is captured by grouping the stress-bearing units into metrical constituents and by marking the head of each constituent. The mechanisms used for grouping and head-marking are a set of parameters provided by UG. In (35)-(38), I

briefly review the basic parameters underlying the construction of metrical grid.

(35) Line 0 mark projection (Project)

Project a line 0 element for each syllable head.

(36) Edge-Marking parameters (Edge)

Place a {left, right} parenthesis to the {left, right} of the {left, right}-most element in the string.

(37) Iterative Constituent Construction parameter (ICC)

Insert a {left, right} parenthesis for each pair of elements.

(38) Head Location parameter (Head)

Project the {left, right}-most element of each constituent onto the next line of the grid.

In connection with ICC (37), Idsardi (1992) suggests that constituents are constructed by inserting the 'far' parenthesis with respect to the direction of application. That is, right parentheses are inserted when going left to right, and left parentheses when going right to left.[30] Given our hypotheses that Maga syllables are first grouped into right-headed

[30] According to the metrical theory developed in Idsardi 1992 and HI, "a left parenthesis indicates that the

binary feet from left to right, the parameter settings specific to this language are as follows.[31]

(39) Edge : LLL -- Place a left parenthesis to the left of the leftmost element in the string.

(40) ICC : R -- Insert a right boundary for each pair of elements.

(41) Head : R -- Project the right-most element of each constituent onto the next line of the grid.

The parameter settings for deriving the Maga Syncope pattern are summarized in (42).

(42) Parameter settings for Syncope (Level 1)[32]:

Edge: LLL ICC: R Head: R

The syncope rule (43) then applies to any vowel that is not the head of a constituent,

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material to its right up to the next parenthesis or the end of the form comprises a constituent; and a right parenthesis indicates that the material to its left comprises a constituent" (Idsardi 1992: 1).

[31] Since the requirement here is only to determine the head of each constituent, rather than to obtain the ultimate prominent position of the string, it is thus not necessary to build onto the higher level, Line 2, as is the usual practices of metrical theories.

[32] I leave the question open whether Level 1 and Level 2 correspond to lexical and post-lexical levels.

namely, any element with only one single mark on the grid.[33]

(43) Syncope: $\overset{X}{\underset{|}{V}} \rightarrow \emptyset \; / \; \underline{\quad\quad} \; *$

After Syncope (and Echo Vowel Insertion) applies, the metrical structure will be constructed again for the purpose of stress assignment. I propose that the parameters for deriving stress are set as in (44).

(44) Parameter settings for Stress Assignment (Level 2):

Edge : RRR ICC : L Head : L

The remaining syllables project to the metrical grid, and the edge is marked by a right parenthesis placed to the right of the right-most element. Constituents are then created from right to left by inserting a left parenthesis, with the left-most element of the constituent being marked as the head and hence receiving the ultimate prominence.

Applying to the example of (28a) /tabalaŋani/ and (28b) /rigirigi/, the settings in (42), the syncope process in (43), and the stress assignment in (44) produce the derivations in (45) and (46).

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[33] There are certain constraints on vowel deletions, though, which will be discussed shortly.

(45)

Level 1	Project	* * * * * t a b a l aŋ a n i
	Edge: LLL	(* * * * * t a b a l aŋ a n i
	ICC: R	(* *) * *) * t a b a l aŋ a n i
	Head: R	* * (* *) * *) * t a b a l aŋ a n i
	Syncope	ø ø ø
	Echo Vowel Insertion	- i
Level 2	Project	* * * t b a l ŋ a n i
	Edge: RRR	* * *) t b a l ŋ a n i
	ICC: L	* (* *) t b a l ŋ a n i
	Head: L	* * (* *) t b a l ŋ a n i
	Output	tbalŋáni

(46)

Level 1	Project	* * * * r i g i r i g i
	Edge: LLL	(* * * * r i g i r i g i
	ICC: R	(* *) * *) r i g i r i g i
	Head: R	* * (* *) * *) r i g i r i g i
	Syncope	ø ø
Level 2	Project	* * r g i r g i
	Edge: RRR	* *) r g i r g i
	ICC: L	(* *) r g i r g i
	Head: L	* (* *) r g i r g i
	Output	rgîrgi

Notice that in the derivation of (45) /tabalaŋani/, when ICC applies, the final mark on the grid is left unmetrified, rather than creating a degenerate foot. This follows from the Metrical Theory adopted here (Idsardi 1992 and HI) which does not allow ICC to create constituents that contain less than two elements. This practice differs from previous metrical theories such as Halle and Vergnaud 1987 (p. 15) which assume Exhaustive Parsing, i.e., constituent construction must cover the string of stress-bearing units exhaustively so that every mark of the string be included in some constituent.

However, as shown in (47), in di-syllabic words such as /maca/ 'eye', only one syllable remains after the application of Syncope (43), in other words, there is no penultimate vowel in the surface form to which the stress can be assigned. Under this circumstance, the trochaic foot is obtained through the lengthening of the final vowel (i.e. the remaining vowel).

(47)

Level 1	Project	* * m a c a
	Edge: LLL	(* * m a c a
	ICC: R	(* *) m a c a
	Head: R	* (* *) m a c a
	Syncope	ø
Level 2	Project	* m c a
	Edge: RRR	*) m c a
	Lengthen	* *) m c a
	ICC: L	(* *) m c a
	Head: L	* (* *) m c a
	Output	mcáa

As demonstrated in (45)-(47), the proposed analysis is able to capture the general patterns observed earlier. There are, however, cases exceptional to the general pattern.

For example, vowels in word-initial position are usually not deleted. Another type of irregularity appears in words like:

(48) *biki* (/biki/) 'pig', *tralupu* (/taralupu/) 'owl', and *o-kami* (/-kami/) 'bake'.

where the first/third vowel of the stem is not deleted, contrary to the proposed analysis.

These exceptions, I assume, are caused by the idiosyncrasy of the lexical items. That is, a lexical accent is placed on these vowels, which prevents them from deletion. In HI's metrical theory such lexical property can be indicated by parenthesis projected to the grid, as demonstrated with words /biki/ and /taralupu/ in (49).

(49)

Level 1	Project	*) * b i ki	* * *) * t a r a l u p u
	Edge: LLL	(*) * b i ki	(* * *) * t a r a l u p u
	ICC: R	 N/A	(* *) *) * t a r a l u p u
	Head: R	* (*) * b i ki	* * (* *) *) * t a r a l u p u
	Syncope	ø	ø ø
	Echo Vowel Insertion	i	u
Level 2	Project	* * b i ki	* * * t r a l u p u
	Edge: RRR	* *) b i ki	* * *) t r a l u p u
	ICC: L	(* *) b i ki	* (* *) t r a l u p u
	Head: L	* (* *) b i ki	* * (* *) t r a l u p u
	Output	bíki	tralúpu

Irregularities are also found in words like

(50) *csasaa* (/casasa/) 'whet stone', *tmacaa* (/tamaca/)'face', *tbalcaa* (/tabalaca/) 'earlobe', and *sdamraa* (/sadamara/) 'side dish'.

In these words the surface forms have more than one vowel, yet, instead of constructing a trochaic foot with the available vowels, these words opt to create a troche by lengthening the final syllable. These exceptions, I assume, also arise from the idiosyncrasy of the

lexical items. Similar to the examples discussed in (49) where the medial vowel is prevented from deletion by a lexical accent, in the words shown in (50), the accent is placed on the final vowel. This lexical accent not only prevents the final vowel from being deleted in words like *csasaa* (/casasa/) and *tmacaa* (/tamaca/), but also marks the foot-hood of the final syllable, so that it is lengthened to fulfill the troche requirement. This is demonstrated by the examples *csasaa* and *tbalcaa* in the following.[34]

(51)

Level 1	Project	* * *) c a s a s a	* * * *) t a b a l a c a
	Edge: LLL	(* * *) c a s a s a	(* * * *) t a b a l a c a
	ICC: R	(* *)*) c a s a s a	(* *)* *) t a b a l a c a
	Head: R	* * (* *)*) c a s a s a	* * (* *)* *) t a b a l a c a
	Syncope	ø	ø ø
Level 2	Project	* *) c s a s a	* *) t b a l c a
	Edge: RRR	N/A	N/A
	Lengthen	* **) c s a s a	* **) t b a l c a
	ICC: L	*(**) c s a s a	* (**) t b a l c a
	Head: L	* *(**) c s a s a	* * (**) t b a l c a
	Output	csasáa	tbalcáa

[34] An alternative account is to assume that there is an empty position after the final vowel in the underlying representations, which causes the lengthening in these forms.

We now turn to morphologically derived words, such as the negative forms. Some examples are repeated from (28) in the following.

(52)		Positive	Negative	Gloss	UR
	a.	si-ptaa	i-sputaa	'burn'	/-puta/
	b.	ma-rbiki	i-k-rubkii	'rotten'	/-rubiki/
	c.	ma-ɖlipsi	i-k-ɖilpisii	'thin'	/-ɖilipisi/
	d.	u-spii	i-supii	'dream (v.)'	/-sipi/
	e.	u-skulu	i-sukluu	'pick up'	/-sukulu/
	f.	u-lŋilŋi	i-liŋliŋii	'aim'	/-liŋiliŋi/

Notice that, as in the stems, vowels in prefixes also show variations. Compare for example (52a) *si-ptaa* and *i-sputaa*. In the positive form, /i/ surfaces in the prefix, whereas in the negative form, the vowel disappears. I suggest that such an alternation results from the displacement of the morpheme boundary between a prefix and the stem. More precisely, I assume that the negative morpheme *i-*, being a cyclic affix, erases the metrical structure of the preceding cycle at the beginning of each cycle. Thus, in negation, as shown in the right column of (53), the parameter settings start anew by assigning new parentheses. Furthermore, I assume that the addition of another affix, as in the case of negation, induces an internal structural change between the inner affix and

the stem. Thus, as indicated in the right column of (53), the boundary, represented by a parenthesis, is erased between /si-/ and /-puta/.

(53)

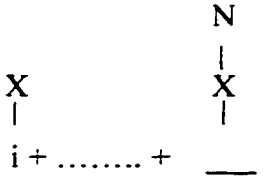
Level 1	Project	* * * s i - p u t a	* * * * * i - s i p u t a - V
	Edge: LLL	(* (* * s i - p u t a	(* (* * * * i - s i p u t a - V
	ICC: R	(* (* *) s i - p u t a	(* (* *) * *) i - s i p u t a - V
	Head: R	* * (* (* *) s i - p u t a	* * * (* (* *) * *) i - s i p u t a - V
	Syncope	ø	ø
Level 2	Project	* * s i - p t a	* * * * i - s p u t a - V
	Edge: RRR	* *) s i - p t a	* * * *) i - s p u t a - V
	Lengthen	* * *) s i - p t a	* * * *) i - s p u t a - a
	ICC: L	* (* *) s i - p t a	* * (* *) i - s p u t a - a
	Head: L	* * (* *) s i - p t a	* * * (* *) i - s p u t a - a
	Output	si-ptáa	i-sputáa

As a consequence of this boundary shifting, the prefix vowels, as well as the stem vowels, exhibit alternations with zero. Therefore, under the present analysis, the two major factors that determine the surface vowels in related forms are affixation and the

properties of the affixes. The distinction of cyclic and noncyclic affixes is discussed in Section 3.1.2.4.

Another point to be noted is that in negative forms, the final vowel is uniformly lengthened. This property, I assume, is part of the morphological process. That is, as represented in (54), in addition to the explicit prefix *i-*, the negation morpheme contains also an empty vocalic position (represented by 'V' in (53)) which is attached at word-final position and filled in by the final stem vowel.

(54) Negation morpheme



In (53), this abstract vowel and the final stem vowel not only constitute the final foot in the metrical structure, they also form a geminate. Thus, the stem vowel in the right column of (53) is not subject to deletion, even though it is not the head of the final foot. This is in accord with the observations that in many languages geminates usually resist phonological rules whose application would modify only one half of the geminate while leaving the other unchanged (see Schein and Steriade 1986).

2.2.4. Constraints on vowel deletions

Li (1977b: 398) notes that in certain contexts vowel deletion does not take place:

(55) i. preferably no deletion of the initial vowel before stress if there is no initial consonant;

ii. generally, no deletion of a vowel if it occurs between identical consonants.

Words described by the first condition include: *avaŋi* 'boat', *aŋatu* 'tree, wood', *inee* 'sand', *uvee* 'rattan', *isivi* 'hair', to list just a few. The second condition depicts words such as: *θlevava* 'rainbow', *tmacicriŋi* 'black' and *θnavivroo* 'yellow'. Although there are exceptions to both of the observations, the first can be considered as generally true, while some comments are in order for the second. As will be discussed later with respect to Reduplication, deletion is in fact preferred between the reduplicated syllable and the stem, hence creating geminates in these words, for examples *u-lupe* 'hunting with dogs' vs. *u-llupu* (/u-lu-lupu/)'many people hunting with dogs / hunting with dogs for many times', *u-stiti* 'hit' vs. *u-stitti* (/u-s-ti-titi/) 'hit many times'. Thus it does not appear to be a general constraint which prohibits deletion from applying between identical consonants. Rather, it seems that a differentiation has to be made between derived and nonderived words. In derived words, for example by Reduplication,

geminates created by vowel deletions are allowed, whereas in nonderived environment, vowel deletions are generally avoided in places where geminates may result. But common to both derived and nonderived contexts, word-initial geminates are disallowed. For example, the first vowel in *cacŋali* (/cacaŋali/) 'star' is exempt from deletion given this constraint. Thus, a more accurate description of the constraint against vowel deletion can be stated as follows: deletion is not allowed between identical consonants in nonderived lexical items, or in word-initial position in derived or simple words.

2.2.5. Consequences

Recall that one of the characteristic features of consonant clusters of Maga is that the number of segments is limited to two (see Section 2.1.1.2.) This restriction is also observed in morphological processes. For example, Li (1975b: 27) notes that when a stem with a word-initial cluster such as *bvaa* 'wine' is prefixed as in *k-bavaa* 'aboriginal wine', a vowel turns up after the second consonant. Based on this observation, we may postulate that consonant clusters of Maga are regulated by the following constraint:

(56) *CCC : No more than two consonants appear in a cluster.

However, under the current analysis, such a constraint is rendered unnecessary since both

the appearance of the intervening vowel and the limitation on consonant sequences follow from the prosodic structure, as illustrated in (57). Specifically, given the underlying CV syllable-structure assumed as in (28), and since Syncope deletes one element of a binary foot, it naturally yields the result of at most two consonants in a sequence.

(57)

Level 1	Project	* *) b a v a	* * *) k a - b a v a
	Edge: LLL	(* *) b a v a	(* * *) k a - b a v a
	ICC: R	(* *) b a v a	(* *) *) k a - b a v a
	Head: R	* (* *) b a v a	* * (* *) *) k a - b a v a
	Syncope	ø	ø
Level 2	Project	*) b v a	* *) k - b a v a
	Edge: RRR	N/A	N/A
	Lengthen	* *) b v a	* * *) k - b a v a
	ICC: L	(* *) b v a	* (* *) k - b a v a
	Head: L	* (* *) b v a	* * (* *) k - b a v a
	Output	bvaa	k-bavaa

Another significance of Syncope is that it triggers the application of other processes. For instance, when a low vowel is deleted, it is coalesced with a high vowel in the following syllable and yields a mid vowel. This process is illustrated in Section 2.3. Moreover, final vowel deletion triggers the insertion of an echo vowel, which is to be discussed in Section 2.4.

2.2.6. Concluding remarks

In this section, we examined a previous analysis of vowel / zero alternations and demonstrated that the vowel deletion of Maga is not solely determined by the placement of stress or pitch. I have instead proposed a metrical account in which stress and vowel deletion both follow from the prosodic structure, which is constructed by a set of parameters provided by UG.

2.3. Mid Vowel Formation

As noted in Section 2.1.2, Maga is unique among the Rukai dialects in its use of the contrast between mid and high vowels, which gives rise to three additional vowels -- the mid vowels /e/ and /o/ and the central high vowel /ɨ/.

2.3.1. The historical analysis of the development of /e/ and /o/

Based on a survey of the cognates from five modern dialects of Rukai, Li (1977a: 22) suggests that the two mid vowels /e/ and /o/ are evolved from Proto Rukai with three origins: a) diphthongs, b) vowel sequences, and c) high (or mid) vowel due to the loss of the low vowel. The three sources are illustrated in (58) - (60) for /e/, and (61) - (63) for /o/, respectively.[35]

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[35] The data are taken from Li 1977a, with some modifications. First, I represent a long vowel as a sequence of identical vowels rather than with a colon, e.g., /ee/ replaces /e:/. Second, in Li's system of the other dialects and Proto Rukai, /o/ represents the high back vowel, which alternates between [u] and [o]. Here I use /u/ instead to distinguish it from Maga's mid vowel /o/. The retroflex lateral /ɭ/ in Li's system is replaced by /l̩/ here. These modifications also apply elsewhere in the text for the data taken from Li's work.

Front mid vowel /e/:

(58) Diphthong: Maga /e/ corresponds to /ai/ in Mantauran and /ay/ in the other dialects.

		a. bear	b. buy	c. give	d. hundred
Maga	/ee/	cmée	o-lŋée	o-bée	idée
Tona	/ay/	cumáy	wa-laŋáy	wa-baʔáy	idáy
Mantauran	/ai/	cumai	u-laŋai	u-vaʔai	iðai
Tanan	/ay/	cumáy	wa-laŋáy	wa-baáy	idáy
Budai	/ay/	cúmay	wa-laŋáy	wa-báay	íday
Proto Rukai	*ay	*cumay	*ua-laŋay	*ua-baʔay	*iday

(59) Vowel sequence: Maga /e/ corresponds to the vowel sequence /ai/ in the other dialects.

		a. hungry	b. rope
Maga	/e/	o-bé	tési
Tona	/ai/	ʔa-baisi	taísi
Mantauran	/ai/	--	[caiʔi]
Tanan	/ai/	mo-baísi	---
Budai	/ai/	mo-baísi	---
Proto Rukai	*ai	*-baisi	*taisi

(60) /i/ plus the loss of /a/: Maga /e/ corresponds to /i/ in the other dialects if the preceding low vowel has been lost.

		a. hemp	b. skirt (male)	c. tooth	d. excrement
Maga	/e/	dméle	lbéte	vlése	ckée
Tona	/i/	damíli	labíti	valísi	cakí
Mantauran	/i/	ðamili	laviti	aliʔi	caki
Tanan	/i/	damili	labíti	valísi	cakí
Budai	/i/	damíli	lábiti	válisi	cáki
Proto Rukai	*i	*damili	*labiti	*valisi	*caki

Back mid vowel /o/:

(61) Diphthong: Maga /o/ corresponds to /au/ in Mantauran and /aw/ in the other dialects.

		a. big/many	b. leopard	c. wash (clothes)
Maga	/oo/	maɖóo	rkúlo	u-sini-sinóo
Tona	/aw/	maɖáw	ɭikúlaw	sináw
Mantauran	/au/	maðau	ɭikulau	ʔənau
Tanan	/aw/	maɖáw	ɭikuláw	sińaw
Budai	/aw/	máɖaw	ɭikúlaw	sinaw
Proto Rukai	*aw	*maɖaw	*ɭikulaw	*sinaw

(62) Vowel Sequence: Maga /o/ corresponds to the vowel sequence /au/ in all the other dialects.

		a. head	b. horn
Maga	/o/	óru	lóŋu
Tona	/au/	aúu	laúŋu
Mantauran	/au/	---	lauŋu
Tanan	/au/	auɭu	laúŋu
Budai	/au/	aúɭu	láuŋu
Proto Rukai	*au	*auɭu	*lauŋu

(63) /u/ plus the loss of /a/: Maga /o/ corresponds to /u/ in the other dialects if the preceding /a/ has been lost.

	a. bee/honey	b. bridge	c. pan
Maga	vlóo	tlódo	plóŋo
Tona	valú	talúdu	palúŋu
Mantauran	alu	taluðu	paluŋu
Tanan	valú	talúdu	ʔalúŋu
Budai	válu	talúdu	paluŋu
Proto Rukai	*valu	*taludu	*paluŋu

Certain common features can be observed in the above sources: They all involve the low vowel /a/ and a segment of [-consonant, +high], and the result is uniformly a third vowel with neutralized height. Operations of this type, especially between two adjacent segments as in (58)-(59) and (61)-(62), are commonly found in world's languages (see

e.g., Casali 1996). It is thus conceivable, following Li's historical explanation, that in the evolution of Maga from Proto Rukai, a process, as sketched in (64), took place and somehow merged the two segments, yielding the mid vowels of Maga.[36]

(64)

C	V	(C)	V	→	C	(C)	V
	|		|				|
	a		i				e

However, (60) and (63) differ from the other two processes in that the two segments involved are not adjacent, but separated by a consonant. And more interestingly, morphophonemic alternations that parallel those in (60) and (63) are observed in the modern dialect of Maga, as illustrated in the alternations of (65) and (66) for /e/, and (67) for /o/.

(65)

	positive	negative	gloss
a.	dmele	i-k-damlii	'hemp'
b.	vlese	i-k-valsii	'tooth'
c.	ckee	i-k-cakii	'excrement'

---

[36] In the reconstructed phonemic inventory of Proto Rukai, Li posits both *i/u* and *y/w*. However, unlike the other dialects, glides in Maga are not phonemic, but variants of the high vowels, see Section 2.1.2.2. I assume that glides in Proto Rukai had turned into high vowels earlier in the evolution. Thus, in the following discussion, glides are not represented in processes such as (64) and (74).

(66)

ckee	'excrement'	m-caki	'defecate'
mo-cke	'defecate'	m-caki-aa	'Defecate!'

(From Li 1975b: 22)

(67)

	positive	negative	gloss
a.	vloo	i-k-valuu	'bee'
b.	tlodo	i-k-talduu	'bridge'
c.	ploŋo	i-k-palŋuu	'pan'

2.3.2. A synchronic analysis of the development of /e/ and /o/

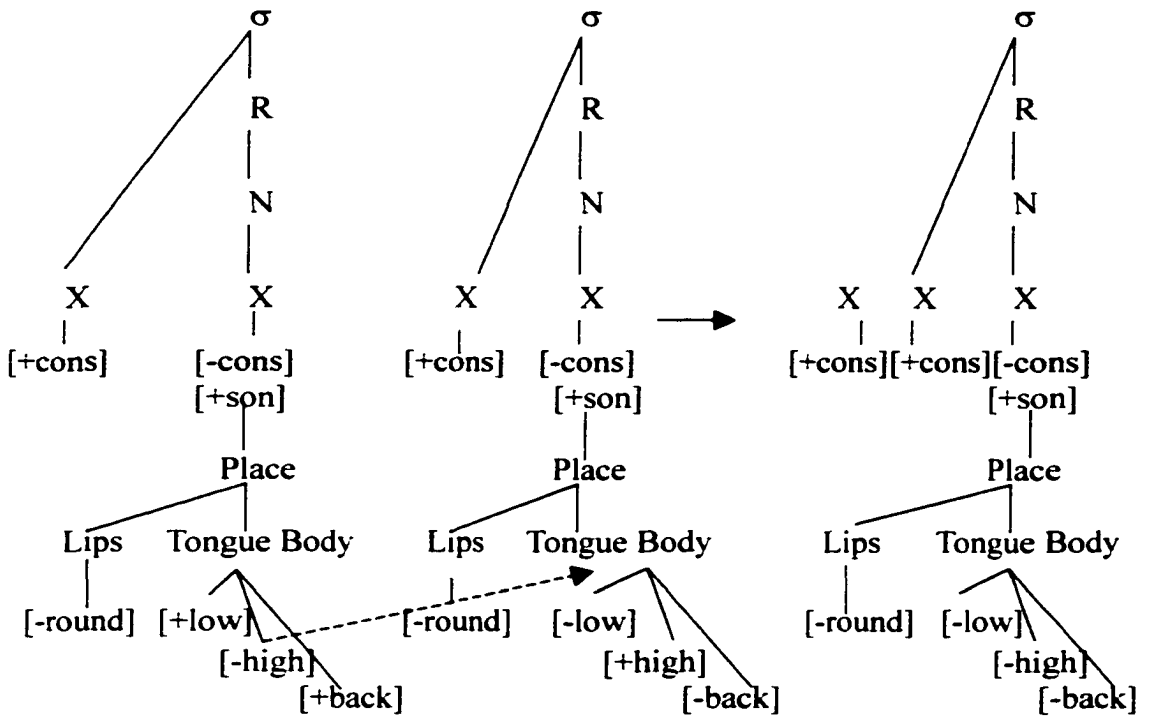
In light of the alternations such as (65)-(67) in the modern dialect, it seems plausible to postulate a process from the synchronic point of view in addition to the historical explanation. Thus, based on the alternations from Maga , I propose that the mid vowels of Maga are derived from processes of the modern dialect, rather than being lexicalized from Proto Rukai. In the following discussions, I will focus on the derivations of the front vowels, but the result applies to the back vowels as well.

Take (65a) *dmele* 'hemp' for example. Inferring from its negative derivative *i-k-damlii*, I assume that the underlying representation of *dmele* is /damili/. Two changes can be observed from /damili/ to *dmele*. First, /a/ alternates with zero. Second, /e/ appears in the place of /i/. The behavior of /a/ conforms to the systematic pattern of vowel/zero alternations and thus can be dealt with by the syncope process

proposed in Section 2.2. Then how do we explain the emergence of /e/ in the place of /i/? Li (1977a) suggests that this is some sort of lowering effect caused by the low vowel, which 'pulls' down the high vowel to mid before it is lost. Building on Li's insight, let us try to determine the properties of such process. For example, what exactly happens in this action of 'pulling-down'? More precisely, does this derivation involve an assimilation rule in which the low vowel spreads its [-high] feature, thus neutralizes the high vowel? Or is it a coalescence operation that merges the high and low vowels to a mid vowel? These two possibilities are explored in turn in the following discussion.

First, let us assume that the process involved is assimilation. Namely, as demonstrated in (68), the [-high] feature from /a/ spreads to the following high vowel and replaces the [+high] feature, yielding a combination of [-high, -low] feature specification, namely a mid vowel. After the assimilation is completed, /a/ is deleted by the syncope rule.

(68) Assimilation



One advantage of this analysis is that the two segments need not be adjacent, which is the situation here, since assimilation is often observed taking place in neighboring syllables, across the intervening consonant(s). This is the case found in, for example, Turkish (cf. Poser 1982, Clements and Sezer 1982).

It is not implausible that the two processes apply in such a fixed order so that deletion of /a/ takes place only after the assimilation applies. It is peculiar, however, that the assimilator /a/ should be in complementary distribution with the assimilated segment. As pointed out by Li and shown in (69), when /a/ is not deleted, the following

high vowel is not affected.

(69)		Maga	Proto Rukai	
	a.	adɟisi	*ʔadɟisi	'eagle'
	b.	ma-rimúru	*marimuru	'forgetful'
	c.	a-rima	*aɭima	'head'

In other words, the presence of /a/ does not trigger the assimilation; on the contrary, it blocks the application of this process. This is unexpected, and contradicts the assimilation rule in (68). We may therefore conclude that assimilation is not the process implemented in (60), (65) and (66).

Let us turn to the other option, that a coalescence process merges /a/ and /i/ to form /e/, which is consistent with the data in (58) and (59). This hypothesis thus has the potential of treating (58)-(60) as governed by the same operation. A question naturally arises: as coalescence usually takes place in a sequence of vowels, as in the case of (58) and (59), how do the two segments in (60) which are divided by a consonant get to be adjacent? Two hypotheses concerning this are entertained in the following discussion.

The first hypothesis is that there is a metathesis rule that switches the sequence *aC* to *Ca*, as sketched in (70). The coalescence rule applied to (58) and (59) can apply to the /ai/ sequence in (70), yielding a mid vowel.

(70)	C	a	C	i	-->	C	C	a	i	-->	C	C	e
	1	2	3	4		1	3	2	4		1	3	2+4

Simple as it may look, the account in (70) is not without problems. First, it is stipulative, as Metathesis of this type is not found elsewhere in the language.[37] Second, there is no independent motivation for triggering the metathesis, other than to make the two vowels immediately adjacent so they can undergo coalescence. This also raises the issue of whether the metathesis rule should be able to look ahead so as to apply only where coalescence will follow.

Alternatively, I propose that the lowering effect follows from the syncope process. More specifically, adopting an autosegmental model in which the features and nodes consist of separate tiers, I suggest that when vowel deletion takes place, the element

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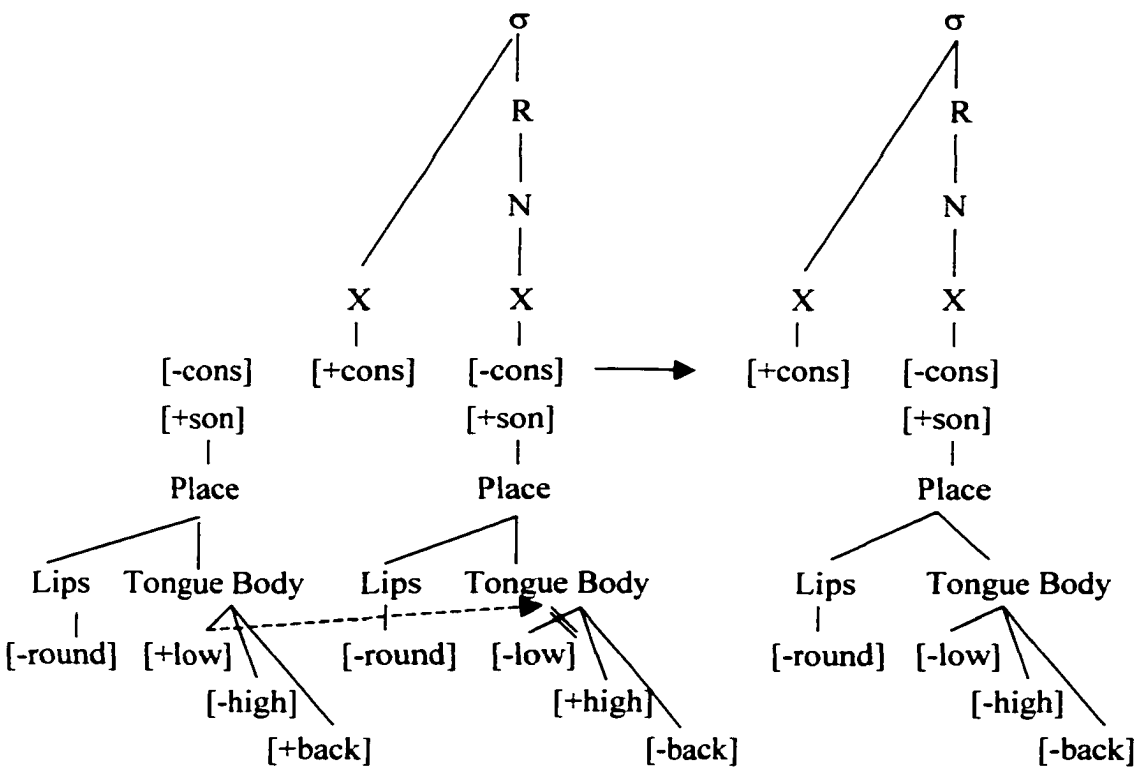
[37] It is mentioned in Li 1977a (p. 73, footnote 1) that there are some cases of metathesis between the consonants of two syllables, e.g.,

(i)		a. sting	b. ear
	Maga	u-kpici	cŋira
	Tona	wa-pəkə́cə	caŋía
	Mantauran	u-pəkəcə	caɭiŋa
	Tanan	---	caɭiŋa
	Budai	---	caɭíŋa
	Proto Rukai	*pəkəcə	*caɭiŋa

However, there is no report of the switch of adjacent consonant and vowel, i.e., the type of metathesis described in the text.

being deleted is not a vowel in the segmental level, but a position in the prosodic level, namely, the X-slot with which the vowel is associated. Take /damili/ for example. When Syncope applies, it eliminates the X-slot to which /a/ is linked, and hence leaves the features of /a/ unattached. These stranded features then associate themselves with the next compatible X-slot, the high vowel in the following syllable, and together they surface as a mid vowel through the process in (71).

(71) Vowel Coalescence *aCi → Ce* (irrelevant features omitted)



More concretely, I assume that the mid vowel is generated in (71) by taking contrastive

features [+low] and [+high, -back] from /a/ and /i/ respectively. However, since the combination of *[+low, +high] is universally prohibited, I assume, following Calabrese (1988 and 1995), that these features are reverted to [-high, -low] by what Calabrese calls feature reversal, or negation.[38]

It is worth noting that the operation proposed above occurs merely as a consequence of the syncope process, and is triggered only if the deletion takes place first. This is manifested by Li's observation in (69), repeated in (72), that if /a/ remains, /i/ is not affected.

(72)

	Maga	Proto Rukai	
a.	adi̯si	*ʔadi̯si	'eagle'
b.	ma-rimúru	*marimuru	'forgetful'
c.	a-rima	*a[i̯]ima	'head'

The fact that /a/ in these cases fails to be deleted, and consequently, to lower the high vowel, also follows from the metrical analysis proposed earlier: In (72a), a

---

[38] It remains a question, though, why only the low vowel /a/ triggers Vowel Coalescence, whereas the other vowels are simply deleted. This seems to conform to a general observation that /a/ tends to be more resistant to reduction and deletion in world's languages, which may be attributed to its hierarchy in the sonority scale. The same effect, I suspect, is the reason why only /a/ surfaces through Vowel Coalescence in Maga, but not the other vowels. Furthermore, if /i/ and /u/ associate with the following high vowels after deletion, they would produce segments like [ü] and [ɯ] which are marked and tend to be banned by the constraints in most languages.

word-initial vowel such as /a/ in /aḍisi/ generally is not subject to Syncope due to the constraints on vowel deletion (see Section 2.2.4.) And in (72b-c) /ma-rimuru/ and /a-rima/, /a/ in the prefixes are divided from the stem by a morpheme boundary. Since they project to the higher level in the metrical grid, as sketched in (73), the syncope rule proposed in (43) does not apply to them. Thus, it is not necessary to postulate other constraints to block the vowel coalescence.

(73)

*	*
(* (* * *	(* (* *
ma-rimuru	a-rima

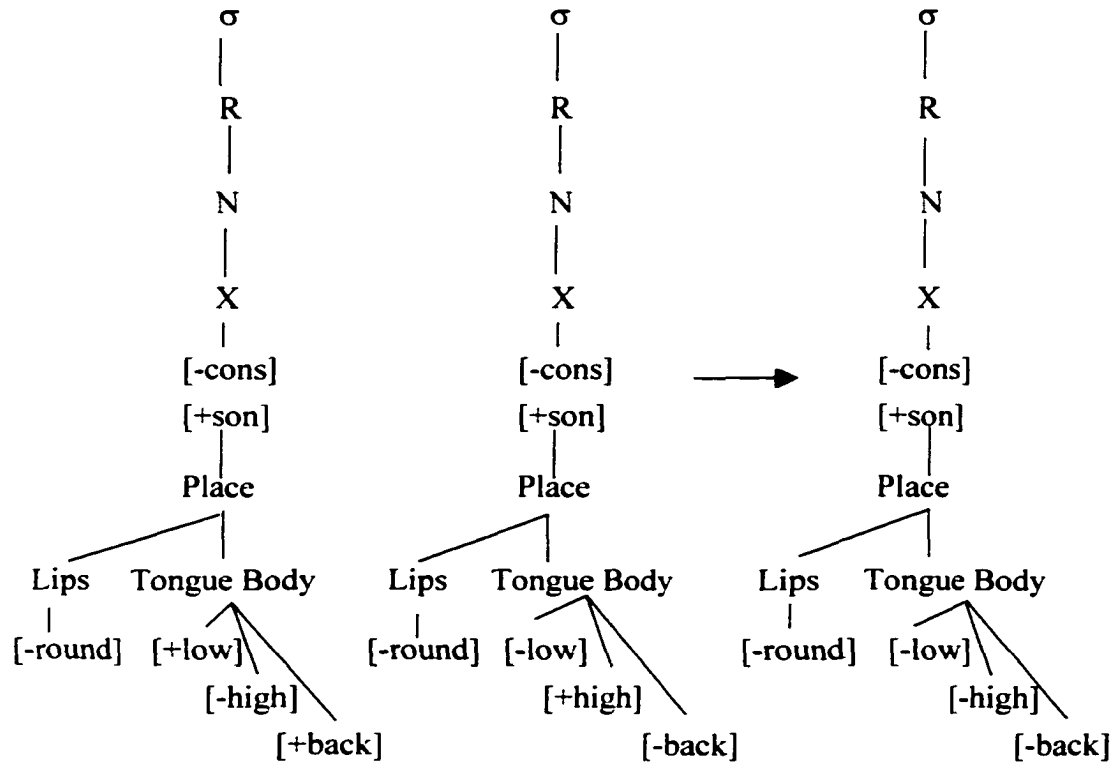
The above discussion depicts the processes of how the mid vowel /e/ in the case of (60) is derived under the synchronic hypothesis. Now, to extend the hypothesis even further, I propose that the mid vowel /e/ in (58)-(59) is also generated synchronically. Namely, the process that incorporates the adjacent low and high vowels to form a mid vowel, as (74), takes place in the modern dialect.[39]

---

[39] It is pointed out to me by Jackson Sun (personal communication) that it may be problematic to hypothesize an absolute neutralization of the type in (74) since the vowel sequences do not show alternations in surface forms, except in the negative forms listed in (i) where the final *e* surfaces as *ai*.

(i)	o-pvee	'to dry under the sun'	i-pavee / i-pavaii
	o-bee	'to give'	i-baii

(74) Nucleus Incorporation *ai* → *e* (irrelevant features omitted)



The type of vowel coalescence portrayed in (74) is commonly found across languages. For example, Chomsky and Halle (1968: 358) mention that in languages such as Sanskrit and Kasam, a sequence of two vowels is contracted into a third vowel, which maintains the lowness of the first vowel and the backness of the second vowel. More recently, Casali's (1996) language survey shows that 'Height Coalescence', which applies only to sequences in which V_1 is non-high and V_2 is high, occurs most frequently among vowel

---

However, it will be shown later in the alternations of *e* ~ *r* and *o* ~ *v* that this hypothesis is in fact required in dealing with such processes.

coalescences. The phonetic result of such coalescence is always a non-high vowel with the frontness and roundness of V_2 (p. 131).

2.3.3. The development of central vowels

If the hypothesis that the mid vowel /e/ and /o/ are derived from synchronic processes (71) and (74) is on the right track, it means that the vocalic system of Maga in fact contains less vowels lexically than appears phonetically. Notice, however, that there remains one additional vowel of Maga, the high central /ɨ/. It would be desirable if the central vowels /ɨ/ and /ə/ can be related by the same alternations found between other high and mid vowels. If so, we are able to claim that the vocalic inventory of Maga in fact conforms to the other Rukai dialects.

Li (1977a) does not provide explicit cognate comparison and reconstruction for the two central vowels /ɨ/ and /ə/, but he mentions that /ə/ has developed in contrast to /ɨ/ due to the loss of vowels, e.g. PR ***bələbələ*** > ***blɨbli*** 'banana', PR ***baləbalə*** > ***bləblə*** 'bamboo'. However, as mentioned (see Section 2.1.2.), the two central vowels are perceptually indistinguishable in most cases, even for the native speakers, and disparities of transcriptions among researchers tend to occur with respect to these vowels. Thus, to verify the alternations between the two would be an even trickier task. In lieu of

evidence from morphophonemic alternations, I attempt an account by comparing nonderived words where the contrast of /ɨ/ and /ə/ is well established. For example, the minimal pair ***blɨblɨ*** 'banana' vs. ***bləblə*** 'bamboo', and some words whose transcriptions are consistent among researchers. Based on such evidence, I will argue that /ə/ is in fact a variant of /ɨ/.

Consider the following cognates from Li 1977a.

(75)

	a. banana	b. iron	c. mountain
Maga	blɨblɨ	adʝimɨ	rgɨrgɨ
Tona	bələbələ	ʔadʝəmə	əgəəgə
Mantauran	vələvələ	ʔaðəmə	ɭəhəɭəhə
Tanan	bələbələ	adʝəmə	ɭəgəɭəgə
Budai	bələbələ	adʝəmə	ɭəgəɭəgə
Proto Rukai	*bələbələ	*ʔadʝəmə	*ɭəgəɭəgə

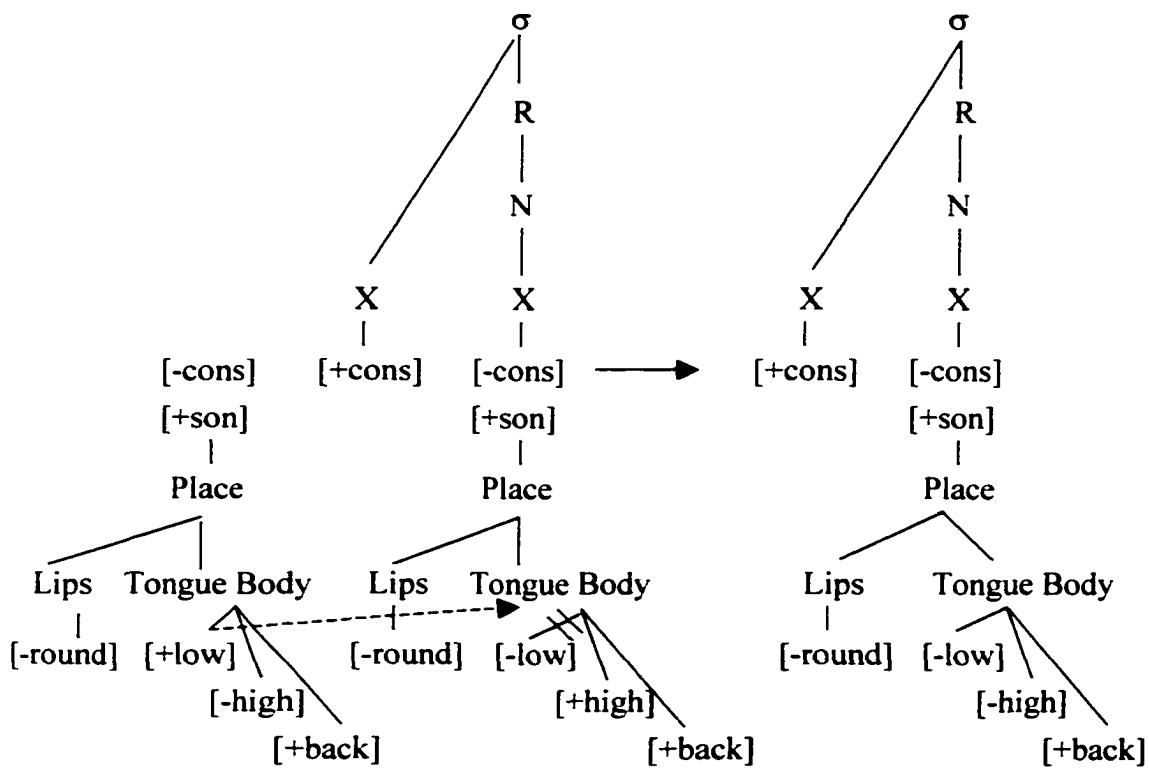
(76)

	a. bamboo	c. bark (of tree)	b. vegetable
Maga	bləblə	kcəkcə	lcəŋə
Tona	baləbalə	kacəkacə	lacəŋə
Mantauran	valəvalə	kacəkacə	(latəŋə)
Tanan	baləbalə	---	lacəŋə
Budai	baləbalə	kacəkacə	lacəŋə
Proto Rukai	*baləbalə	*kacəkacə	*lacəŋə

In the above cognates, while all the other dialects contain the same reflex of /ə/, Maga shows two variants: /ɨ/ in words like ***blɨblɨ*** 'banana' (75a) and /ə/ in ***bləblə*** 'bamboo' (76a). The contexts where the two variants appear are crucially differentiated by one

factor, i.e., in the other dialects, there is a low vowel in the syllable preceding the central vowel in *bləblə* 'bamboo', but not in *blibli* 'banana'. If we assume, following Li (1977a), that /i/ of Maga corresponds to **ə* of Proto Rukai, the pattern in (76) parallels the derivations in (60) and (63). Thus, I propose that /ə/ is in fact derived from /i/ in Maga through the vowel coalescence process (71), triggered by the deletion of /a/ in the preceding syllable. The process, which is another instance of Vowel Coalescence (71), is represented in (77).

(77) Vowel Coalescence of central vowels *aCi → Cə*



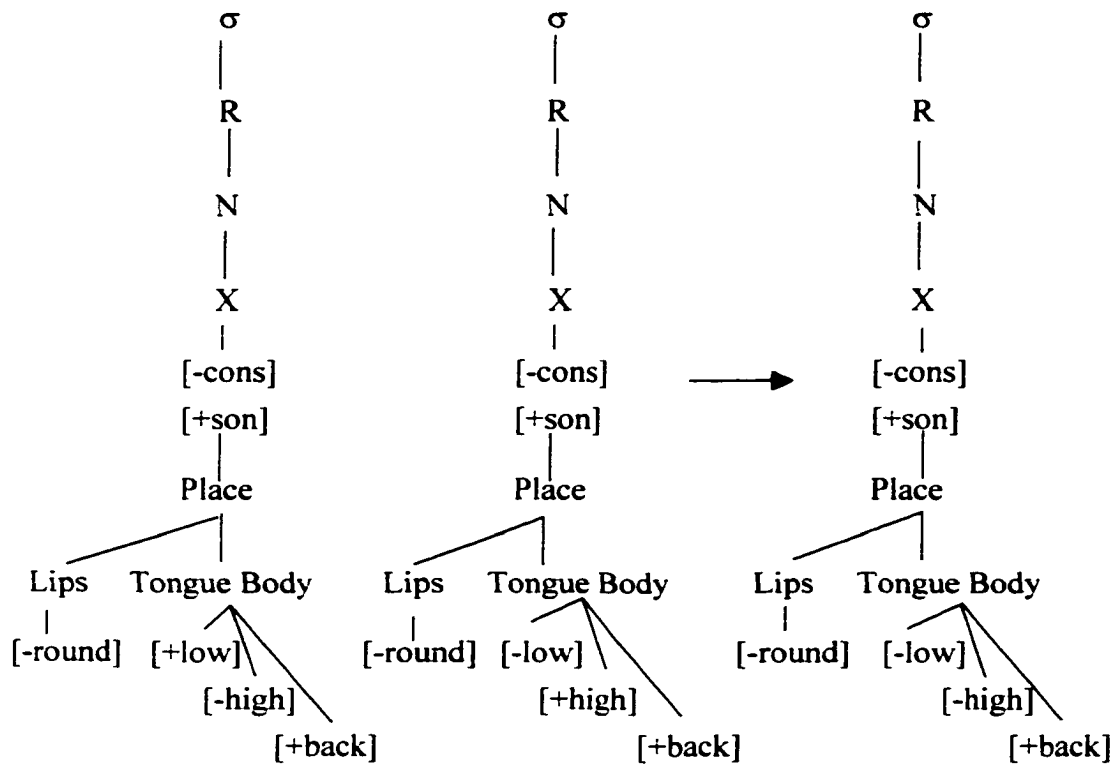
Furthermore, there is also one word found in Li's (1977a) dialectal comparison which exhibits the correspondence between /ə/ of Maga and /aə/ in the other dialects (78).

(78)

	door
Maga	səlbáa
Tona	saələbánə
Mantauran	ʔəələbaə
Tanan	saələləbá
Budai	saələləbánə
Proto Rukai	*saələbana

Given this clue, we may assume that /ə/ is also generated by applying Nucleus Incorporation (74) to the sequence /aɨ/, as shown in (79).

(79) Nucleus Incorporation of central vowels *ai* → *ə*



2.3.4. Consequences

If the hypothesis discussed in the above is correct, it unveils a somewhat different picture of the vocalic system of Maga. Given the fact that all the mid vowels are surface variants of their high counterparts, Maga in fact contains only four vowels, which is similar to the other dialects.[40]

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[40] Or perhaps identical, if we adopt Li's observations: "Maga /i/ is phonetically [ə] or [i], similar to the /ə/ in the other dialects, and Maga /ə/ is phonetically [ʌ] or [ɐ]" (1977a: 22). My impression also indicates that /ə/ is somehow lower than the ordinary schwa.

Furthermore, with the general criteria for the distribution of high and mid vowels, we now can capture the occurrences of the two central vowels and predict their alternations, despite the fact that they are perceptually indistinguishable. This, I believe, not only sheds light on our knowledge of this language, but also provides considerable help in our future investigations.

Another significant result of the synchronic approach is that, by recognizing the fact that /ɨ/ is the only central vowel in Maga's vocalic system, we resolve the issue of why /ɨ/ is inserted as the echo vowel following the stem vowel /a/, or more generally, the issue of how the uniform pattern of echo vowels is obtained among Rukai dialects. Stated briefly, I assume that an echo vowel is a copy of the preceding stem vowel. However, since /a/ is banned from the echo vowel position (see Section 2.4. for an argument to this effect), a default segment is called for. Given the fact that /ə/, corresponding to the only central vowel /ɨ/ of Maga, is the unmarked vowel in most of the world's languages, it is not unexpected that Rukai dialects all take the central vowel in this position. In the next section, this issue will be illustrated with more detail.

The proposed synchronic analysis has yet other desirable consequences. First, the alternations of *e* ~ *r* and *o* ~ *v* (e.g. *toto* ~ *totv-a-na*) no longer require historical explanations, but can be accounted for as processes of the modern dialect. As to be

shown in Section 2.5., under the assumption that word-final /e/ and /o/ are underlyingly /ai/ and /au/ respectively, the high vowel in these sequences may be realized as glides when preceding a low vowel suffix. *r* and *v* then appear as the result of a strengthening process that turns a prevocalic glide into a corresponding liquid or fricative.

Second, it builds on Li's reconstruction work and helps to produce a more consistent system of reflexes among Rukai dialects. For example, Li (1977a: 23-24) shows that /i/ in the other dialects and Proto Rukai corresponds to /i/ in Maga, except for the peculiar case (60) where the corresponding sound in Maga is /e/. In the proposed analysis, the anomaly is alleviated: The reflex in Maga, as well as in the other dialects, is uniformly /i/, since /e/ only appears as a derived form, resulting from synchronic operations.

There remains a problem in this proposal, however. As the alternations in (58)-(60) seem to share certain properties, are we missing a generalization by proposing the two separate operations (71) and (74) to deal with the shared phenomena? It is certainly more appealing if the two processes can somehow be collapsed, so that the mid vowels can be generated through a single process.

Ideal as it may be, this scheme is not viable because, despite the surface similarities, the processes in (71) and (74) in fact differ in the following aspects. First, they have different contexts: while Nucleus Incorporation (74) crucially calls for adjacency of the

involved segments, in Vowel Coalescence (71) the vocoids are separated by a consonant. More importantly, they differ in the relative ordering with respect to the syncope process (43). As mentioned, Vowel Coalescence (71) occurs as a consequence of Syncope, since the lowering effect only takes place when there is a low vowel being deleted in the preceding syllable. On the other hand, Nucleus Incorporation (74) must apply before the vowels are syncopated, as demonstrated by the derivations of *cmee* 'bear' (58a).

(80) a.

			*		
		(	*	*)	*
	c	u	m	a	i
Syncope		ø			ø
NI (74)			N/A		
Lengthen				aa	
			* cmaa		

b.

			*		
		(	*	*)	*
	c	u	m	a	i
NI (74)				e	
Syncope		ø			
Lengthen				ee	
			cmee		

The final high vowel /i/ in (80b) avoids being syncopated by incorporating with the proceeding low vowel and the correct output follows. In (80a), the reversed order, Nucleus Incorporation is bled by Syncope, and an incorrect outcome is yielded.

A crucial ordering relation among these processes can be inferred from the foregoing discussion, as shown in (81).

(81) Nucleus Incorporation (74) > Syncope (43) > Vowel Coalescence (71).

2.3.5. Concluding remarks

To summarize, in this section a synchronic approach is proposed to deal with the development of mid vowels of Maga in light of evidence from the alternations of the modern dialect. Under this proposal, the mid vowels are only derived in the modern dialect through two separate vowel coalescence processes, which are distinct in their properties and their relative ordering with the syncope rule. Several desirable consequences follow from this proposal. For instance, it enables us to differentiate the distributions of the central vowels, and to resolve issues concerning the echo vowel insertions. Most significantly, it reveals that Maga in fact is consistent with the rest of Rukai dialects in having a simpler vocalic system.[41]

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[41] Inevitably, there are some exceptions to the proposed analysis. For instance,

(i) ma-rgii 'good' cf. i-k-ragii

But the few cases, like *ma-rgii*, are high frequency items, where exceptions tend to occur. There are also other words which, according to Li's reconstruction, should result in a mid vowel, but they do not. For example,

(ii)	Proto Rukai	Maga		
	*taɭupuŋu	trupŋu	'hat'	cf. i-k-turpuŋuu
	*samitu	smitu	'lips'	cf. i-k-simtuu
	*tularə	tlura	'throat'	cf. i-k-tuluraa

I assume that the mid vowels do not occur in these forms because Maga vowels are sometimes assimilated by a neighboring vowel, as evidenced in the negation forms.

2.4. Echo Vowel Insertion

No word in Maga ends with a consonant. It appears that a general constraint that disallows word-final coda is active in the language. However, the final vowel in many words appears as a weakened vocoid, or simply a consonantal release, rather than a full vowel, somewhat similar to the released consonants in French (see Schane 1968). The vowel in this position is usually assumed to be epenthesized to support a word-final consonant in the underlying form (e.g., Tsuchida 1976). Therefore, it is usually called a 'supporting vowel' for its function. It is also called an 'echo vowel' since it is generally identical to the vowel in the preceding syllable. In the discussions, I will refer to these vowels as 'echo vowels', following the usual practice among Formosan linguists.

Echo vowels are not a unique feature of Maga, but are found in the other dialects of Rukai (see Li 1977a), as well as in the dialects of Tsouic languages, such as (North) Tsou (see Li 1972, Tsuchida 1976: 88), Saaroa (see Ting 1967: 920-27, Tsuchida 1976: 61-62), and Kanakanavu (see Tsuchida 1976: 32-33).[42] Some examples of Maga echo vowels are listed in (82).

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[42] Tsuchida (1976: 209) also mentions a number of non-Formosan languages in which echo vowels are observed: Sangirese in the Sangir and Talaud Islands between Mindanao and Celebes, Makassarese in Celebes, and some Melanesian languages, such as Kia (Central Solomon Islands).

(82) Echo vowels in Maga

i	ikivi̱	'tail'	kpiŋi̱	'clothing'
e	θveke̱	'betel nut'	rvele̱	'arrow'
u	uŋulu̱	'drink'	tkasludu̱	'shrimp'
o	tesboko̱	'egret (black)'	svoŋvoŋo̱	'butterfly'
ɨ	krɨmɨ̱	'palate'	adɨmɨ̱	'iron'
ə	ɖkəsə̱	'camphor laurel'	lcəŋə	'vegetable'
a	cacŋali̱	'star'	tkorpaŋi̱	'frog'

2.4.1. The properties and correspondence relation of echo vowels

Li (1973, 1975b and 1977a) presents a series of insightful discussions regarding the echo vowels of Rukai dialects. Li (1973: 51) notes that many words in Rukai (Tanan dialect) end in a released consonant followed by an optional short vowel that is similar to the preceding vowel. He further observes that such vowels are weakened, devoiced or dropped in normal or rapid speech, while the preceding consonant is always released. Li's description of Tanan echo vowels is applicable to those of Maga as well.

Besides the qualities of echo vowels, Li is also concerned with the issue of their representations. Specifically, his studies explore the questions such as whether the echo vowels exist in Proto Rukai, and whether these vowels should be represented in the underlying forms of the modern Rukai dialects. In Li's (1977a) reconstruction work based on cognates from five modern dialects, he argues that the echo vowels should be

treated as an inherited feature from Proto Rukai. Otherwise, Li reasons (1977a: 25-26), it would be difficult to explain how they develop so uniformly in all the dialects. Furthermore, excluding the echo vowels from the Proto forms would make it difficult to account for the historical derivations in Maga in particular, for example, PR **balabalə* > *bləblə* 'bamboo' and PR **bələbələ* > *blibli* 'banana'. However, Li also remarks that it does not necessarily follow that echo vowels are part of the underlying representations of individual dialects. For example, in Tanan a nearly predictable stress pattern (almost always on the final syllable) can be obtained if the echo vowels are not written out, whereas in Maga (or the Lower Three Villages in general), for a uniform stress pattern, echo vowels must be represented as phonemic.

Nonetheless, some interesting questions arise from Li's hypotheses that echo vowels must be represented in the underlying forms of Maga, and that mid vowels of Maga are developed from Proto Rukai (see Section 2.3.1.) One such puzzle is observed in the derivation of mid vowels, in which the high vowel is affected by a deleted low vowel in the preceding syllable. Relevant examples are repeated in (83).

(83)		a. hemp	b. skirt (male)	c. tooth	d. excrement
Maga	/e/	dméle	lbéte	vlése	ckée
Tona	/i/	damíli	labíti	valísi	cakí
Mantauran	/i/	ðamili	laviti	aliʔi	caki
Tanan	/i/	damili	labíti	valísi	cakí
Budai	/i/	damíli	lábiti	válisi	cáki
Proto Rukai	*i	*damili	*labiti	*valisi	*caki

A peculiarity of this process, as Li (1977a: 23) points out, is that in a word like (83a) *dmele* 'hemp', there is more than one high vowel being affected by the low vowel, hence we get the echo vowel *e* following an *e* in the stem, and the output form as *dmele*, rather than **dmeli*. This is indeed curious because, as argued in Section 2.3.2., the process involved in (83) is not assimilation which spreads the [-high] feature through syllables. Rather, the only possible operation through which the mid vowels are derived is by coalescing /a/ and /i/. Hence it is unclear how one single low vowel can affect two high vowels at the same time through coalescence given the above assumptions.

Yet a more serious problem is revealed by the negative counterparts of the words in (83), listed as (84).

(84)	affirmative	negative	gloss
a.	dmele	i-k-damlii	'hemp'
b.	vlese	i-k-valsii	'tooth'
c.	ckee	i-k-cakii	'excrement'

Notice that if mid vowels are historically derived from Proto Rukai, then the word-medial /e/ of *dmele* should exist underlyingly. Further, if echo vowels are treated as phonemic, then the *e-e* correspondence must exist in the lexical form of *dmele*. More explicitly, under such an analysis, *dmele* cannot appear as /damili/ in Maga lexicon. It is then perplexing that *dmele* should have a negative form as *i-k-damlii* (84a) which contains a medial /a/ and a final /i/. On the other hand, these intriguing facts find proper explanations under the Vowel Coalescence and Echo Vowel Insertion.

Before delving into the details explaining how these problems are accounted for under the proposed analysis, let us first recount the differences between the historical account and the one proposed in this study. Essentially, the two analyses differ in when the derivation of the mid vowels is completed. For the historical account (e.g., Li 1977a), the mid vowels originate in Proto Rukai, hence /e, o/ appear as part of the underlying representations of the Maga lexicon, e.g. *dmele* (83a). In contrast, the present analysis invokes the synchronic processes to account for the emergence of mid vowels. I propose that Maga, just like the other Rukai dialects, inherited lexical representations like /damili/ (83), and the derivations that change /damili/ to [dmele] take place in the modern dialect. Namely, /damili/ exists as the underlying representation of the surface form *dmele* in Maga.

Now that we have made clear the conceptual differences, it is easy to see how the puzzles faced by the diachronic approach can be resolved under the synchronic method. First, the correspondence relation of *e-e* in words like ***dmele*** in fact follows from the construction of metrical structure and a proper ordering. As illustrated by the simplified derivations in (85a), the final vowel of /damili/ does not constitute a foot and therefore is deleted by the subsequent syncope process. Following this, an echo vowel must be inserted in its place because word-final consonants are not allowed in Maga. Since the echo vowel takes its properties from the preceding vowel,[43] as long as the insertion applies after the formation of the mid vowel, the *e-e* correspondence is obtained.

(85) a.

				*			
		(	*		*	)	*
	d	a	m	i	l	i	
Syncope		ø				ø	
V.C. (71)				e			
Echo vowel						e	
				dmele			

b.

				*			
		(	*		*	)	*
	d	a	m	i	l	i	
Syncope		ø				ø	
Echo vowel						i	
V.C. (71)				e			
				*dmeli			

Second, the fact that different vowels surface in the negative form of *i-k-damlii* also follows from the metrical analysis. As shown in (86), given the underlying form

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[43] I assume that the echoing effect is achieved by a feature spreading process which will be discussed shortly.

/damili/ assumed in our account, the processes start with the input /i-ka-damili/. Since the word-medial low vowel is not deleted, vowel coalescence does not apply. Subsequently, the word-final vowel remains as /i/ in the surface form.

(86)

		*		*			*			
		(	*	(	*		*	)	*	) *
		i	-	k	a	-	d	a	m	i l i - V
	Syncope				ø			ø		
	Lengthen									ii
		i-k-damlii								

2.4.2. The quality of echo vowels

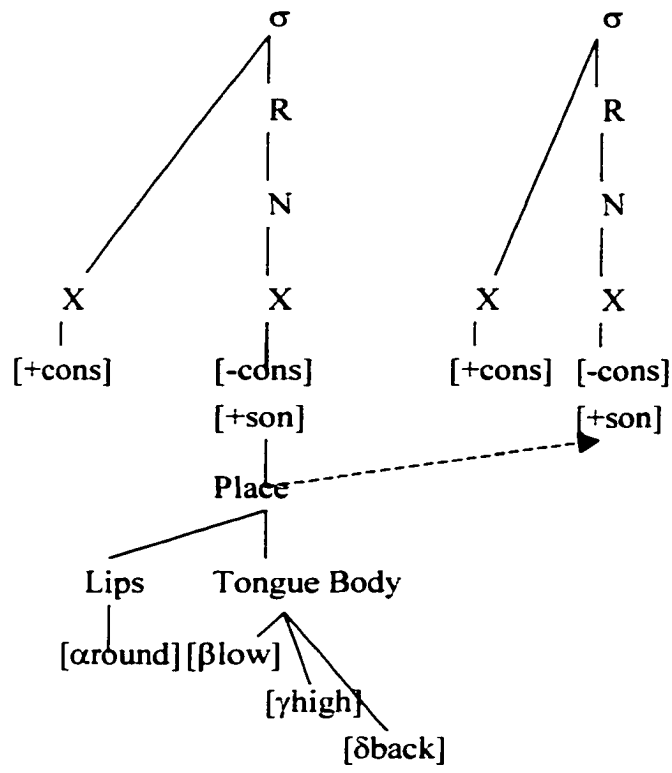
We now turn to examine the specific qualities of echo vowels in Maga. As can be observed from (82), repeated in (87), the epenthesized echo vowel is generally identical to the vowel in the preceding syllable, with the only exception being /a/ in the preceding syllable. In this case the echo vowel turns out as the high central vowel /ɨ/.

(87) Echo vowels in Maga

i	ikivi̱	'tail'	kpiŋi̱	'clothing'
u	uŋulu̱	'drink'	tkasludu̱	'shrimp'
ɨ	krɨmɨ̱	'palate'	adɨmɨ̱	'iron'
a	cacŋali̱	'star'	tkorpaŋi̱	'frog'
e	θveke̱	'betel nut'	rvele̱	'arrow'
o	tesboko̱	'egret (black)'	svoŋvoŋo̱	'butterfly'
ə	ɖkəsə̱	'camphor laurel'	lcəŋə̱	'vegetable'

I propose that the corresponding relation between an echo vowel and the stem vowel is obtained by a spreading process as in (88), which spreads the features of the preceding vowel to the echo vowel position.

(88) Feature Spreading of echo vowels



This general pattern has an exception as noted above. Namely, when the preceding stem vowel is /a/, the echo vowel emerges as /i/, rather than /a/. This exception, I assume, results from a constraint that prohibits /a/ from appearing as an echo vowel, due to the conflicting natures of a low vowel and the echo vowel position. Observe that an echo vowel, according to Li's (1973) description noted above, is usually weakened, devoiced or dropped in normal or rapid speech, where its function is to help the final consonant obtain release. These characteristics seem to be incompatible with the most

sonorous segment /a/. Therefore, it is conceivable that the low vowel /a/ is banned from the echo vowel position. But why does /ɨ/ appear instead? This, I suggest, is because /ɨ/ is the unmarked, default vowel of Maga. It is pointed out by L. Chang (1998, note 12) that in many Austronesian languages, schwa is the preferred vowel in epenthesis and in environments of vocalic neutralization. In other languages, for example English, schwa ('a central, high, or mid unrounded neutral vowel') is more often used as the reduced vowel in unstressed positions (see SPE: 110). Such facts indicate that /ə/ is the unmarked vowel in most languages. Recall our discussion in Section 2.3. that /ɨ/, which corresponds to /ə/ in the other dialects, is the only central vowel in Maga's underlying vocalic system. Thus, when /a/ is banned from the position of echo vowels, the unmarked vowel of Maga, /ɨ/, naturally surfaces as the default segment.

Incidentally, this also answers the question raised in Li 1977a, i.e., how could the echo vowels develop so consistently in all the dialects, if they are not historically inherited from Proto Rukai? As can be inferred from the foregoing discussion, this uniform pattern is not language-specific, but actually follows from a general spreading process and a universal constraint. In normal contexts, the echo vowels obtain the properties of the preceding vowel by feature spreading (88). The only exception arises from the constraint that prohibits a low vowel from appearing as an echo vowel due to the

conflicting natures of these two entities. Given this constraint, a default vowel is called for to substitute in this position. And since the most common neutral vowel in the world's languages tends to be the central vowel /ə/, it is not surprising that all of the Rukai dialects choose this vowel as the default vowel. Thus, the uniform pattern of echo vowels developed among Rukai dialects simply reflects some universal properties of languages, rather than the language-specific characters or the historical relations.

Furthermore, as mentioned, echo vowels are not unique to Rukai dialects, but also found in other Formosan languages such as Tsou and its dialects, Saaroa and Kanakanavu. According to the descriptions in Tsuchida 1976, a similar pattern is observed in these languages as well.[44] It therefore proves that such pattern is not restricted to related dialects, but is obtained following certain natural devices.

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[44] According to Tsuchida (1976), in Kanakanavu, a four-vowel system, the corresponding pattern of echo vowels is:

/u/ after the stem vowel /u/;

/i/ after the stem vowel /i/;

/ə/ after the stem vowel /ə/ or /a/.

Saaroa, also containing four vowels, exhibits the same pattern as Kanakanavu, except in one case:

/a/ appears if the last stem-final vowel is /a/ followed by the consonant /q/ (which surfaces as /ʔ/).

In Tsou, although there are six vowels, the correspondence displays the same pattern, as follows:

/u/ after the stem vowel /u/;

/i/ after the stem vowel /i/ or /e/;

/ə/ after the stem vowel /ə/, /a/ or /o/.

To sum up, the synchronic hypothesis proposed in Section 2.3. is further supported by the process of echo vowel insertion. More precisely, the development of the mid echo vowels is shown to derive from the specific ordering of the synchronic processes, Vowel Coalescence (71) and Feature Spreading (88). Furthermore, the uniform quality of the echo vowels among the dialects can be regarded as following from the universal properties of languages.

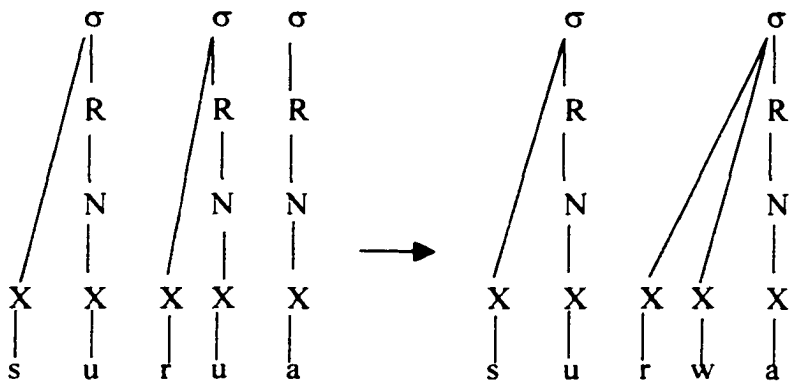
2.5. Glide Formation

As mentioned in Section 2.1.2.2., in a vowel sequence such as *ia* in *kcarsia* or *ua* in *surua*, the preceding high vowel is realized as a prevocalic glide. Hence *kcarsia* and *surua* are realized phonetically as [kcarsyaa] and [surwaa] respectively. Other examples are listed in the following.

(89)				
	ua	slabua	[slabwáa]	'toad'
	ia	tpupulia	[tpupulyáa]	'white, blank'
	uə	nuəŋə	[nwáŋə]	'cow'
	uo	tramuoro	[tramwóro]	'dragonfly'
	iə	iəla	[yə́la]	'snow'
	ia	bia	[byáa]	'plant name'

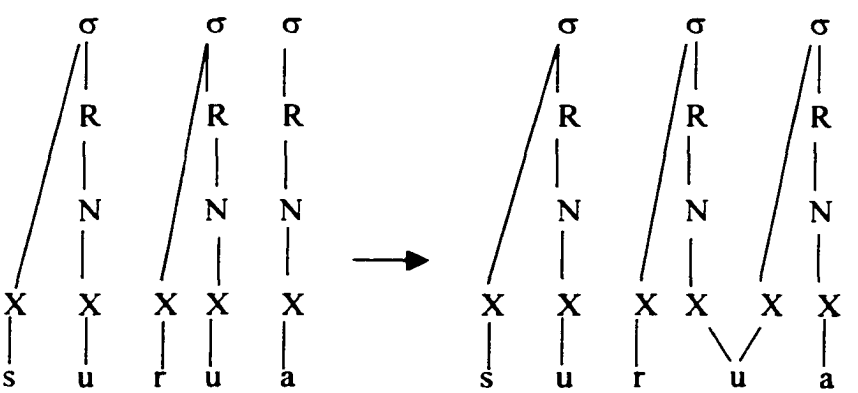
Glide Formation of high vocoids of this type is commonly found among world's languages. In this process, as illustrated in (90), the nucleus dominating the high vowel is removed, then the high vocoid along with its former onset is incorporated into the onset of the following nucleus through resyllabification.

(90) Syllable Incorporation (/surua/ → [surwa])



However, in contexts such as deliberate speech, the high vowel may retain its nuclear status and instead a glide is inserted between the two vowels.

(91) /surua/ → [suruwa]



Glide Formation is necessarily ordered before the syncope process. Take ***slabua***

[slabwaa] 'toad' for example. As demonstrated in (92a), Syncope would block Glide Formation from applying since the high vowel, being a non-head of the constituent, is deleted, and the output would become **slabaa*.

(92) a.

```
                *  *)
             (*  *)**)
             s a l a b u a
Syncope      ø     ø
Glide Form.    N/A
Lengthen             aa
             *slabaa
```

b.

```
                *  *)
             (*  *)**)
             s a l a b u a
Glide Form.          w
Syncope      ø
Lengthen             aa
             slabwaa
```

Glide Formation also takes place in morphological contexts. When a stem-final high vowel is suffixed by a morpheme with /a/ initial, such as the imperative *-a*, this high vowel is realized as a prevocalic glide, as in *biry-aa* 'Answer!' (cf. *u-brii* 'answer').

(93)

```
                *  *)
             (*  *)*  *)
             u b i r i - a
Glide Form.          y
Syncope      ø
Lengthen             aa
             biryaa
```

2.5.1. Alternations of *e* ~ *r* and *o* ~ *v*

A phenomenon related to Glide Formation is the alternations of *e* ~ *r* and *o* ~ *v*. As noted (see Section 2.1.2.2.), the sequence of *oa* is not found in Maga since the back mid vowel systematically turns into a labial fricative *v* before a suffix low vowel, as exemplified in (94).

(94) Alternation of o ~ v:

a.	okoko	'call (someone)'	kokov-a	'Call (someone)!'
b.	ababnoo	'bathe'	ababanv-aa	'Bathe!'

Parallel behavior is noted with /e/ which alternates with /r/ when preceding /a/:

(95) Alternation of e ~ r:

a.	u-lŋee	'swim'	luŋr-aa	'Swim!'
b.	u-θnee	'sing'	θinr-aa	'Sing!'
c.	u-brililee	'play (games)'	birilar-a	'Play!'

In keeping with the hypothesis that Maga mid vowels are developed from diachronic processes, Li (1975b) proposes that the *e* ~ *r* and *o* ~ *v* alternations can be attributed to their distributions in the historical derivations: "Historically, Proto-Rukai *ay > Maga ee

in word-final, but (a)r in word-medial. That is to say, *y is preserved as r medially. Similarly Proto-Rukai *aw > Maga oo in word-final, but (a)v in word-medial" (p. 28). Represented as rules, the diachronic changes of Li's account are summarized in (96) and (97) for /e/ and /o/ respectively.

(96) a. *ay → ee / __ #

b. *ay → (a)r / elsewhere

(97) a. *aw → oo / __ #

b. *aw → (a)v / elsewhere

Additional variations of *o* ~ *v* are noted in Zeitoun 1995, as shown in (98), which are incorporated into Li's rule (97), as in (99).

(98) a. toto 'Toto (Nom.)' toto-na / totv-a-na 'Toto (Obl.)'

b. vakao 'Vakao (Nom.)' vakao-na / vakav-a-na 'Vakao (Obl.)'

(from Zeitoun 1995: 120)

(99) a. *aw → oo / __ {#, C}

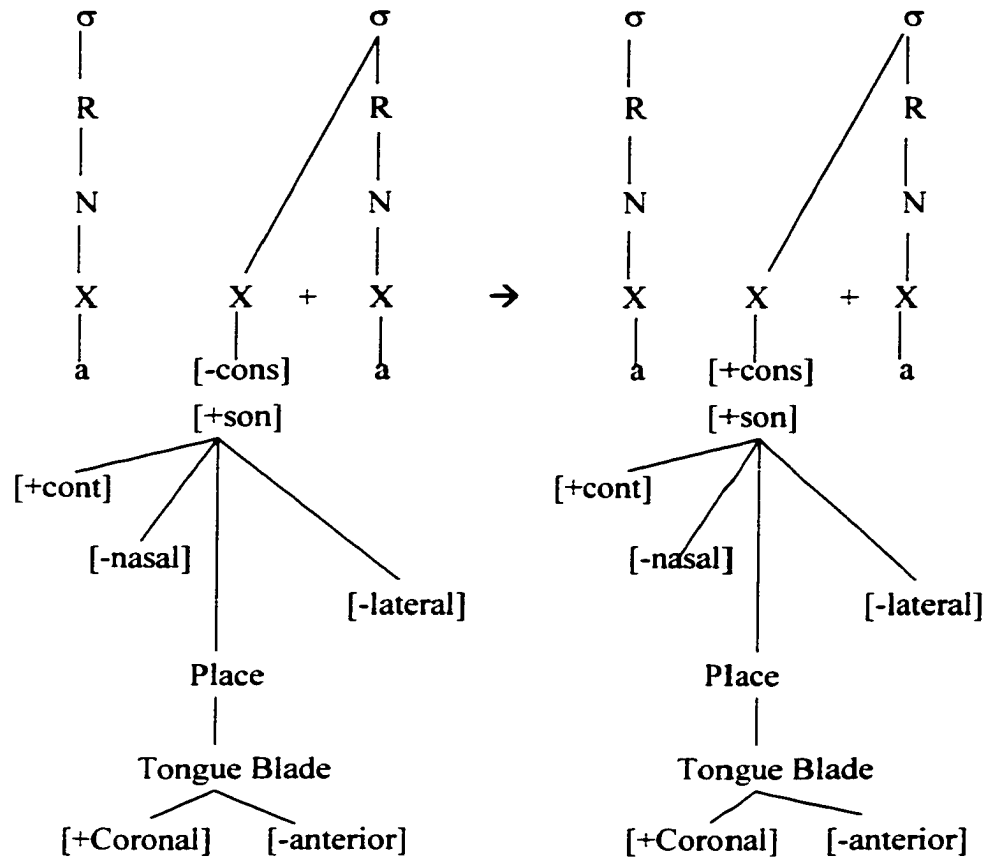
b. *aw → (a)v / __ + V

Stated plainly, (99) indicates that **aw* of Proto Rukai developed into the back mid vowel in Maga word-finally or before a consonant, but into the fricative *v* before a vowel.

Yet the alternations in (98) impose a problem for the historical account. Observe that in (98), along with the *o* ~ *v* alternations of the stem, the Oblique Case suffix also displays allomorphs, *-na* and *-ana*. On the one hand, the choice of *o* ~ *v* appears to be determined by the surface shape of the suffix -- whether it begins with a vowel or a consonant, but on the other hand, the *-na/-ana* variants also depend on which segment appears at the final position of the stem, *o* or *v*. It is difficult to tell, under this condition, which part, the stem or the suffix, should surface first and determine the final form of the output. It thus appears that the diachronic hypothesis is unable to account for the distributions of *o* ~ *v* in this situation.

In contrast, the alternations in (98) can be captured under the synchronic approach advocated in this study. First, recall our discussion of Glide Formation in the above. When suffixed by a low vowel, a stem-final high vowel is realized as a glide and incorporated as the onset of the following nucleus, e.g., *u-brii* vs. *biry-aa*. Following this, if the glide is located at syllable-initial position, it is susceptible to a fortition process which turns a glide into a [+cons] segment of the corresponding place of articulation. The process in (100) illustrates the change of *ay+a* to *ar+a*.

(100) Fortition process of *y* → *r*



This fortition process is also a common practice in the other Rukai dialects (see Li 1974, 1977b): in Mantauran, /i, y/ alternate with retroflex lateral /l̢/; in Tanan and Budai, /y/ alternates with /ð/; and in all the dialects, /w/ alternates with /v/. This process is reported in other Formosan languages as well. For example, in Tsou, /y/ alternates with /z/ (see Tung 1964).

Second, the essence of our proposal, to briefly recap, is that mid vowels of Maga are underlyingly represented as a sequence of low and high vowels, and that they are only created in the modern dialect through coalescence processes. Thus, under the proposed analysis, the underlying representation of *toto* in (98a) is /tautau/.

Combining the above two parts, the derivations of *toto-na* and *totv-a-na* are demonstrated in (102) and (101) respectively.

(101)

	t a u t a u - a n a
Glide Form.	w
Fortition (100)	v
N.I. (74)	o
Syncope	ø
	totv-a-na

(102)

	t a u t a u - a n a
Glide Form.	N/A
N.I. (74)	o o
Syncope	ø
	toto-na

As shown in the above derivations, the two variants are determined by the process of glide formation. In the normal context (101), Glide Formation applies and blocks the Nucleus Incorporation from applying to the sequence of vowels in word-final position,

and we obtain *totv-ana.* On the other hand, (102) appears as an exceptional case, where Glide Formation does not take place. Thus, Nucleus Incorporation is free to apply to both word-medial and -final vowel sequences, generating the result *toto-na.*

Such variations not only occur in morphological contexts, but also within lexical items, e.g., *kamea* is realized as either [kamaya] or [kameya], as demonstrated in (103) and (104) respectively.

(103)

	k a m a i a
Glide Form.	y
N.I. (74)	N/A
	kamaya

(104)

	k a m a i a
Glide Form.	N/A
N.I. (74)	e
Glide Insertion	y
	kameya

It is important to notice that the fortition process depicted in (100) applies only in morphological contexts, as indicated by the morpheme boundary '+'. Since it is not applicable to the glides derived within lexical items, [kamaya] will not proceed to be realized as *[kamara], even though the glide is at syllable-initial position.

2.5.2. Consequences

The alternations of *o* ~ *v* and *e* ~ *r* in the above discussion are significant for the current analysis since, in addition to offering an account for the observed alternations, they give support to the proposal that Nucleus Incorporation is a synchronic process of Maga (see Section 2.3.) As mentioned there (note 39), unlike Vowel Coalescence (71) which is evidenced by morphophonemic alternations, the hypothesis that Nucleus Incorporation exists in the modern dialect is abstract due to the lack of synchronic alternations. However, through Glide Formation and the fortition process, there is evidence that, underlying a surface word-final mid vowel as in *toto*, there exists a sequence of low and high vowels *a+u*, which are coalesced by Nucleus Incorporation. It also confirms, indirectly, the effect of Nucleus Incorporation on word-medial sequences as in /tau-tau/ --> *toto*. It, therefore, gives further support to Nucleus Incorporation as a synchronic operation.

Yet, given that there is no direct evidence in the modern dialect for Nucleus Incorporation as a synchronic process, one may suggest a hybrid analysis of mid vowel formations of Maga. Namely, the development of mid vowels is divided into two stages, and both historical and synchronic derivations play a role. Specifically, the mid vowels

in certain words (e.g. (58)-(59)) were created from Proto Rukai to Maga by Nucleus Incorporation which coalesced two adjacent nuclei, while those in other words (such as (60)) are generated within Maga through Vowel Coalescence following the deletion of the preceding low vowel. This hybrid theory is in fact redundant, since it implies that the mid vowels are underlyingly present in the vocalic system of Maga. Moreover, as demonstrated by the variants of *totv-ana* and *toto-na*, the diachronic account cannot capture the distributions of the vowels and the derived corresponding fricative or liquid. On the other hand, by assuming that both Nucleus Incorporation (74) and Vowel Coalescence (71) are synchronic processes, we not only can account for the alternations like *totvana* vs. *totona* as well as those like *dmele* vs. *i-k-damlii*, but also obtain an additional benefit, that is, a simpler vocalic system which conforms to the other Rukai dialects. Thus, it may be concluded that the synchronic approach proposed in this study is the only plausible hypothesis for the development of mid vowels, rather than merely an alternative account to the diachronic analysis.

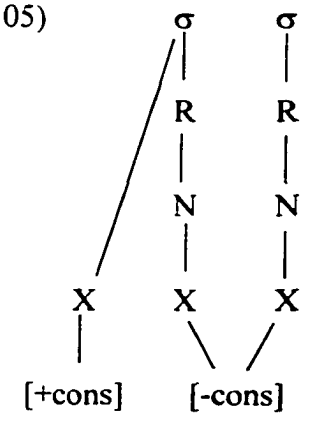
To sum up, this section demonstrateed the process of glide formation on Maga vowel sequences, and the fortition rule which may follow and turn a glide into a liquid or a labial fricative in syllable initial position. An important consequence is that, by invoking these derivations, we are able to resolve the issue of *e* ~ *r* and *o* ~ *v* alternations

without resorting to diachronic distributions as in previous studies. Furthermore, the alternations between the mid vowel and the corresponding liquid or fricative help establish the validity of the synchronic hypothesis that Nucleus Incorporation applies to vowel sequences of *ai* and *au* in the modern dialect.

2.6. Vowel Lengthening

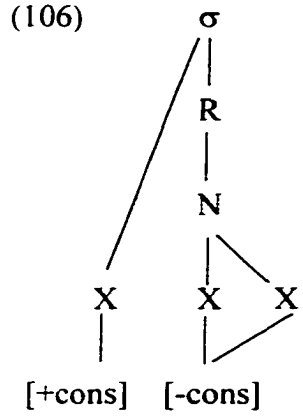
In discussing the vocalic inventory of Maga (Section 2.1.2.), we have decided that length is not a distinctive feature of this language, based largely on the fact that vowels in general show alternations of length depending on their positions in a word, e.g. *ma-lo-loo* vs. *ma-lo-lo-ŋaa*. Furthermore, in spite of instances of long vowels found in lexical items, there is a lack of minimal pairs. Given that the majority of long vowels can be derived, a simpler system, i.e., one set of underlying short vowels, is postulated for Maga. Furthermore, I assume that the word-medial long vowels are marked as idiosyncratic properties of the lexicon, and thus they in fact are differentiated from the long vowels in final position with respect to their representations. Specifically, word-medial long vowels resemble the sequences of different vocoids; they are dominated by two distinct nuclei, as illustrated in (105).

(105)



On the other hand, long vowels found in word-final position are represented as geminates, dominated under one single nucleus, as represented in (106).

(106)



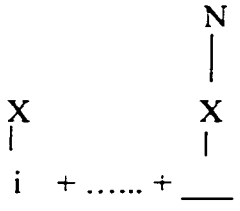
This section is devoted to the latter type, i.e., the long vowels in word-final position.

Concerning the origin of long vowels, Li (1977a) regards lengthening as a compensatory effect, especially in the case of mid vowel derivations: "Long vowels in modern dialects are normally due to ... monophthongization and compensation, e.g. PR **comay* > *cmee* 'bear' (Maga)" (p.25). This assertion, however, fails to explain other final long vowels, such as ***abuu*** 'ash' and ***didaa*** 'earth, which do not appear to derive from monophthongization, nor to result from loss of vowels. Furthermore, this assumption amounts to saying that word-final long vowels, at least of the mid vowels, are inherited from Proto Rukai and underlyingly present in the Maga lexicon. It runs afoul

of the general hypothesis of a single set of short vowels of Maga (see Li 1977a, Zeitoun 1995 and the above).

Under the synchronic hypothesis advocated in the current study, Lengthening is one of the phonological processes of the modern dialect. Specifically, in previous sections, two types of Vowel Lengthening are identified in our analyses: one is determined by phonological conditions, the other by morphological conditions. The former is the trochaic foot created by the word-final vowel for stress purposes, and the latter is demonstrated by the negation process in which the negative morpheme contains a word-final empty slot that is filled in by the stem-final vowel, as repeated in (107).

(107) Negation morpheme



(108) and (109) illustrate these two types of lengthening with examples discussed earlier.

(108) Level 1

Project	* * m a c a
Edge: LLL	(* * m a c a
ICC: R	(* *) m a c a
Head: R	* (* *) m a c a
Syncope	ø

Level 2

Project	* m c a
Edge: RRR	*) m c a
Lengthen	**) m c a
ICC: L	(**) m c a
Head: L	* (**) m c a
Output	mcáa

(109)

Level 1	Project	* * * * * i - s i p u t a - V
	Edge: LLL	(* (* * * * i - s i p u t a - V
	ICC: R	(* (* *) * *) i - s i p u t a - V
	Head: R	* * * (* (* *) * *) i - s i p u t a - V
	Syncope	ø
Level 2	Project	* * * * i - s p u t a - V
	Edge: RRR	* * * *) i - s p u t a - V
	Lengthen	* * * *) i - s p u t a - a
	ICC: L	* * (* *) i - s p u t a - a
	Head: L	* * * (* *) i - s p u t a - a
	Output	i-sputáa

To sum up, by positing two different representations for word-medial and -final long vowels, we are able to maintain the hypothesis that Maga contains only a set of short vowels. Furthermore, in contrast to the historical hypothesis, it is argued in this study that Lengthening is due to synchronic processes whose applications are phonologically or morphologically conditioned.

2.7. Surface syllable structure and Stress

From the discussion in the foregoing sections, it has been shown that the syllable structure we observe in the language is a surface phenomenon, resulting from various phonological processes, such as Syncope and Vowel Lengthening. Internal evidence concerning the alternations between morphologically related forms (see (28)), as well as external evidence such as Li's dialectal comparison (see note 25), all point to the conclusion that the typical syllable of Maga is of (C)V structure.

In this section, I will look into the issues of Maga syllable structure and stress. I will inspect the syllables with respect to their surface shapes by considering factors such as minimal word, syllable type and consonant clusters, that are observed in the words of the language. Then I will discuss some possible hypotheses of how the observed syllable types should be represented.

2.7.1. Minimal word

Most of Maga words are comprised of at least two syllables. Only a small number of words appear as monosyllabic, as in (110), but they are all grammatical particles, such as case and aspect markers as in the sentences (111)-(113) (see Zeitoun 1995: 166-172).

(110) *ki* Nominative (personal)

na Nominative / Oblique (non-personal)

(111) u-kani ɖaɖoŋu na bliɓli

Act/Real-eat monkey banana

'The monkey ate the banana.'

(112) u-lŋee kiki na dani

Act/Real-buy/sell 1Sg.Nom. house

'I bought a house.'

(113) obe ŋkua na pesu ki vakao

Act/Real-give 1SG.OBL. money vakao

'Vakao gave me money.'

2.7.2. Syllable structure

As exemplified by the vowel / zero alternations in Section 2.2., the underlying syllable structure of Maga is (C)V. But in surface forms, the syllable structure is manifested as several types. Let us start by examining the various parts of a word. First, in word-final position, there is always an open syllable (even though in some places an echo vowel is weakened as merely a consonantal release). It follows that a constraint against word-final consonant coda is active in Maga.

In word-initial position, that is, before the first vocoid, there can be Ø, one consonant, or a consonant cluster, which contains at most two consonants, indicated as the underlined portions in the following examples:

(114)	a.	ØV	i.dee	'hundred'	u.bərə	'smoke'
	b.	CV	pi.ki	'navel'	si.to	'peanut'
	c.	CCV	lpa.ne	'corn'	θle.vava	'rainbow'

In word-medial position, namely following the first syllabic vowel and before another vocoid, we find similar sequences:

(115)	a.	ØV	a.i.di	'blood'	a.o.ru	'head'
	b.	CV	ka.me.a	'mango'	i.si.vi	'hair'
	c.	CCV	ca.cna.li	'star'	tka.slu.du	'shrimp'

Certain properties of the surface syllables of Maga can be summarized as below.

(116) Properties of Maga syllables:

i. No word-final coda;

ii. Onset is not obligatory, and hiatus is allowed;

iii. Consonant clusters can appear in word-initial position;

iv. Regardless of its position, a consonant cluster is restricted to two segments.

Inferring from (114) and (116), the word-initial syllables of the surface forms can be regarded as (C)(C)V, i.e., a syllable contains a nuclear vocoid and the preceding consonants, which are optional, and no more than two. The structure of the medial syllable is less clear, however. The problem lies in the division of the consonant cluster located between two vocoids, as in (115c) *cacŋali* and *tkasludu*, since they can be analyzed in two different ways: either tautosyllabic, i.e., both included in the onset of the following vocoid, or heterosyllabic, namely, one as the coda of the preceding vocoid, and the other, the onset of the following vocoid.

Before we investigate further the syllabification of medial consonants, let us take another look at consonant clusters. The attested consonant sequences and the properties observed from them are repeated in tableau (117) and (118) below.

(117) Attested consonant clusters

x = initial-position (and medial)
(x) = medial-position only

C2 / C1	p	b	t	d	ɖ	k	g	m	n	ŋ	c	v	θ	s	l	r
p	(x)	(x)	x	(x)	x	x	x		x	x	x	x	(x)	(x)	x	x
b			x			x			(x)	x	x	x	x	x	x	x
t	x	x	(x)		x	x	x	x	x	x		x		x	x	x
d				(x)		x		x		(x)		x			x	x
ɖ	x				(x)	x	(x)	x		x				x	x	x
k	x	x	x	x	x	(x)	(x)	(x)	x		x	x	x	x	x	x
g		(x)	(x)					x	x	x	x		x	(x)	x	x
m				(x)	(x)	x		(x)	(x)	x	x			x		x
n			(x)					(x)	(x)		(x)	(x)				
ŋ			x	x		(x)			(x)		(x)	(x)			(x)	x
c	x	x				x		x	(x)	x	(x)	x		x	(x)	(x)
v				(x)	x	x	(x)		x	x	(x)		(x)		x	x
θ	x	x	x	x	x	x	x	(x)	x	(x)		x	(x)		x	x
s	x	x	x	x	x	x	x	x	x	(x)	x	x		(x)	x	x
l	x	x			(x)	(x)		x		(x)	x	x		(x)	(x)	x
r	x	(x)	x	(x)	x	x	x	x	x	x	(x)	x	(x)	x	(x)	(x)

(118) i. A cluster contains two and only two consonants;

ii. There are no clusters including two voiceless fricatives, i.e., *θs and *sθ, but combinations of voiceless fricative + voiced fricative, i.e., *sv* and *θv*, are found;

iii. Homorganic sequences of labial and dorsal stops are restricted to word-medial positions;

iv. Geminates only appear in word-medial position, not word-initially.

Most noteworthy in (118) are (iii) and (iv), which depict some disparities between word-initial and -medial clusters. That the homorganic clusters and geminates can appear in one position but not in the other seems to indicate that word-initial and -medial syllables have different structures. More precisely, since the consonants of a homorganic sequence or a geminate can belong to two syllables word-medially, they can appear in this position.

On the other hand, as noted in (i)-(ii) of (118), both word-initial and -medial clusters seem subject to the same phonotactic constraints, especially the common restriction on the number of consonants allowed in a cluster (118i). Given that word-initial cluster allows at most two consonants, one may expect three consonants in a row word-medially

if a coda is possible at a medial position. Since this is not the case, word-medial consonants must be considered parallel to the -initial ones, namely, behaving as an onset constituent to the following nucleus.

However, as pointed out in Section 2.2., the restriction on consonant number in fact follows from the metrical structure. Since Syncope applies to one vowel of a binary feet, and given the assumed CV syllables, it naturally results in a bi-consonant cluster. Hence the restriction on consonant number is not due to any constraint, but is rather a characteristic of the prosodic structure. It therefore does not provide any evidence for the hypothesis that the medial consonants form a constituent in syllabification.

Concluding from the foregoing discussion, it seems more reasonable to hypothesize that Maga has different structures of word-initial and -medial syllables: word-initial is (C)(C)V(C), whereas word-medial is (C)V(C).[45] This issue will be further discussed in Chapter 4, in which the above hypothesis will be strengthened by the comparison of Maga with Tsou.

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[45] Further evidence may be needed to test this assumption. So far, no phonological processes provide such evidence in Maga. Phonetic analysis may not be of help in this respect. As shown in Wright's (1996, 1998) studies on the consonant clusters of Tsou, in a word-medial cluster, the consonant release, which is used to argue for the onset status, may not be as strong as in word-initial position, since the necessary acoustic cue may be provided by the preceding vowel in this position.

2.7.3. Stress

Stress of Maga has been generally described as predictable, always falling on the penult syllable of a word. However, parallel to the discussion above of syllable structure, I will argue that such a description is simply surface true. First let us review some facts of the stress placement in Maga words.

Stress of Maga is non-phonemic, since there is no word differentiating the meaning by the placement of stress. As a regular pattern, stress falls on the penultimate syllable, as in the following examples.

(119)	bcíŋi	'millet'	acíle	'water'
	cacŋáli	'star'	tkaslúḍu	'shrimp'

When suffixation takes place, the stress shifts and remains on the penult vowel of the derived forms.

(120)	bcíŋi	'millet'	i-k-bicŋíi	'not millet'
	acíle	'water'	i-k-acilée	'not water'
	vláki	'child'	vlakí-li	'my child'

However, Li (1975b) notes that in few words, listed in (121), the stress is on the antepenult or the final syllable.

(121)	a.	cíua	'bamboo shoot'
	b.	lóəŋi	'horn'
	c.	krulúəŋi	'sparrow'
	d.	ŋisá	'one'

There again appear to be some divergences in terms of transcription. In my fieldnotes, as well as in the wordlist of Li 1997a, the word for 'horn' is transcribed as [lóŋi] where there is no word-medial vowel sequence. And although the word /ciua/ (121a) has various pronunciations, such as [cyúva], [cíva] or [cíwa], the stress uniformly falls on the penult syllable. And in my notes, 'sparrow' and 'one' are [kruluáŋi] and [ŋisa] respectively. But even if we adopt Li's transcriptions, notice that in most of these exceptions, the stressed syllable comprises a vowel sequence of rising sonority. Recall our discussions in Section 2.1.2.2. of vowel sequences where a high vowel is realized as a glide when preceding a non-high vowel. Thus, we can still maintain the regular stress pattern discussed above.

It seems that the statement that Maga stress falls regularly on penult syllable is true to the extent that it correctly describes the surface phenomenon. However, this

surface-true statement is in fact problematic and may lead to a misconception of stress assignment of Maga. For example, in words like *mcáa* (/maca/) 'face' and *rgírgi* (/rigirigi/) 'mountain', the penult syllables of the surface forms do not match those in the input, since the surface forms are derived by phonological processes such as Syncope and Vowel Lengthening. The derivations of *mcáa* and *rgírgi* are repeated in (122) and (123) respectively.

(122)

Level 1	Project	* * m a c a
	Edge: LLL	(* * m a c a
	ICC: R	(* *) m a c a
	Head: R	* (* *) m a c a
	Syncope	ø
Level 2	Project	* m c a
	Edge: RRR	*) m c a
	Lengthen	* *) m c a
	ICC: L	(* *) m c a
	Head: L	* (* *) m c a
	Output	mcáa

(123)

Level 1	Project	* * * * r i g i r i g i
	Edge: LLL	(* * * * r i g i r i g i
	ICC: R	(* *) * *) r i g i r i g i
	Head: R	* * (* *) * *) r i g i r i g i
	Syncope	ø ø
Level 2	Project	* * r g i r g i
	Edge: RRR	* *) r g i r g i
	ICC: L	(* *) r g i r g i
	Head: L	* (* *) r g i r g i
	Output	rgírgi

Thus, if stress is considered as being placed on the penult syllable of the output forms that are derived by various phonological processes, we are led to postulate an underlying final long vowel in words like *mcaa*, contrary to fact. In contrast, as demonstrated in Section 2.2., the stress assignment of Maga is in fact related to the prosodic structure of the language, and can be correctly predicted under a metrical analysis such as the one implemented in this study.

2.8. Conclusion

It has been demonstrated in this chapter that a synchronic approach offers solutions to many puzzling facts that have resisted a satisfactory explanation. More specifically, all the phonological processes of the language under study can be closely related, and their properties can be accounted for through the interactions among them. For instance, the construction of metrical structure determines the position where Syncope applies, thus resolving the issue of vowel / zero alternations. Syncope gives rise to the formation of mid vowels in word-medial positions (e.g. *dmele*), and the echo vowel insertion. Given the ordering between the Vowel Coalescence and Echo Vowel Insertion, the puzzling fact about the corresponding *e-e* in words like *dmele* is resolved.

It is also shown that many issues that have been resorted to historical explanations -- issues such as the development of mid vowels and the alternations of *e* ~ *r* and *o* ~ *v* -- find proper explanations under the synchronic analyses.

Another significance of the current study is that it reveals the relation between the surface structure and the lexical structure of Maga. In particular, it is shown in our discussion that the structure resulting from phonological processes is merely surface appearance. And only through exploring the lexical level of structure, which sometimes may be abstract, can we discover the true relations among the surface phenomena.

Chapter 3 Morphology

This chapter deals with the morphology of Maga, in particular how phonological alternations interact with morphological processes. There are two basic processes of word formation in Maga, affixation and reduplication, which may function either independently or in conjunction. These two processes will be dealt with in Sections 3.1 and 3.2 respectively. In connection with the major theme of the dissertation, this chapter mainly focuses on the interface between the components of phonology and morphology, that is, the effect on the level of phonology caused by morphological operations. Thus, our discussions in this chapter will concentrate on the morphophonemic alternations triggered by affixation and reduplication, and attempt to provide a general analysis to account for the observed variations.

3.1. Affixation

This section deals with the process of affixation. There are many affixes in Maga, which are used not only to indicate different aspects of verbs (e.g. *nu-* 'future', *maka-* 'completion'), and Case of nouns (e.g. *-na* and *-a*, 'oblique case'), but also to change the grammatical category of a lexical item; a noun can be turned into a verb by affixation, and conversely, a verb may be turned into a noun or a nominalized predicate. A list of

some frequently used affixes are presented with examples in the following section. They are divided into three subgroups: prefixes, suffixes and complex affixes. However, since a thorough description of Maga morphology is not our purpose here, this list is far from being exhaustive (see Zeitoun 1995 and Saillard 1997).

3.1.1. Affixes:

i) Prefixes:

A. *ma-* 'stative verb marker'

Maga, like many other Austronesian languages, divides verbs into two classes, stative and dynamic, depending on the semantic distinction. Stative verbs denote the state or quality of an object. This category is usually marked by the prefix *ma-* or *m-*.

(1)

a.	ma-ɖlamɨ	'like'
b.	ma-θɖɨrɨ	'wither'
c.	ma-ŋriciŋci	'angry'
d.	m-aɖoo	'many'

Although not many examples of this type found, *ma-* sometimes takes a dynamic verb and turns it into a stative verb, as in (2).

(2) **ma-gucu** ' to be sympathetic' cf. **u-gucu** 'to frown'

B. *u-* 'dynamic verb marker'

u- is the marker of dynamic verbs, or active verbs, which are typically associated with actions.

(3)
a.	**u-krubŋu**	'to cover'
b.	**u-bcuku**	'cut open'
c.	**u-cŋulu**	'connect'

u- also functions as a verbalizer when prefixed to a noun stem, indicating an action performed to or with the noun in question, for example,

(4)
a.	**u-ŋcuu**	'to peel'	cf.	**ŋcuu**	'fruit peel'
b.	**u-slatɨ**	'to write, to draw'		**slatɨ**	'paper, letter'
c.	**u-tkisi**	'to light fire'		**tkisi**	'match'
d.	**u-səpɨ**	'sweep'		**səpɨ**	'broom'
e.	**u-bsɨbsɨ**	'wind blow'		**bsɨbsɨ**	'wind'

There are other verbalizing prefixes, including *ki-* (5), *si-* (6), *ti-* (7), and *mu-* (8) which are added to nominal bases to derive verbs.

C. *ki-* 'to harvest'

(5)	a.	ki-sito	cf.	sito	'peanut'
	b.	ki-suroo		suroo	'grass, hay'
	c.	ki-lpilpi		lpilpi	'pea'
	d.	ki-bciŋi		bciŋi	'millet'

D. *si-* 'to put on'

(6)	a.	si-kpiŋi	cf.	kpiŋi	'clothes'
	b.	si-slivi		slivi	'bead'
	c.	si-krikri		krikri	'necklace'

E. *ti-* 'to make, to produce'[1]

(7)	a.	ti-kunu	cf.	kunu	'skirt for female'
	b.	ti-kyari		kyari	'breakfast'
	c.	ti-tpuccani		tpuccani	'rice field'

F. *mu-* 'toward'

(8)	a.	mu-didi	'fall toward the ground'	cf.	didaa	'ground'
	b.	mu-dani	'enter (house)'		dani	'house'

---

[1] Another meaning of *ti-* is 'to draw X' when following the verb *u-slati* 'to draw'.

(i)	u-slati	ti-ci-coo	cf.	icoo	'person'
		ti-spuspuŋu		spuspuŋu	'leaves'
		ti-vŋire		vŋire	'flowers'

Various verbal derivatives are also created by prefixation:

G. *pa-* 'causative'

(9)	a.	pa-kani	'feed'	cf.	u-kanni	'eat'
	b.	pa-θuθu	'breast feed'		θuθu	'breast'
	c.	pa-siri	'marry off'		u-siri	'marry (to a woman)'

H. *ki-* 'passive'

(10)	a.	ki-titi	'bitten'	cf.	u-titi	'bite'
	b.	ki-siri	'marry (to a man)'		u-siri	'marry (to a woman)'
	c.	ki-kratpi	'pinched'		o-kratpi	'pinch'

I. *ua-* [wa] 'undo something'

(11)	a.	ua-kpiŋi	'take off clothes'	cf.	si-kpiŋi	'put on clothes'
	b.	ua-libi	'open (e.g., window)'		u-libi	'close'

J. *n(u)-* 'future'

(12)	a.	nu-kani	'will eat'	cf.	u-kani	'eat'
	b.	nu-bakaa	'will speak'		ma-sobkaa	'speak'

K. *api-* 'want to'

(13)	a.	api-kani (musuu?)	'(Do you) want to eat?'	cf.	u-kanni	'eat'
	b.	api-upu θveke	'want to chew betel nut'		upuu	'chew'

L. *maka-* 'completion'

The prefix *maka-* may apply in conjunction with the suffix *-ŋa(a)* 'already', which serves to intensify the completion aspect, and to discriminate from the combination of *ma-ka-* 'reciprocal + stative verb marker' (see below).

(14)	a.	mak-kani-(ŋaa)	cf.	o-kanni	'eat'
	b.	maka-kami / mak-kami		o-kami	'bake'
	c.	mak-giaa		giaa	'go
	d.	maka-kcya-(ŋaa) / mak-kacya-(ŋaa)		u-kcyaa	'cut with scissors'

M. *ma-* 'reciprocal'

When prefixed to dynamic verbs, *ma-* applies in conjunction with *Ca*-reduplication, for example, ***ma-ka-kpele*** 'embrace each other' (cf. ***o-kpele*** 'embrace'). More discussion and examples of this prefix will be put off until Section 3.2.1.1. regarding *Ca*-reduplication.

N. *ta-* 'let's ...', with a hortative meaning

(15)	a.	ta-gŋugŋu	'let's tap/knock together''	u-gŋugŋu	'tap, knock'
	b.	ta-te-pu-puru	'let's make fires together'	te-puru	'make fire'

O. *ta-* can also be prefixed to a number, indicating the number of the people as a group.

But this type of usage is rather limited.

(16)	a.	ta-ɖusa	'two people'	cf.	ɖusa	'two
	b.	ta-turu	'threesome (of people)'		turu	'three'

P. *la-* 'plural'

The noun stems that can be prefixed by *la-* are restricted to human.

(17)	a.	l-valkɨ	'children'	cf.	vlakɨ	'child'
	b.	l-alii	'female friends'		alii	'female friend'
	c.	la-mama	'elder men'		mamaa	'father or elder man'

ii) Suffixes:

Q. *-a* 'imperative'

(18)	a.	piry-aa	'Choose!'	cf.	u-prii
	b.	sukl-aa	'Pick up!'		u-skulu
	c.	uŋl-aa	'Drink!'		uŋulu
	d.	kwan-aa	'Eat!'		o-kanni

R. *-ŋa(a)* 'already'

(19)	a.	u-kani-ŋaa	'ate already'	cf.	o-kanni	'eat'
	b.	u-gyaa-ŋaa	'went already'		gyaa	'go'

S. *-la(a)* 'still, progressive, again'

(20)	a.	u-kani-laa	'still eating', 'not eat yet'	cf.	o-kanni	'eat'
	b.	sierki-laa	'still sleeping'		sierki	'sleep'

iii) Complex affixes:

Complex affixes refer to the type of affixes that are composed of more than one part. This category includes combinations of two independent affixes, and circumfixes, which are comprised of a prefix and a suffix used conjointly.

T. *l(a)-ma-* : 'reciprocal relationship'

When the prefix *la-* is used together with the prefix *ma-* 'reciprocal', they signify a reciprocal relationship, in particular of kinship terms:

(21)	a.	l-ma-tama	'father and child'	cf.	mamaa	'father'
	b.	l-ma-tina	'mother and child'		ninaa	'mother'
	c.	l-ma-use	'two brothers'			
	d.	l-ma-ususe	'many brothers'			
	e.	l-ma-lii	'two sisters'			
	f.	l-ma-lilii	'many sisters'			

U. *t-... -a(ni)* 'place where X takes place'

(22)	a.	t-ababnav-a	'place to bathe'	cf.	ababnoo	'bathe'
	b.	t-sensenv-aa	'place to wash clothes'		u-snisnoo	'wash clothes'
	c.	t-pa-snisnav-a[2]	'washing machine'			

V. *sa-/a- ...-ani* 'a place full of ...'

The stem attached to this circumfix usually appears in reduplicated forms. I will leave discussion of it till Section 3.2.1.2. on stem reduplication.

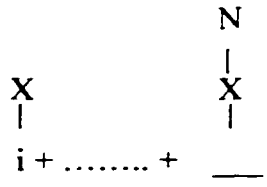
W. *i- ... -V* 'negation'

(23)	a.	i-supii	cf.	u-spii	'dream (v.)'
	b.	i-sukluu		u-skulu	'pick up'
	c.	i-θilbii		u-θlibi	'fly'
	d.	i-liŋliŋii		u-lŋilŋi	'aim'

[2] The modern term for 'washing machine' is created by combining the circumfix *t-... -a(ni)* with the causative prefix *pa-*.

As proposed in Section 2.2., the negation morpheme, represented in (24), is comprised of a negation prefix *i-* and an empty vocalic position that is filled in by the stem-final vowel, which causes the lengthening of the final vowel in negative forms.

(24) Negation morpheme



The derivations of negation are demonstrated in Section 2.3.

3.1.2. Morphophonemic alternations

Morphophonemic alternations arise from the processes of affixation. Derivations of this type include Vowel Lowering, Vowel Coalescence and Vowel Deletion.

3.1.2.1. Vowel Lowering

A process of vowel harmony exists between the prefix and stem vowels. Prefix vowels in morphemes like *u-* 'dynamic verb marker', *ki-* 'to harvest' and *ti-* 'to make', agree with the height of the stem vowel, as shown in (25)-(30).

(25) *u- / o-* 'dynamic verb marker'

a.	o-kami	'bake'	u-cŋulu	'connect'
b.	o-drani	'make a road'	u-ɖmiŋi	'make a wall'
c.	o-lapi	'hunt without dogs'	u-lupu	'hunt with dogs'

(26) *i- / e-* 'negative marker'

a.	e-kaplii	'not hold with hands'	i-tukruu	'not hit with stones'
b.	e-lalpii	'not hunt (without dog)'	i-ulpuu	'not hunt (with dog)'

(27) *si- / se-* 'to wear'

a.	se-kceŋe	'wear pants	si-slivi	'wear beads'
b.	se-kcabu	'wear legging'	si-krikri	'wear necklace'

(28) *ti- / te-* 'to make

a.	te-kceŋe	'make pants'	ti-slivi	'make beads'
b.	te-tovnaa	'build a hut'	ti-kunu	'make skirt'
c.	te-sdamraa	'cook side dish'	ti-krikri	'make necklaces'

(29) *ki-/ke-* 'to harvest'

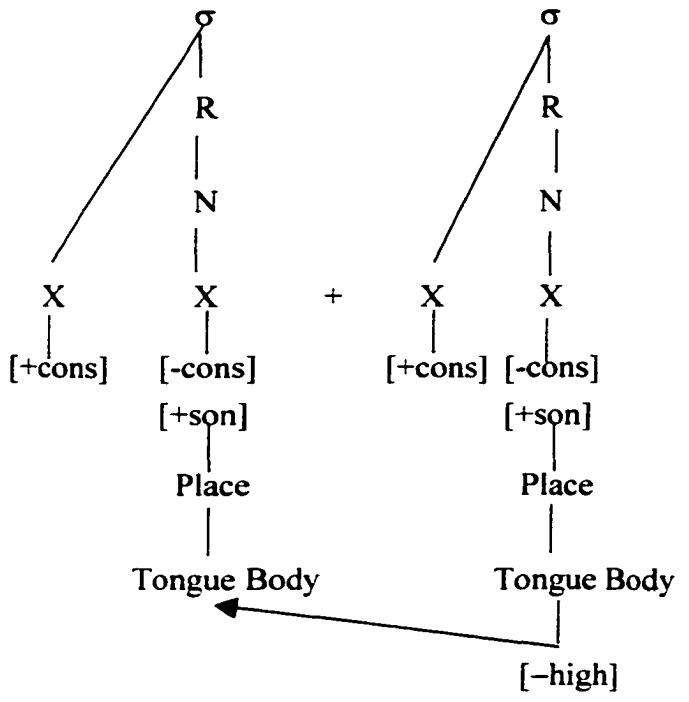
a.	ke-teθo	'harvest turnip'	ki-sito	'harvest peanut'
b.	ke-bləblə	'harvest bamboo shoot'	ki-lpilpi	'harvest peas'

(30) *ki- / ke-* 'passive'

a.	ke-ɖoɖoo	'be awaited'	ki-klukluɖu	'be frightened'
b.	ke-kθabi	'peeled'	ki-titi	'be bitten'

As demonstrated by (29) *ki- / ke-* 'harvest (+noun)' and (30) *ki- / ke-* 'passive (+verb)', the assimilation takes place regardless of the category of the prefix or the stem. The general pattern of the assimilation can be described as follows: when the prefix contains a high vowel, the vowel is lowered if the first vowel of the stem is non-high, as expressed in (31).

(31) Vowel Lowering



Some observations concerning the lowering process should be mentioned. First, the direction of the process is fixed. It always applies from the stem to the prefix vowel, not vice versa. For example, *pa-siri* 'marry off' does not appear as **pa-seri* or **pa-sere*. Second, although the lowering process seems prevalent, there exit exceptions to the pattern described in (31), such as doublets like *u-blee* / *o-blee* 'conceal', where the speakers (my informants) would acknowledge both forms as acceptable. In general,

vowel lowering seems to be determined by formality or style.[3]

3.1.2.2. Vowel Coalescence

Mid vowels are also created in morphological processes. When /a/ and a high vowel /i/ or /u/ come in contact across morpheme boundaries, they may merge and form a mid vowel. In essence, this operation seems identical to the Nucleus Incorporation discussed in Section 2.3 which applies to two adjacent vowel in words like /tautau/ → *toto*. Some examples of this type are shown in (32)-(34).

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[3] There is, however, one pair of words, listed in (i), in which the height variants are relevant to the meaning differentiation.

(i) o-lŋee 'to sell, to buy'
u-lŋee 'to swim'

In their surface forms, the two stems (without the prefix) appear identical (and are pronounced the same), but they are not lexically identical. As revealed by their derivatives in (ii), the two words contain a different vowel in their first syllable. In the positive forms, the only residue reflecting such difference exists in the height of their prefixes. Therefore, the prefix vowels in (i) cannot vary, since they are crucial for the two unrelated words to be distinguished. But when the difference is made explicit, e.g., in their negative derivatives where the first stem vowel emerges, the prefix does not necessarily reflect the difference of these vowels.

(ii)

Positive		Negative	
o-lŋee	'sell / buy'	i-laŋee	'not sell / buy'
u-lŋee	'swim'	i-luŋee	'not swim'

However, I do not have an account for this pair at this point, and therefore leave it to future research.

(32) aɖa + i- 'not' + 'negative marker' → aɖe 'Don't....!'

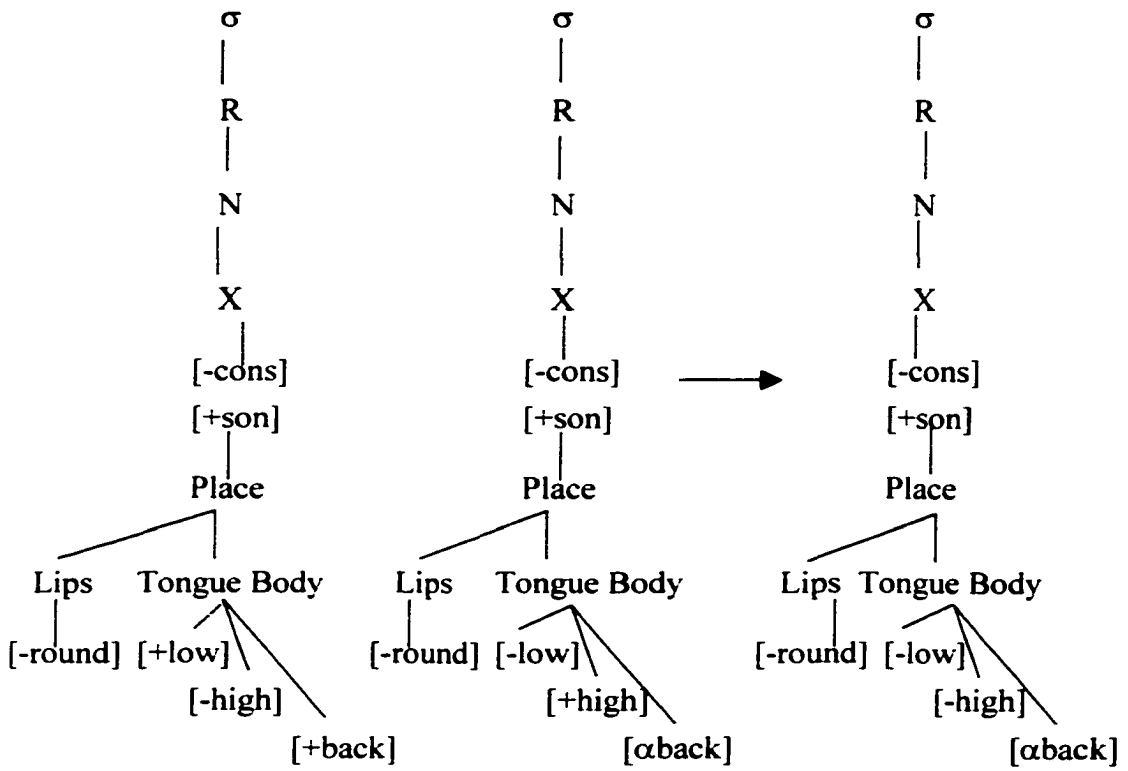
aɖa + i-kanɨɨ	→	aɖe-kanɨɨ	'Don't eat!'
aɖa + i-mumuu aθoo	→	aɖe-mumuu aθoo	'Don't kiss dogs!'
aɖa + i-ptemuduu troka	→	aɖe-ptemuduu troka	'Don't kill chickens!'

(33)	maka + uŋulu	→	mak-oŋlu	'finish drinking'
	maka + inunuu	→	make-nunu-(ŋaa)	'already sat'

(34)	ma-ibubu	→	me-bubu	'mix
	pa-ibubu	→	pe-bubu	'cause to mix'
	pa-innuu	→	pe-nnuu	'cause to sit'

In the above examples, the two vowels across the morpheme boundary appear in the same order as that specified in Nucleus Incorporation (see Section 2.4.), i.e. a low vowel precedes a high vowel (*a*+*i* or *a*+*u*). Therefore, the proposed Nucleus Incorporation, repeated as (35), also applies to the adjacent vowels in morphological conditions.

(35) Nucleus Incorporation



There are other words, such as those listed in (36) and (37), where the mid vowels result from two morphologically adjacent vowels.

(36)	ketee	'to harvest yam'	cf.	/ki + atee/
	keŋatu	'to collect wood'		/ki + aŋatu/
(37)	tepuru	'to make fire'	cf.	/ti + apuru/
	tebee	'to make rice cake'		/ti + abee/
	tevaŋi	'to build a ship'		/ti + avaŋi/

Notice, however, that the vowels involved in the above examples are located in the opposite order than that specified in (35); they appear as *i+a* rather than *a+i*. Recall that the same sequence of vowels within morphemes like ***kcarsia*** [kcarsyaa] do not merge. Rather, the preceding high vowel is realized as a prevocalic glide. Thus, if we consider the pattern in (36)-(37) as an instance of Nucleus Incorporation, the different order of the vowels must be attributed to the fact that the condition for coalescence is less restricted across morphemes than within stems.

Nonetheless, the hypothesis that *i+a* may be merged across morphemes raises another problem with respect to the observations of vowel coalescences. As mentioned, Casali (1996) notes that the coalescence generally takes place in the context of V_1V_2, where V_1 is a low vowel and V_2 is non-low. If the vowels that undergo coalescence may come in a different order, then Casali's generalization does not hold universally.

In the following, I will venture a tentative account which maintains the above generalization, but gives the operations involved in (36) and (37) a different interpretation. However, it should be noted that further investigation is necessary on this issue. The tentative account goes as follows. The mid vowels in (36) and (37) are the result of Vowel Lowering (31) followed by a deletion rule. As illustrated by the derivation of ***ki+atee → ke-tee*** in (38), the height of the prefix vowel is first affected by

the stem vowel through the lowering process presented in (31), then a deletion rule, which is to be discussed later, erases one of the two vowels across a morpheme boundary.

(38) /ki + atee/

assimilation	e
deletion	ø
output	ketee

3.1.2.3. Vowel Deletion

When a stem is suffixed by a vowel-initial morpheme, the stem-final vowel tends to be deleted during the process, as shown by the following examples.

(39)	a.	a-balbal-ani	'a place full of bamboo shoot'	cf.	bləblə
	b.	a-bilbil-ani	'a place full of banana'		blibli
	c.	uŋl-aa	'Drink!'		uŋulu
	d.	tips-aa	'Hit (with open palm)!'		u-tpisi
	e.	gimgim-a	'Hold!'		u-gmigmi

Notice that in the above words, the final vowel of the stem is deleted before the initial vowel of the locative suffix *-ani* and imperative *-a*. Vowel deletion across morpheme boundary differs from the syncope process discussed in the previous chapter, since it is not determined by prosodic structure, but simply applies to the stem-final vowel (or

stem-initial vowel as in the case of (38)) when affixation causes two vowels to be adjacent. As exemplified by the derivations of *tips-aa* in (40a) , vowel deletion of this type must apply before the regular syncope process.

(40) Stem: /-tipisi/

a.

	Input	/utipisi-a/
	Vowel deletion	/utipisi-a/ ø
Level 1	Project	* * * *) utipis-a
	Edge: LLL	(* * * *) utipis-a
	ICC: R	(* *)* *) utipis-a
	Head: R	* * (* *)* *) utipis-a
	Syncope	ø ø
Level 2	Project	* *) tips-a
	Edge: RRR	N/A
	Lengthen	* **) tips-a
	ICC: L	* (**) tips-a
	Head: L	* * (**) tips-a
	Output	tipsáa

b.

	Input	/utipisi-a/
	Vowel deletion	N/A
Level 1	Project	* * * * *) u tipis i-a
	Edge: LLL	(* * * * *) u tipis i-a
	ICC: R	(* *)* *) *) u tipisi-a
	Head: R	* * * (* *) **)*) u tipisi-a
	Syncope	ø ø
Level 2	Project	* * *) tipsi-a
	Edge: RRR	N/A
	Lengthen	* * **) tipsi-a
	ICC: L	* *(**) tipsi-a
	Head: L	* * *(**) tipsi-a
	Output	*tipsiáa

3.1.2.4. Cyclic vs. noncyclic affixes

As demonstrated in Section 2.2., the interaction between the affixes and the stems gives rise to alternations of vowel and zero in related form, as shown in (41).

(41)

	Positive	Negative	
a.	si-ptaa	i-sputaa	'burn'
b.	u-spii	i-supii	'dream (v.)'
c.	u-skulu	i-sukluu	'pick up'
d.	u-θlibi	i-θilbii	'fly'
e.	u-lŋilŋi	i-liŋliŋii	'aim'

This effect is triggered by the negative prefix *i-* in the parsing of prosodic structure. As demonstrated in (42a), in positive forms, the prefix *si-* is excluded from the prosodic parsing of the stem, while in negation (42b), with the addition of the negative prefix *i-*, *si-* is included in the parsing, which consequently causes the alternations of the surface vowels.

(42)

a.

		*		*				
		(	*	(	*	*	)	
		s	i	-	p	u	t	a
Syncope			ø					
Lengthen				a	a			
Output			si-ptaa					

b.

		*			*			*		
	(	*	(	*	*	)	*	*	)	
	i	-	s	i	p	u	t	a	-	V
Syncope				ø						
Lengthen								a	a	
Output				i-sputaa						

The above changes, as argued in Section 2.2, result from the shifting of morpheme boundaries; when the negative prefix *i-* is added to the stem, the boundary between the inner affix and the stem is erased. Following Halle and Vergnaud (1987), I assume that this change is caused by the Stress Erasure Convention which applies at the beginning of each cycle, canceling the metrical structure of the preceding cycle.

However, not every affix induces the same effect. For example, as shown in (43) to (45), *si-* 'to put on', *ki-* 'to harvest', and the dynamic verb marker *u-* do not change the prosodic structure of the stems they attach to.

(43)	a.	ki-suroo	cf.	suroo	'grass, hay'
	b.	ki-lpilpi		lpilpi	'pea'
	c.	ki-bciŋi		bciŋi	'millet'

(44)	a.	si-kpiŋi	cf.	kpiŋi	'clothes'
	b.	si-slivi		slivi	'bead'
	c.	si-krikri		krikri	'necklace'

(45)	a.	u-ŋcuu	'to peel'	cf.	ŋcuu	'fruit peel'
	b.	u-slati	'to write, to draw'		slati	'paper, letter'
	c.	u-tkisi	'to light fire'		tkisi	'match'
	d.	u-bsibsi	'wind blow'		bsibsi	'wind'

On the other hand, *la-* 'plural' in (46), just like the negative prefix *i-* in (41), does

trigger vowel / zero alternations of the stems.

(46)	a.	l-valkɨ	'children'	cf.	vlakɨ	'child'
	b.	l-alii	'female friends'		alii	'female friend'

Similarly, the imperative suffix *-a* seems to cause the same alternations in imperative forms, as shown in (47).

(47)	a.	sukl-aa	'Pick up!'	cf.	u-skulu
	b.	uŋl-aa	'Drink!'		uŋulu
	c.	kwan-aa	'Eat!'		o-kanni
	d.	piri-aa [piryaa]	'Choose!'		u-prii

The changes in (47), I propose, are in fact induced by the presence of the dynamic verb marker in the input, as demonstrated in (48).

(48) a.

	*		*			
	(*	(*	*) *			
	u -	s	u	k	u	l u
Syncope		ø		ø		
Other rules				u		
Output		u-skulu				

b.

	*				*	
	(*	*)	*		*)	
	u	s	u	k	u	l - a
Syncope	ø			ø		
Other rules					a	a
Output	suklaa					

Similar to the derivations in (42), the affixation in (48b) causes changes in the inner

constituency, hence resulting in vowel / zero alternations. In (48b) the dynamic verb marker *u-* is deleted and does not appear in the surface forms. However, the existence of *u-* in the input is evidenced by the imperative forms of a group of words, some of which are listed in (49).

(49)		Imperative			Realis	UR
	a.	boraa	'Give!'	cf.	o-bee	/-bai/
	b.	povara	'Dry under the sun!"		o-pvee	/-pavai/
	c.	koplaa	'Hold (someone)!'		o-kpele	/-kapili/
	d.	volaa	'Separate!'		u-vlaa	/-vala/
	e.	topsa	'Winnow!'		o-tpəsə	/-tapisi/
	f.	kwanaa	'Eat!'		u-kanni	/-kani/

Notice that in the above imperative forms, the stem vowel of the first syllable (/a/) is either rounded or incorporates a prevocalic glide, which displays the properties of the high back vowel *u-*. Therefore, I propose that the dynamic verb marker is present in the input of derivations. Furthermore, as revealed by the rounding of the imperative forms, when *u-* is deleted, it incorporates with the following low vowel in the stem. Nonetheless, I assume that these are special features of imperative forms, since, as argued in Chapter 2, vowels in word-initial position usually are not deleted, and the deleted high vowels normally do not surface.

As a generalization from the above affixes, it appears to be the lexical property of individual affixes whether they participate in the prosodic parsing of the stem. More precisely, these affixes can be classified into two categories, cyclic and noncyclic. With the cyclic affixes, such as the negative morpheme *i-*, the plural *la-*, and the imperative *-a*, the Stress Erasure Convention applies, erasing the prosodic structure of the previous cycle. Thus, vowel / zero alternations are triggered in these affixations, as demonstrated in (42b) and (48b). On the other hand, the noncyclic affixes, such as the dynamic verb marker *u-*, *si-* ' to put on', and *ki-* 'to harvest', maintain the previous prosodic structure of the preceding cycle, hence does not induce the alternations of vowel and zero, as shown in (42a) and (48a).

3.2 Reduplication

Reduplication is a widespread process observed in many Austronesian languages (see Blust 1998), including the Formosan languages, for example, Tsou (see Tung 1964), Thao (see L. Chang 1998), Bunun (see Yeh 2000), among others. Likewise, reduplication plays an important role in Maga morphology by fulfilling various functions.

The first part of this section is a description of the patterns and meanings of two major types of reduplication, *Ca*-reduplication and stem reduplication. The second part is an attempt to account for these patterns in terms of the theoretical framework of Steriade 1988.

3.2.1 Patterns of reduplication

Reduplication in Maga can be divided into two major types, *Ca-* reduplication and stem reduplication.[4] As a general observation, these two types of reduplication differ in the following respects. First, *Ca-* reduplication involves only one consonant of the base plus a fixed vowel, while stem reduplication contains material exclusively from the stem,

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[4] There seems to exist a third type of reduplication in which one vowel of the stem, usually /a/, is lengthened. This phenomenon is also observed in the neighboring Mantauran dialect (Elizabeth Zeitoun, personal communication). But at this point, the occurrence of this type of reduplication is unclear to me due to the lack of sufficient data. More investigation on this topic will be required.

which, in general, includes the first foot of the base. Second, *Ca-* reduplication does not apply by itself, but is always accompanied by other affix(es), whereas the stem reduplication may appear on its own. Third, stem reduplication basically modifies the original word by adding a sense of intensification, but does not alter the meaning or the categorial status of the base, while *Ca-* reduplication not only causes shift of the meaning, but often changes the grammatical categories of the stems as well.

3.2.1.1 *Ca-* reduplication

The survey of Blust 1998 shows that *Ca-* reduplication is found in Austronesian languages distributed over a rather wide geographical area, stretching from Taiwan to Indonesia. Drawing evidence from several languages such as those in (50), Blust further states that *Ca-* reduplication is a morphological process retained from Proto Austronesian (PAN), whose major function is to form instrumental nouns from verbs.

(50)

	'sweep'	'broom'
Saisiyat:	sapoeh	sa-sapoeh
Thao:	c-m-apu	ca-capu
Puyuma:	selap	sa-selap

Ca- reduplication is also a common process in Maga, as will be shown in the following examples. Nonetheless, *Ca-* reduplication in Maga does not seem to comply with Blust's descriptions. For one thing, unlike the above examples where the *Ca-* prefix appears alone with the stem, the reduplicated *Ca-* of Maga always applies in conjunction with other affix(es). Moreover, although *Ca-* reduplication is associated with various meanings in Maga, it does not assume the 'instrumental' function as those in (50).[5] As illustrated by the following instances of *Ca-* reduplication, the meaning of the whole component seems to be determined by the prefixes that occur with *Ca-*.

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[5] The more prevalent pattern of Maga is in fact the opposite: a noun is usually turned into a verb by prefixation, as shown in the following (and other examples in Section 3.1.1.)

(i)	a.	səpi	'broom'	u-səpi	'sweep'
	b.	sbaki	'spear'	o-sbaki	'shoot (with spear)'

(51) *ma - Ca – X (verb)* 'reciprocal'[6]

a.	ma-ba-bee	'give each other'	o-bee	'give'
b.	ma-pa-pnaa	'shoot each other with arrows'	o-pnaa	'shoot (with arrow)'
c.	ma-ca-cŋili	'see / look at each other'	u-cŋili	'see, look at'
d.	ma-ka-kpele	'embrace each other'	o-kpele	'embrace'

(52) *aŋ(i) - Ca – X (verb)* 'reflexive'

a.	aŋ-ka-kiti	'cut oneself'	u-kiti	'cut'
b.	aŋ-ca-cŋili	'look at oneself'	cŋili	'see, look at'

(53) *a - Ca - X (noun)* 'turn into X'

a.	a-θa-θoo	'turn into a dog'	aθoo	'dog'
b.	a-ba-biki	'turn into a pig'	biki	'pig'
c.	a-ta-tgaga	turn into a crow'	tgaga	'crow'
d.	a-va-vŋire	'turn into a flower'	vŋire	'flower'

Generalizing from the above examples, the basic pattern of *Ca-* reduplication of Maga can be schematized as (54).

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[6] When the 'reciprocal' prefix *ma-* occurs with stative verbs, as in (i), *Ca-* reduplication does not apply. In such cases, the stative verb marker *ma-* is realized as the non-finite form *-ka-*.

(i)	a.	ma-ka-ɖlami	'like / love each other'	cf.	ma-ɖlami
	b.	ma-ka-ŋriciŋici	'dislike / hate each other'		ma-ŋriciŋici

(54) X - $\mathbf{C_1a}$ - $C_1(C_2)V$

The reduplicated *Ca*, which constitutes part of the prefix, is formed by a copy of the initial consonant of the base, plus an invariant low vowel *a*. If the base begins with a cluster, as in (51b-d), only the first consonant of the two is reduplicated.

When the base begins with a vowel rather than consonant(s), two possible patterns may occur, as shown by the examples of *a-Ca-X (noun)* 'turn into X' in (55) and (56).

(55)	a.	a-pa-puru	cf.	apuru	'fire'
	b.	a-ḍa-ḍisi		aḍisi	'eagle'
	c.	a-ka-kivi		ikivi	'tail

(56)	a.	a-inee	inee	'sand'
	b.	a-ispi	isipi	'shoulder'
	c.	a-uvci	uvaci	'vein'

These two patterns are equally common. In one case, as in (55), the initial vowel of the stem disappears, while the following consonant is reduplicated. In the other pattern, demonstrated by the words in (56), the stem is kept intact, and *Ca-* reduplication does not appear to apply. These two patterns are not mutually exclusive, though; they may

co-exist as doublets with some words. For example, both forms were provided or judged as acceptable by the informants for words like the following.

(57)		Ca- 1	Ca- 2	Base	Gloss
	a.	a-ba-bərə	a-ubrə	ubərə	'smoke'
	b.	a-sa-sivi	a-isvi	isivi	'hair'

The variations seem to arise from the different ways the stem-initial vowel is analyzed. If the initial vowel is taken to be a prefix to the stem,[7] the pattern in (55) is obtained. That is, the initial vowel is skipped and the reduplication targets the following consonant, which is regarded as the initial consonant of the base. If, on the other hand, the initial vowel is treated as an integral part of the root, the pattern in (56) arises. In this case, the base can be considered as beginning with a null consonant, ø, which is then copied onto the *Ca-* reduplication.[8] Thus, if the initial consonant is allowed to be null, we can maintain the generalized schema in (54) for both consonant- and vowel-initial stems.

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[7] This reanalysis may be due to the fact that some words can occur either with or without the initial *a-*, for example, *a-rima / rima* 'hand', *a-tobŋə / tobŋə* 'cockroach'. For these words, *a-* seems to be a prefix whose function is unclear to me at this point. However, there are also words that cannot exist without the initial *a-*, e.g. *aŋatu* (**ŋatu*) 'tree'.

[8] Assuming that a deletion process erases one of the low vowels across morpheme boundary, see Section 3.1.2.3.

3.2.1.2. Stem Reduplication

Stem reduplication fulfills various functions, depending on the category of the base it applies to. For example, it intensifies the degree of stative verbs, signals the repetitive/continuative aspect in dynamic verbs, and with nouns, it marks plurality. In general it does not change the category, or the meaning of the word.

In the case of true reduplication, the meaning is generally determined by the category of its base. With a dynamic verb, reduplication indicates the iterative, continuative, or distributive aspect of the verb, as in (58). The reduplicated portion is indicated by underline.

(58)

	BASE	REDUP.	GLOSS	CITATION FORM[9]
a.	/-ramɨ/	o-ra-ramɨ	'keep sneezing'	o-ramɨ
b.	/-laubu/	u-lo-lobu	'burn continuously'	u-lobu
c.	/-ŋcuu/	u-ŋcu-ŋcuu	'keep peeling'	u-ŋcuu
d.	/-kadaŋɨ/	o-kda-kdaŋɨ	'kick many times'	o-kdaŋɨ
e.	/-luŋai/	o-lŋe-lŋee	'buy/sell many things'	o-lŋee
f.	/-cibɨnɨ/	u-cbɨ-cbɨnɨ	'with fist many times'	u-cbɨnɨ

When applied to a stative verb, reduplication denotes intensification, as in (59).

[9] Citation forms refer to the forms of root and affix(es).

(59)		BASE	REDUP.	GLOSS	CITATION FORM
	a.	/-ɖalamɨ/	ma-ɖla-ɖlamɨ	'like very much'	ma-ɖlamɨ
	b.	/-ɖu/	ma-ɖu-ɖuu	'well cooked'	ma-ɖuu
	c.	/-kɨciŋɨ/	ma-kɨ-kɨcŋɨ	'very strong'	ma-kɨcŋɨ
	d.	/-θɨmɨ/	ma-θmɨ-θmɨɨ	'very salty'	ma-θmɨɨ
	e.	/-rapa/	ma-rpa-rpaa	'very hot'	ma-rpaa

With a noun base, reduplication marks plurality. It should be noted, however, that this usage is specifically used in conjunction with the circumfix *sa-/a-... -ani*, meaning 'a place that is full of X'.[10] Normally, the plurality of nouns is indicated by a lexical item, *m-aɖoo* 'many' or *tapulu* 'many (human)', as in *m-aɖoo dani* 'many houses' and *tapulu icoo* 'many people'.

(60)		BASE	REDUP.	GLOSS
	a.	/guŋu/	a-gu-guŋ-anɨ	'a place full of ducks/geese'
	b.	/pɨkɨ/	a-pɨ-pɨk-anɨ	'a place full of pigs'
	c.	/vɨŋɨrai/	a-vŋɨ-vŋɨr-anɨ	'a place full of flowers'

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[10] The prefixes *a-* and *sa-* have similar meaning when used in combination with the locative suffix *-ani*, but they seem to denote places of different distance: *a-* indicates a place in or near the house, while *sa-* refers to somewhere outside and farther.

Furthermore, although the reduplication of nouns is restricted to certain usage, it remains productive to the extent that it can apply to most of the nouns. This is in direct contrast to the observation of Saillard (1997: 28), who claims that reduplication of nouns is no longer a productive process since not every noun can be reduplicated.

Inferring from the above examples, we may state a generalized pattern of stem reduplication as the following: the reduplicant corresponds to the first foot of the base. However, there exist irregularities. For instance, the reduplicant in the following words ends with a consonant, rather than a vowel.

(61)

	BASE	REDUP.	CITATION FORM	GLOSS
a.	/icoo/	ic-icoo	icoo	'human being'
b.	/-kani/	mu-kan-kani	mu-kani	'come'
c.	/-mara/	a-mar-mara	a-mara	'take, win'
d.	/-sapara/	pa-s-par-para	pa-spara	'help'
e.	/-vagai/	ma-vag-vage	ma-vage	'divorce'
f.	/-karatipi/	o-k-rat-ratpi	o-kratpi	'kick'
g.	/-baka/	ap-bak-baka	a-pbaka	'speak'
h.	/-kani/	te-kan-kanni	te-kanni	'cook meal'
i.	/-sadamara/	te-s-dam-damraa	te-sdamraa	'cook side dish'

Second, reduplication may result in doublets, that is, two forms may appear as variants, as in the following examples.

(62)

	REDUP.1	REDUP.2	CITATION FORM	GLOSS
a.	a-blibl-ani	a-bilbil-ani	blibli	'banana'
b.	a-lpilp-ani	a-liplip-ani	lpilpi	'beans'
c.	a-rpa-rpad-ani	a-rap-rapd-ani	rpadi	'kidney'
d.	a-lpa-lpany-ani	a-lap-lapny-ani	lpane	'corn
e.	ma-cbe-cbere	ma-cab-cabri	ma-ccabri	'battle'

Third, when the first syllable contains a high vocoid that is realized as a prevocalic glide in the surface forms, the reduplicant copies only this high vowel and the preceding consonant.

(63)		BASE	REDUP.	CITATION FORM	GLOSS
	a.	/-pua/	a-pu-pwaa	a-pwaa	'put, set'
	b.	/-puara/	u-pu-pwara	u-pwara	'catch'
	c.	/-θiabɨ/	u-θi-θyabɨ	u-θyabɨ	'chop'
	d.	/-kucia/	u-k-ci-cyaa	u-kcyaa	'cut (with scissors)'
	e.	/-sŋialɨ/	u-s-ŋi-ŋyalɨ	u-sŋyalɨ	'carry on back/shoulder'

Fourth, in addition to the prefix, the reduplication may skip one consonant or one syllable of the base, as shown in (64).

(64)		BASE	REDUP.	CITATION FORM	GLOSS
	a.	/-pa-vai/	o-p-ve-vee	o-pvee	'dry by the sun'
	b.	/-cɨlɨbɨ/	o-c-lɨ-lɨbɨ	u-clɨbɨ	'close (e.g. box)'
	c.	/bara/	ma-te-bra-braa	ma-te-braa	'be enemy'
	d.	/tɨlɨŋanɨ/	a-ta-tlɨ-tlɨŋnɨ	atatlɨŋnɨ	'hiccup'
	e.	/-rataki/	o-r-ta-takɨ	o-rtakɨ	'break'
	f.	/-salara/	o-s-la-lara	o-slara	'chase'
	g.	/-θɨbɨlai/	u-θ-bɨ-bɨle	u-θbɨle	'float'

3.2.2. An account of reduplication

With the above descriptive background, let us now consider the reduplication

template of Maga. In the following section, adopting the framework laid out in Steriade 1988, I will attempt an account for the facts observed in Maga reduplication.

3.2.2.1 Steriade 1988

The central idea underlying Steriade's analysis of reduplication is that reduplication, whether full or partial, always begins with a full reduplication, which copies both the prosodic structure and the segmental substance of the base. A partial reduplication is the result of subsequent operations, such as syllable markedness, transfer parameters and truncation rules, which eliminate syllables or alter their shape to produce the desired number of segments in the reduplicated portion of the derived morpheme.

Like McCarthy and Prince's (1986) theory, Steriade rejects the concept advocated in the earlier copy-and-association model (e.g., Marantz 1982) in which templates are unconstrained strings of slots with specified syllabicity, Cs and Vs. Unlike McCarthy and Prince, for whom there are only a limited number of allowable templates, Steriade considers no such limitation. Under her view, templates have no independent existence; they are only the intersection of two types of constraints: those on the prosodic weight of the reduplicant and those on the markedness of its syllable structure.

According to Steriade, the copied elements are made to fit the template by an

elimination process which removes from the base a unit disallowed by the template. The elimination process is governed by the general rule that it applies to eliminate a peripheral and continuous string of syllables. The derivation in (65) taken from Steriade 1988 (p. 121) illustrates how this model derives a stem like *ta-stambh* 'prop' of Sanskrit (square brackets indicate the boundaries of the root syllable).

(65)	Input:	s[tambh]
	Copy:	s[tambh]-s[tambh]
	Removal of unlicensed material: monosyllable:	[tambh]-s[tambh]
	light rhyme:	[ta]-s[tambh]
	Output:	ta-stambh-

Notice that in this derivation the copied root *s[tambh]* is reduced to the syllable *ta*, given the conditions that the Sanskrit (perfect) prefix is restricted to a monosyllable and a light rhyme.

3.2.2.2 Maga reduplication

As described above, there are two major patterns of reduplication in Maga, *Ca*-reduplication and stem reduplication. In the former, we need to capture the fact that

there is an invariant segment in the reduplicant, while in the latter, we need to account for several exceptional patterns, as listed in (61)-(64), in addition to the regular one.

Let us begin with the *Ca*-reduplication. As shown by the examples in 3.2.1.1., *Ca*-reduplication of Maga is rather straightforward and almost exceptionless; a simple copying rule of the initial consonant followed by a fixed low vowel exhausts the basic pattern of this type of reduplication.

In Steriade's theory, prespecified reduplication is regarded as the insertion of segments or features into the copied base. Applying this analysis to the *Ca*-reduplication patterns found in Maga, we can derive the examples such as (51c) ***ma-ca-cŋili*** 'look at / see each other' (cf. u-**cŋili** 'look at, see'), as shown in (66).

(66) Input:	/ma-/ + /-**ciŋili**/
Copy:	ma - **ciŋili** - **ciŋili**
Removal of unlicensed material: initial C:	ma - c - **ciŋili**
a-insertion	ma - c a - **ciŋili**
Syncope	ma - ca - **cŋili**
output:	ma-ca-**cŋili**

We now turn to the stem reduplications. Our discussion begins with the examples

in (67).

(67)		BASE	REDUP.	CITATION FORM	GLOSS
	a.	/-pua/	a-pu-pwaa	[a-pwaa]	'put, set'
	b.	/-puara/	u-pu-pwara	[u-pwara]	'catch'
	c.	/-θiabi/	u-θi-θyabi	[u-θyabi]	'chop'
	d.	/-kucia/	u-k-ci-cyaa	[u-kcyaa]	'cut (with scissors)'
	e.	/-sɲiali/	u-s-ɲi-ɲyali	[u-sɲyali]	'carry on back'

As mentioned, the high vowel copied in the reduplicant maintains its nuclear status, rather than being realized as a prevocalic glide as in the citation forms. This practice indicates that reduplication must apply before Glide Formation. Otherwise, as shown in (69), under the adopted theory in which the reduplicant copies both the segments and the syllable structure, we should obtain reduplicated form ***u-pwa-pwara***.

(68)	Input:	/u-/ + /-puara/
	Copy:	u - puara - puara
	Removal of unlicensed material: initial foot:	u - pu - puara
	Glide Formation	u - pu - pwara
	Syncope	N/A
	Output:	u-pu-pwara

(69)	Input:	/u-/ + /-puara/
	Glide Formation	u - pwara - pwara
	Copy:	u - pwara - pwara
	Removal of unlicensed material: initial foot:	u - pwa - pwara
	Syncope	N/A
	Output:	*u-pwa-pwara

The doublets listed in (62), repeated in (70), demonstrate the effect of Syncope in morphologically derived forms.

(70)		REDUP.1	REDUP.2	BASE	GLOSS
	a.	a-rpa-rpad-ani	a-rap-rapd-ani	/rapadi/	'kidney'
	b.	a-lpa-lpany-ani	a-lap-lapny-ani	/lapanai/	'corn'
	c.	ma-cbe-cbere	ma-cab-cabri	/-cabiri/	'battle'

I assume that these variants arise from the different analyses exercised by the speakers with respect to the relation between the prefix /a/ and the stem. More specifically, the reduplication process adopted here applies uniformly to both forms, which results in the same reduplicant, i.e., the first foot of the base, as demonstrated in (71) with the example *rpadi* 'kidney'.

(71) input: a - rapadi - ani

vowel deletion: a - rapad - ani

copy: a- rapad - rapad - ani

removal of unlicensed material: foot: a- rapa - rapad - ani

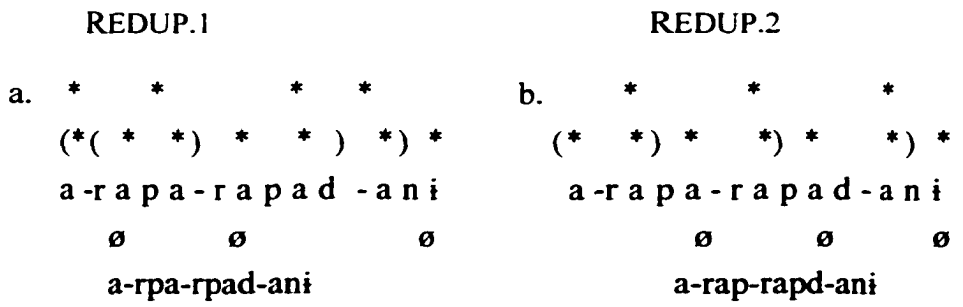
Syncope: a- rpa - rpad - ani

or a- rap - rapd - ani

output: a-rpa-rpad-ani / a-rap-rapd-ani

As indicated in the above derivation, the variations begin from the application of Syncope. To be more precise, as illustrated in (72), they arise from the different metrical structures constructed on these forms. I assume that, as the speakers analyze the forms differently, two possible constituent groupings result. In (72a), the prefix *a-* is divided from the reduplicated stem, thus a parenthesis is inserted between these two units. On the other hand, as in (72b), *a-* is analyzed as part of the stem, and hence is grouped together with the first stem-vowel.

(72)



The derivations in (72) thus indicate that the syncope process must apply after reduplication. Furthermore, by assuming these variations, we can maintain the same reduplication process, yet account for the occurrences of such doublets.

Similar to the doublets, the irregularities found in (61), repeated below, can be accounted for by the interaction of Reduplication and Syncope.

(73)	BASE	REDUP.	CITATION FORM	GLOSS
a.	/icoo/	ic-icoo	icoo	'human being'
b.	/-kani/	mu-kan-kani	mu-kani	'come'
c.	/-mara/	a-mar-mara	a-mara	'take, win'
d.	/-sapara/	pa-s-par-para	pa-spara	'help'
e.	/-vagai/	ma-vag-vage	ma-vage	'divorce'
f.	/-karatipi/	o-k-rat-ratpi	o-kratpi	'kick'
g.	/-baka/	ap-bak-baka	a-pbaka	'speak'
h.	/-kani/	te-kan-kanni	te-kanni	'cook meal'
i.	/-sadamara/	te-s-dam-damraa	te-sdamraa	'cook side dish'

The reduplication copies not only the segments, but also the lexical accent, of these forms. In particular, as in the stem, the first vowel in the reduplicant is prevented from being deleted due to the effect of such accent, as exemplified by the derivation of (73b) *mu-kan-kani* in (75).

(74) Input: /mu-/ + / -kani/

Copy: mu-kani-kani

Removal of unlicensed material: foot: N / A → (75)

Syncope: mu - kan - kani

Output: mu-kan-kani

(75)

Project	* *) * *) *) m u - k a n i k a n i
Edge: LLL	(*(*)* *)*) m u - k a n i k a n i
ICC: R	N/A
Head: R	* * * * (*(*)* *)*) m u - k a n i k a n i
Syncope	ø
Output	mu-kan-kani

However, the forms in (73) remain peculiar in that the reduplicant template in these forms is satisfied by the first two syllables, rather than by the first foot. It is apparent that more investigation is required in this aspect.

3.2.3. Pseudo reduplication forms

There also exist a large group of words in Maga which appear to be reduplicated, some of which are shown in (76). In appearance, these words are comprised of two identical sections (apart from the prefix in some).

(76)

a.	blɨblɨ	'banana'
b.	lpɨlpɨ	'beans'
c.	gθigθi	'board'
d.	ma-susu	'cough'
e.	ma-ɖrɨɖrɨ	'together (to do s.t.)
f.	u-blibli	'pull'
g.	o-nono	'stir

These words are peculiar in that they exist without a base; the single part, such as /ma-su/ and /o-no/, do not exist independently in Maga, and therefore cannot be regarded as bases. Thus, the words in (76), which I will call 'pseudo reduplication' forms, will be treated as simple words, rather than as the result of the reduplication process. They can be considered as lexicalized reduplicated forms, which, as argued by Dempwolff (1934-38), are fossilized forms inherited from Proto Austronesian. Or they can be represented in the lexicon as, for example /bɨlɨ+R/, in which 'R' indicated reduplication.

These words, in particular the nouns of this group, behave differently in reduplication pattern. As shown in (77), it does not produce another reduplicated

syllable in the place where reduplication occurs.

(77)	d.	**a-blɨbl-anɨ**	'a place full of bananas'	**blɨblɨ**	'banana
	e.	**a-lpɨlp-anɨ**	'a place full of beans'	**lpɨlpɨ**	'beans'

3.3. Concluding remarks

This chapter described the two basic morphological processes of Maga, affixation and reduplication, and an account is attempted for the reduplication patterns. As the major theme concerns the phonological aspects of the language, the discussions in this chapter focus on the interaction between the components of phonology and morphology, rather than on a detailed description of the morphological features.

The significance of stem-reduplication with respect to the analyses proposed for Maga phonology is the fact that it confirms the prosodic structure hypothesized in the previous chapter. For example, recall that in deriving the vowel / zero alternations (Section 2.2.) it is suggested that the irregularities of Syncope in words like *biki* arise from an idiosyncrasy of the lexical items. That is, some vowels are prevented from deletion due to the effect of a lexical accent, which is formally represented by a parenthesis projected onto to the metrical grid. Our investigation of reduplication in this chapter in fact confirms this hypothesis, as the assumed underlying accents are reflected in the processes.

Chapter 4 A comparison between Maga and Tsou

This chapter extends the findings of Maga in the previous chapters and compares them with another Formosan language, Tsou (the northern dialect). The comparison concerns mainly the behavior of the consonants of the two languages, especially with respect to the tolerance of homorganic clusters.

One may wonder why Tsou, among all the Formosan languages, is chosen as the language to be compared with Maga. The most obvious reason is that Tsou and Maga (or Rukai in general), display many common features which have led researchers like Tsuchida to conclude that these two languages belong to a subgroup in the Formosan family (see Chapter 1). But what is more intriguing is that some similarities shared by Tsou and Maga are not commonly found in the other Formosan languages. In particular, few Formosan languages contain the wide array of consonant clusters observed in the two languages, clusters which are derived from the syncope process that builds on the prosodic structure.

Second, Tsou is one of the Formosan languages that have been better documented and studied. In addition to the two corpuses compiled by Tung (1964) and Szakos (1994), research on Tsou has been done from various perspectives. For example, Zeitoun (1992, 1995) and M. Chang (1998) explore the syntactic features; Ladefoged

(1994) and Wright (1996) examine the phonetic characteristics; Li (1972), Ho (1976), Tsuchida (1976) and Hsin (2000) discuss various issues in phonology. In other words, we have a better understanding of Tsou in many aspects. In contrast, as mentioned in Chapter 1, the research conducted specifically on Maga is much more scarce and sporadic. It is thus possible that a comparison of Maga with Tsou may shed some light in our understanding of Maga.

In this chapter, I will first provide the background information on Tsou phonology, including its syllable structure and consonant clusters. The similarities and differences between Tsou and Maga in the aspect of the consonant behavior are then summarized. Finally, I will propose some possible hypotheses for the observed differences.

4.1 Background information of Tsou

Tsou is an Austronesian language spoken in Central Taiwan, with approximately 3,000 speakers. There remain three major dialects today: Tapangu, Tfuea and Duhtu. According to Tung (1964), these three dialects differ only in marginal phonological variations; there is no significant grammatical discrepancy observed among them. The phonemic system of Tsou contains six vowels and seventeen consonants, as shown in (1) and (2) respectively, based on Wright and Ladefoged's survey on Tfuea dialect.

(1) Vowels

i	ɨ	u
e		o
	a	

(2) Consonants (Tfuea dialect, from Wright and Ladefoged 1997: 995)[1]

	BILABIAL	LABIO-DENTAL	ALVEOLAR	PALATAL	VELAR	GLOTTAL
PLOSIVE	p		t		k	ʔ
IMPLOSIVE	ɓ		ɗ			
AFFRICATE			c (ts)			
FRICATIVE		f v	s z			h
NASAL	m		n		ŋ	
APPROXIMANT	w			y		

Stress in Tsou is non-phonemic. With only a handful of exceptions, stress almost always falls on the penultimate syllable. Stress also shifts following affixation, as indicated in (3).

(3) a. óko 'child' okó-si 'his child'
b. îmni 'good' imnî-a 'love (inflected form)'

(from Tung 1964: 40)

[1] It should be noted that the status of glides remains a debatable issue in Tsou phonology. Tung (1964) considers them as the variants of mid vowels, whereas Ho (1976) argues that they should be treated as separate phonemes on the ground of stress assignment and having fewer vowel sequences. Our discussion here does not hinge on this issue.

Similar to Maga, Tsou contains a wide array of consonant clusters. Examples of some of the possible sequences are shown in (4)

(4) Consonant clusters (from Tung 1964, Wright 1996)

	INITIAL	GLOSS	MEDIAL	GLOSS
a.	tposɨ	'drawing'	tatposa	'colorful'
b.	pciyɨ	'kidney'	apcia	'one half'
c.	ʔvokɨ	'joint (bones)	aʔvihno	'give advice'
d.	ftuke	'be bent'	aftuŋu	'break (v.)'
e.	hcuyu	'hill'	ahcihci	'dull (tools)'
f.	msipŋi	'to wedge'	amsuhza	'get rid of'

The table in (5) adopted from Wright 1996 further illustrates the combinations of consonant clusters that have been attested in Tsou.[2] The vertical line C1 indicates the first consonant, and the horizontal line C2, the second segment.

[2] The cluster *kŋ* is not included in Wright's chart. This addition is based on the data from Szakos 1994, which indicates that the variations of *-kŋi / -hŋi / -hoŋ-i* are attested in Tsou.

(5) Attested consonant clusters (adapted from Wright 1996: 35)

x = clusters appearing both word-initially and internally

(x) = clusters appearing only word-internally

	C2 →	p	f	v	ɓ	m	t	ɗ	c	s	z	n	k	ŋ	ʔ	h
C1 ↓	p						x	x	x	x	(x)	x	x	x	x	x
	f						x		x	x	x	x	x	x	x	
	v								x		x	(x)	(x)		(x)	x
	ɓ									x	(x)		(x)			
	m	x	x	x	(x)		x	x	x	x	x	x	x	x	x	x
	t	x	x	x	x	x						x	x	x	x	x
	ɗ															
	c	x	x	x	(x)	x					x	x	x	x	x	x
	s	x	x	x	x	x						x	x	x	x	
	z			x											(x)	
	n	(x)	(x)	x	(x)	x	x		x	x	(x)				x	(x)
	k	(x)		x		x		x	(x)	x		x		(x)	(x)	x
	ŋ		x	x		x	x	x	(x)	(x)	(x)	(x)	(x)			x
	ʔ	x	(x)	x		x	x		x	x	(x)	(x)	(x)			(x)
	h	x		x		x	x		x	x	x	x	x	x	x	

Several properties can be observed from (4) and (5). I summarize in (6) the facts of Tsou clusters that have been noticed by previous authors (cf. Tung 1964, Ho 1976, Tsuchida 1976, among others) .

(6) a. Consonant clusters appear in both word-initial and -medial positions, but never word-finally.

b. A cluster is made up of two and only two consonants;

c. A consonant cluster can have almost any consonant as either of its members;

d. Homorganic clusters (including geminates) do not occur (with the exception of clusters involving laryngeals and nasals, and the clusters *cz*).

Most noteworthy in (6) is the lack of homorganic clusters (including geminates), given the fact that a wide array of consonant clusters is allowed in the language.

Regarding the syllable structure of Tsou, previous studies (e.g. Tung 1964, Tsuchida 1976, Ho 1976) argue that Tsou does not allow codas, mainly based on the fact that Tsou words never end in consonants.[3] Furthermore, on the basis that a large number of consonant clusters can appear word-initially, as shown in (4), the Tsou syllable is assumed to be (C)(C)V. Namely, a consonant cluster, regardless of its position within the word, is always syllabified as the onset of the following vowel.

Further evidence supporting the assumed syllable structure is found in the reduplication process. Tung (1964) reports that reduplication of Tsou in general

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[3] Tung (1964) records a list of exceptions, which, he maintains, are shortened or sandi forms.

reduplicates the first syllable of a base, as shown in (7), which expresses the meaning of plural, distributive, or intensifying.[4]

(7)	a.	puzu	'fire'	pu-puzu	'fire place'
	b.	fahe	'fir'	fa-fahe	'fir forest'
	c.	pai	'rice plant'	pa-pai	'rice field'

When the initial syllable includes a cluster, both consonants are copied onto the reduplicated form:

(8)	a.	fsuyu	'bow'	fsu-fsuyu	'hunting bows'
	b.	hcuyu	'hill'	ma-hcu-hcuyu	'hills'

In some cases that express the meaning of a certain 'reciprocal relationship', the first two syllables are separately reduplicated:

---

[4] It is noted in Tung 1964 (p. 170) that there are a very small number of words showing an uncommon pattern of reduplication where CVC is copied rather than just CV. Examples are given below.

(i)	maháho	'to take'	mah-mahá?o	'to take many times/things'
	món?i	'soon'	mon-mon?i	'instantly'

(9)			
	a.	naŋhia	na-na-ŋhi-ŋhia
		'friend, friendly'	'friendly to all'
	b.	na?vama	na-na-?va-?vama
		'father and son'	'father and sons'
	c.	nat?ohaysa	na-na-t?o-t?ohaysa
		'two brothers'	'many brothers'

(Tung 1964: 167, 497)

It is worth noting in the examples of (9) that the reduplicated medial syllable of these words includes both consonants as its onset, while the copied initial syllable contains no coda. However, one might ask whether the words in (9) are comprised of the prefix *na-* and a stem, and hence the reduplicated second syllable is in fact stem-initial, similar to the pattern in (8). There are two reasons to argue that these words are not stems with affixes. First, according to Tung (1964), an affix is never reduplicated in Tsou. Second, there are no words as *ŋhia* or *?vama* found independently in Tsou. Thus, given that the syllabification in (9) is consistent with the assumed structure (C)(C)V, it therefore lends support to the claim that consonant clusters are necessarily in onset, regardless of their position in a word.

Another piece of evidence comes from the phonotactic constraints observed on consonant clusters. As noted in (6), the same combinatory conditions (6c-e) apply to clusters of both positions. These are not expected should a word-internal cluster be

analyzed as coda and onset of different syllables.[5]

4.2. A comparison between the consonant clusters of Maga and Tsou

As described in Section 2.1.1., Maga also contains a large number of consonant clusters. For ease of comparison, the table illustrating the attested consonant clusters of Maga is repeated in (10) below.

[5] This argument is partly supported by the phonetic experiments conducted in Wright 1996. It is shown in Wright 1996 that, at least word-initially, the first segment (stop) of a consonant sequence shows clear release, which is the sign of an onset. Although in word-medial position, the release of the first segment is less clear, given that the acoustic information can be provided by the transition of the preceding vowel.

(10)Attested consonant clusters of Maga:

x = clusters appearing both word-initially and internally

(x) = clusters appearing only word-internally

C2 / C1	p	b	t	d	ɖ	k	g	m	n	ŋ	c	v	θ	s	l	r
p	(x)	(x)	x	(x)	x	x	x		x	x	x	x	(x)	(x)	x	x
b			x			x			(x)	x	x	x	x	x	x	x
t	x	x	(x)		x	x	x	x	x	x		x		x	x	x
d				(x)		x		x		(x)		x			x	x
ɖ	x				(x)	x	(x)	x		x				x	x	x
k	x	x	x	x	x	(x)	(x)	(x)	x		x	x	x	x	x	x
g		(x)	(x)					x	x	x	x		x	(x)	x	x
m				(x)	(x)	x		(x)	(x)	x	x			x		x
n			(x)					(x)	(x)		(x)	(x)				
ŋ			x	x		(x)			(x)		(x)	(x)			(x)	x
c	x	x				x		x	(x)	x	(x)	x		x	(x)	(x)
v				(x)	x	x	(x)		x	x	(x)		(x)		x	x
θ	x	x	x	x	x	x	x	(x)	x	(x)		x	(x)		x	x
s	x	x	x	x	x	x	x	x	x	(x)	x	x		(x)	x	x
l	x	x			(x)	(x)		x		(x)	x	x		(x)	(x)	x
r	x	(x)	x	(x)	x	x	x	x	x	x	(x)	x	(x)	x	(x)	(x)

A comparison of the tables (5) and (10) presents some similarities and differences between the consonant clusters of Tsou and Maga, as listed in (11) and (12) respectively.

(11) Similarities:

a. Consonant clusters appear word-initially and -medially, but not word-finally;

b. A consonant cluster contains at most two consonants;

c. Almost any segment can appear as either the first or the second member in a cluster.

(12) Differences:

a. With few exceptions, homorganic obstruent clusters (including geminates) are disallowed in Tsou, but are allowed in Maga;

b. Homorganic clusters and geminates of Maga are mostly restricted to word-medial positions.

Given the fact that combinations of consonants seem relatively free in both languages (11c), it is interesting that they should behave differently with respect to the homorganic clusters and geminates. In the following, I will entertain some hypotheses to explain the observed differences.

First, the co-occurrence restrictions on homorganic clusters may be regulated by the Obligatory Contour Principle (OCP), which prohibits adjacent identical elements at the

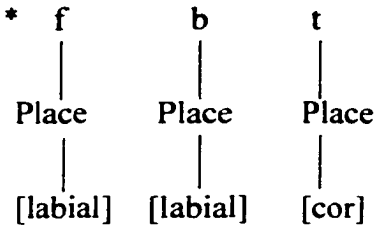
melodic level (see McCarthy 1986, Yip 1988). Since Maga and Tsou differ in their tolerance of homorganic clusters (including geminates), a straightforward account is to assume that the OCP has different effects in these languages. That is, the OCP, as a constraint, is active in Tsou, and thus bans the occurrences of homorganic clusters, whereas in Maga, the OCP is inactive, hence homorganic clusters can appear.

This hypothesis stipulates an answer to our question, but it does not provide any particular insight into the languages under investigation. Thus, I will try to search for other possibilities.

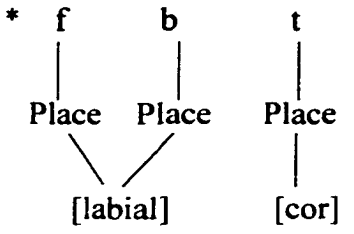
As an alternative, we may assume that the OCP is universally observed, while the differences found between Maga and Tsou can be attributed to other reasons. More specifically, I will develop an analysis similar to the one explored in Hsin 2000 regarding the consonant clusters in Tsou, and extend it to the account of Maga.

McCarthy (1994) observes that in Semitic languages, consonants within a lexical root cannot be homorganic. He proposes that such prohibition is accounted for by two constraints, the OCP and No-Linked-Structure, which disallows representations that contain a single Place node branching to two dominating nodes, as illustrated in (13) with the root * *fbt*.

(13) a. OCP violation



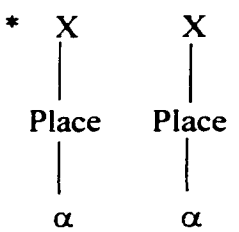
b. No-Linked-Structure



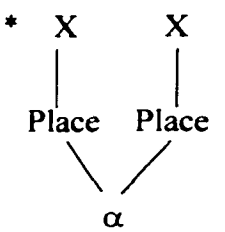
Furthermore, Dell and Elmedlaoui (1996) suggest, based on the observations from homorganic sequences of Imdlawn Tashlhiyt Berber, that release is universally prohibited between two root nodes that are contained in a linked structure.

Following McCarthy (1994) and Dell and Elmedlaoui (1996), Hsin (2000) proposes that the lack of homorganic clusters in Tsou is due to two conflicting requirements imposed on them. On the one hand, release is obligatory for each member of a Tsou consonant cluster, given that they are both the onset of the following vocoid; this is confirmed by the report of Ladefoged (1994) and Wright and Ladefoged (1997) that in a stop-stop cluster of Tsou, both members are fully released. On the other hand, given the OCP, a homorganic sequence is necessarily represented as a linked structure, in which, according to Dell and Elmedlaoui, the release of the first consonant is universally prohibited. This conflict is illustrated in (14) by the two possible representations of a homorganic cluster.

(14) a. OCP violation



b. Release requirement not met



The representation in (14a) allows release to be associated with each member, at the cost of violating the OCP. (14b) complies with the OCP, but the requirement of release is not fulfilled by the consonants in a linked structure. Thus, given the OCP and the release requirement of Tsou consonants, there is no legitimate representation available for homorganic clusters in Tsou, which is consistent with their non-occurrence.

Let us now consider the consonant clusters in Maga. Recall that we assume that the OCP is also observed in Maga, which necessarily causes a homorganic sequence to be represented as a linked structure. A question naturally arises: why is it possible for homorganic clusters to appear in Maga under such circumstances?

I believe that the answer bears on our discussion concerning the surface structure of Maga syllables. As mentioned in Section 2.7., in spite of the fact that a consonant cluster can appear in word-initial position, it is yet uncertain how a word-medial cluster

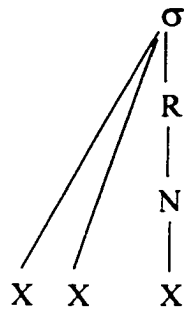
should be syllabified, either as V.CCV or VC.CV. Now, in light of the information from Tsou clusters, let us consider these two possibilities.

First, suppose that the word-medial clusters of Maga behave the same as those of Tsou, i.e., both members are the onset of the following vocoid. Then given the condition that a homorganic cluster must be represented as a linked structure, it is unclear how the requirement of release of the first consonant is obtained in this context.

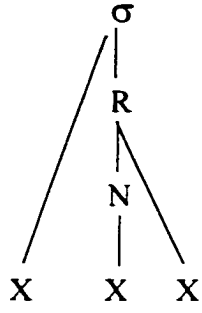
On the other hand, if a word-medial consonant sequence of Maga is analyzed as heterosyllabic, i.e., coda+onset, then release is not required of the first segment, since release is generally not necessary for a segment in coda position. This also explains why in Maga homorganic clusters and geminates are restricted to word-medial positions; in word-initial positions, both consonants necessarily become the onsets, and release would be obligatory.

If the above hypothesis is on the right track, it means that the difference between Maga and Tsou concerning homorganic clusters actually lies in the difference of their surface syllable structure, i.e., (C)(C)V in Tsou, and (C)V(C) in Maga, as represented in (15) and (16) respectively. Specifically, unlike Tsou, Maga has only simple onset and simple coda, which are both optional.

(15) The syllable structure of Tsou



(16) The (medial) syllable structure of Maga

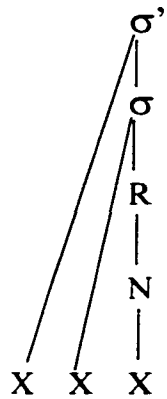


However, given this hypothesis, some facts observed in Maga need to be addressed. First, recall that there is no consonant found in word-final position. It is thus peculiar that coda is allowed word-medially, but not word-finally. Yet, this distinction in fact is not unique to Maga. For instance, it is reported that in Telugu coda is found word-medially, but not in word-final position (see Kaye 1990).

Second, since Maga is like Tsou in having complex onsets in word-initial position, it

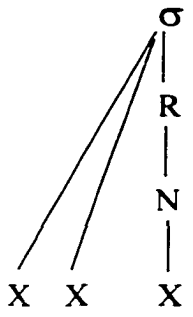
seems necessary to make certain modifications to the syllable structure assumed above. To accommodate this fact, I propose that the word-initial complex onset of Maga is represented as in (17), in which the first consonant is adjoined to the syllable. Since adjunction occurs only at peripheral positions, it has been observed that in languages that allow complex segments, they occur either word-initially or word-finally (see e.g., Steriade 1982 for Greek). Thus, even though the normal syllable of Maga retains the shape of (C)V(C), it, like Tsou, allows a complex onset in the initial syllable.

(17) The initial syllable structure of Maga



On the other hand, the syllable of Tsou is invariantly organized as in (15), repeated in (18), in which both consonants of a cluster are dominated under the syllable node. Hence, complex onsets appear in Tsou both word-initially and -medially.

(18) The syllable structure of Tsou



To summarize, in this chapter we observed the differences between Maga and Tsou concerning the consonant clusters in the two languages. Developing the hypothesis in Hsin 2000 that the lack of homorganic clusters in Tsou results from the OCP and the obligatory onset requirement, I argue that Maga differs from Tsou with respect to surface syllable structure. More specifically, unlike Tsou where the consonants in a cluster are onsets regardless of their position in a word, word-medial clusters of Maga are in fact analyzed as coda and onset. Furthermore, I propose that the initial complex onset of Maga arises from the adjunction of a consonant to the syllable.

Chapter 5 Final remarks

This final chapter illustrates some derivations, which involve interactions of the proposed processes. In particular, to derive the correct output forms in the verbal paradigm in (1), the relevant processes are necessarily ordered as in (2).

(1) Verbal paradigm of Maga:

	Realis	Negative	Intensification	Gloss
a.	u-spii	i-supii	u-spi-spii	'dream'
b.	u-skulu	i-sukluu	u-sku-skulu	'pick up'
c.	o-kpele	e-kaplii	o-kpe-kpele	'hold in arms'
d.	o-pvee	e-pavee	o-p-ve-vee	'dry by the sun'

e.	Imperative	Gloss
	soklaa	'Pick up!'
	koplaa	'Hold!'
	cokpaa	'Patch!'

(2) Prosodification > Vowel Lowering (Lowering) > Glide Formation (G.F.) > Nucleus Incorporation (N.I.) > Reduplication > Syncope > Vowel Coalescence (V.C.) > Echo Vowel Insertion (Echo V) > Vowel Lengthening (Lengthen)

a.	Realis	Negative	Intensification
UR	/u-supi/	/i-u-supi-V/	/u - supi/
	* *	* * *	* *
Prosodification	(* (* *)	(*(* *)* *)	(* (* *)
	u - su p i	i - u s u p i -V	u - su p i
Lowering	---	---	---
Reduplication	---	---	u - supi - supi
N.I.	---	---	---
Syncope	u-s_pi	i-_supi-V	u-s_pi-s_pi
V.C.	---	---	---
Echo V	---	---	---
Lengthen	u-spii	i-supii	u-spi-spii
Output	[uspii]	[isupii]	[uspispii]

b.	Realis	Negative	Intensification
UR	/u-sukulu/	/i-u sukulu -V/	/u-sukulu/
	*	* * *	* *
Prosodification	(* (* *)*	(* (* *) * *) *	(* (* *) *
	u - su ku lu	i - u - su ku lu -V	u - su ku lu
Lowering	---	---	---
Reduplication	---	---	u- suku - sukulu
N.I.	---	---	---
Syncope	u - s_kul_	i-_suk_lu-V	u-s_ku-s_kul_
V.C.	---	---	---
Echo V	u - skulu	---	u-sku-skulu
Lengthen	---	i-sukluu	---
Output	[uskulu]	[isukluu]	[uskuskulu]

c.	Realis	Negative	Intensification
UR	/u-kapili/	/i - u kapili-V/	/u-kapili /
	* *	* *	* * *
Prosodification	(* (* *)*	(* (* *) * *) *	(* (* *)*
	u - ka pi li	i - u ka pi li - V	u - ka pi li
Lowering	o - ka pi li	e - u ka pi li -V	o - ka pi li
Reduplication	---	---	o - kapi - kapili
N.I.	---	---	---
Syncope	o - k_pil_	e - _kap_li-V	o - k_pi-k_pil_
V.C.	o - kpel_	---	o - kpe-kpel_
Echo V	o - kpele	---	u-kpe-kpele
Lengthen	---	e - kaplii	---
Output	[okpele]	[ekaplii]	[okpekpele]

d.	Realis	Negative	Intensification
UR	/u-pa-vai/	/i-u-pavai-V/	/u-pa-vai/
	* *	* *	* *
Prosodification	(* (* *)*	(* (* *) * *) *	(* (* *)*
	u - pa va i	i - u pa va i- V	u - pa va i
Lowering	o - pa va i	---	o - pa va i
Reduplication	---	---	o-pa-vai-vai
N.I.	o - pave	i-pave- V	o-pa-ve-ve
Syncope	o - p_ve	---	o-p_-ve-ve
V.C.	---	---	---
Echo V	---	---	---
Lengthen	o-pvee	i-pavee	o-p-ve-vee
Output	[opvee]	[ipavee]	[opvevee]

[1] Lowering occurs much less frequently in the negative forms of dynamic verbs, and there tend to be variations. I suspect this is influenced by the presence of the dynamic verb marker.

e. IMPERATIVE[2]

UR	/u sukulu - a/	/ukapili - a/	/ucakupu - a/
V.D.	u sukul - a	ukapil - a	ucakup - a
Prosodification	* * / (* *) * *)	* * / (* *) * *)	* * / (* *) * *)
	u s u k u l - a	u k a p i l - a	u c a k u p - a
Lowering	---	o k a p i l - a	o c a k u p - a
N.I.	---	---	---
Syncope	_ s u k _ l - a	_ k a p _ l - a	_ c a k _ p - a
V.C.	sokla	kopl-a	cokp-a
Echo V	---	---	---
Lengthen	sokl-aa	kopl-aa	cokp-aa
Output	[soklaa]	[koplaa]	[cokpaa]

As demonstrated in our discussion, in order to achieve an elegant and adequate analysis of the Maga facts we need to rely on derivations, and in particular on an extrinsic ordering of the different processes characterizing this language.

Throughout this work, I have identified some processes, based on the data available to me, and developed a coherent analysis for them. However, there remain many topics worth exploring in the language, and further research is still required. Thus, it is my

[2] There are variations in imperative forms. The pattern demonstrated in (1) is the more prevalent one.

hope that scholars who are interested can develop more explanatory analyses in various frameworks, hence contributing to our understanding of the language.

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Appendix

a. NATURE		Negation	Reduplication (plural)	turn into ...	note / related form
fire	apúru			a-pa-puru	
ash	abúu	i-abuu		a-ba-buu	
smoke	ubárə	i-ubrəə		a-ubrə / a-ba-bərə	
hole	mobúŋu	i-k-obuŋuu		aŋ-ba-buŋu / a-ma-mobŋu / aŋ-a-obuŋu	
cloud	kúrŋu	i-k-urŋuu		a-ka-kurŋu	u-kurŋu
cloudy	ma-ɖŕimi / ma-ɖiriimi	i-k-ɖirimii / i-k-ɖiriimii [pm]			
sunny, fair (weather)	ma-skúro				
sunny	u-cŋúro	i-cŋuroo			
sky	tbilŋáa	i-k-tabliŋ-nəə		a-ta-tbilŋaa	
earth	dedáa / didáa [pm]				
dirt	adóo	i-k-adoo / i-adoo		a-da-doo	
mud	dukáci / dkáci	i-k-dukcii / dakci-nəə [a little]		a-da-dukaci-	
sand	inée	i-k-inee		aŋ-i-ninee / a-inee	
sun	avée	i-k-avee		a-va-vee	

sunlight	cŋúro				u-cŋulo
moon, month	ɖmári	i-k-ɖamrii		a-ɖa-ɖmari	
star	cacŋáli	i-k-cacaŋlii		a-ca-cŋali	
mountain	rgírgi / rgirgíi	i-k-rigrigii / i-k-rigirgii		a-ra-rgirgi	
mountain top	kunúlu /				nuama kiki kunulu/
	punúla / punuláa				nuama kiki punula
downhill	so-blíŋi				nuama kiki mo-bliŋi / mo-roɖu
uphill	so-róɖu				noroɖu ma kiki
plain, flat land	ɖerɖíki				
river	ɖkárlə	i-k-ɖakralii		a-ɖa-ɖkərlə	
creek	rnáa	i-k-ranaa		a-ra-rnaa	
spring, source	urbúse				
hot spring	ma-rpáa acíle				
pond	bláŋi				
lake	bróo				
deep lake	te-bróo / bróo				tebroo acile [deep water]
sea, ocean	tə-báru / ta-baru				tipiláa [side] rgirgi tipilaa

seashore	tə-báru tipiláa				
waves	tilíve		u-ti-li-live		
waterfall	liθiági [li.θya.gi]				
lightning	kmikmáci	i-kimkimcəə	maḍoo kimkimcə	a-ka-kmikmaci	u-kimkimcə
thunder	ḍiḍri	i-ḍiḍrii		a-ḍa-ḍiḍri	u-ḍiḍri
thunder w/ lightening	cacrə	i-k-cacrəə			u-cacrə / o-cacrə
rainbow	θlcváva	i-k-θelvavaa		a-θa-θlcvava	
rain	u-dáli	i-udalii [did not ...] i-u-də-dlii [never ..]	u-du-dali [continu]	a-udli / a-u-da-dali	sidrəis udali paveanə udali [often rain]
fog	u-rími / u-ri-rími				
typhoon	sbili				u-sbili
storm	takúdli bsibsi				
landslide	mu-cpáa	i-cipaa			
flood	o-ḍgóso	i-ḍagsuu			
earthquake (n)	rnúu				
(v)	u-rnúu / u-rinúu [pm]				
salt	tmúsu	i-k-timsuu		a-ta-tmusu	
iron	aḍími	i-k-aḍmii		a-ḍa-ḍimi	
money	pésu				
gold	taráa /	i-k-taraa			

	tráa				
silver	blávni	i-k-blavnii			
snow	iula [i.ú.la] / iɔ́la [i.ɔ́.la] [yɔ.la] [pm]	i-ulaa [does no] i-ul-ulaa [never]	a-i-ul-ulaa [never]		u-iula
stone (big)	rnîgi	i-k-ringii		a-ra-rnigi	
small stone	rulúlu				
whet stone	csasáa	i-k-casasa-nii			
slate	alápi	i-k-alpee	a-lap-lap-cani	a-la-lapi	
water	acíle	i-k-acilee		a-ca-cile	
wind	bsíbsi	i-k-bisbisii i-bsibsii [windless] i-bsi-bsibsii ["]		a-ba-bsibsi	
windy	u-bsíbsi				
dew	dŋîrti				lamóo [tona]
ghost	plîŋi / piliŋi	i-k-piliŋii		a-pa-pliŋi	
soul	abáki	i-k-abkii		a-ba-baki	
demon (cause sickness)	gráli				
festival	tbisŋáa				
	tsubwaa cubwaa[pm]]				

	makdarúu				
shade	poríri / poriríi	i-k-poririi		a-pa-poriri	
shadow, image	ɨ-rîŋɨ	i-k-ɨrŋɨɨ / i-k-ɨrɨŋɨɨ	u-rɨ-rɨŋɨ	a-ɨrŋɨ	

b. PLANTS		Negation	Plural	turn into...	note/related form
bark (tree)	kcə́kcə	i-kackacii i-p-kacicii [nobark]		a-ka-kcəkcə	
flower	vŋíre	i-k-vaŋiree	a-vŋi-vŋir-ani	a-va-vŋire	
grass	sróo	i-k-suroo	a-sro-sro-vani	a-sa-sroo	
hay, straw, dry hay	ma-pcée sróo				
fruit	səə́rŋi	i-k-sərəŋii			
orange	vnatúku	i-k-vanantukuu			
tangerine	katamnée / mkatamnée [pm]	i-katamnee	a-ka-tam-tamne-ani a-ma-kta-ktam-ani	a-ka-katamnee	
	raráa				
papaya	slitŋu	i-k-siltuŋuu / i-k-saltuŋuu			
guava	lóbsi	i-k-lobisii / i-k-lobsii	a-lo-bi-bs-ani / sa-lobis-ani	a-la-lobsi	
pineapple	pŋúɖlə	i-k-puŋuɖləə / i-k-paŋdaləə	a-p-ŋu-ŋuɖl-ani a-pŋu-pŋuɖl-ani apaŋɖuɖala	apapŋuɖlə	
betel nut	θvéke	i-k-θavkii	a-θva-θvak-ani a-θav-θavk-aa	a-θa-θveke	
banana	blíbli	i-k-bilibilii	a-blibl-ani a-bilbil-aa	a-ba-blibli	

bamboo	blɔ́blɔ	i-k-balibləə	a-balbal-ani	a-ba-bləblɔ	
bamboo shoot	cíua [ʧí.wa] [ʧi.ú.wa]	i-k-ciuaa	a-ci-ciu-ani	a-ca-ciúa	
leaf	spúŋu	i-k-supŋuu	a-spu-spuŋ-ni / a-spus-puŋ-ani	a-sa-spuŋu	
hemp plant	dmélc	i-k-damlii			
hemp fiber	dónnə / də́nnə	i-k-donnəə	sa-do-donn-ani		
rattan	uvée	i-k-uvee	sa-ve-ve-yani		
peanut	síto	i-k-sitoo	a-si-to-to-vani a-si-sito-vani [pm]	a-sa-sito	
beans	lpílpi	i-k-liplipii	a-liplip-ani a-lpilp-ani	a-la-lpilpi	
red bean	dliŋi / tiliáŋi lpílpi				
green bean	tmaθikθíki lpílpi				
pigeon peas	krə́dŋə	i-kirɖaŋəə			
sugar cane	tibúsu / tbúsu	i-k-tibsuu	a-tib-tibs-ani	a-ta-tbusu	
corn	lpáne	i-k-lapanee	a-lpa-lpan-[y]ani a-lap-lapn-[y]ani	a-la-lpane	
millet	bcíŋi	i-k-biciŋii	a-bci-bciŋ-aa sa-bciŋ-ni	ababciŋi	
rice plant	pgée	i-k-pagee	a-pag-pagr-ani sa-pga-pg-ani	a-pa-pgee	
rice (husked)	buə́sə /	i-k-buəsəə	a-bə-bəs-ani	a-ba-buəsə	

	bəəsə/ buasə		sa-buəs-əni		
rice (cooked)	bróo	i-k-buroo		a-ba-broo	mua buro brova [Eat!]
rice plant (young)	stukáa	i-k-satukuu	a-s-tu-tuk-ani		
Long-ang	gŋígŋi	i-giŋgiŋii i-ka-gŋigŋii			
mango	kamayáa [pl] kaméa[ka.me.ya]				
rice (husk of)	icáa / ucáa/ i.u.cáa	i-k-icaa/ i-ka-ucaa	a-ŋi-ica a-ica-ni		
sweet potato	bráθi	i-k-buraθii	a-bra-θ[y]a-θy-ani	a-ba-braθi	
taro	atée	i-k-atee	a-tet-yani	a-ta-tee	
dry taro	kurée				u-kuree
tree, wood	aŋátu	i-k-aŋatuu	a-ŋat-ŋat-wani	a-ŋa-ŋatu	
trees	təbaró-ŋu	i-k-tabroŋuu			
forest	təbaro-ró-ŋu				
grove	təpukuáa [kwá:]	i-k-tapukwa-nii			
trunk, stem	pláka	i-k-palakaa			
branch	ma-t-palkáa/ te-pláka	i-k-tapalkaa			
twig	príŋi	i-k-pirŋii			
root	amíci	i-k-amcii	sa-mi-mic-ni		

			a-mi-mic-yani		
fish poison	ɖpólo, ɖpúlu	i-k-ɖapluu			
seed (of grains)	iápi [i.ya.pi],[ya.pi]	i-k-iapii	a-yap-ani	a-ya-yapi	
seed (kernel of fruit)	cpíi	ikcipii	a-cpi-cp-aa	a-ca-cpii	
cogon grass	bsáŋi	i-k-busŋii			
miscanthus	aúsu [a.u.su]	i-k-ausuu			
vegetable	lcáŋə	i-k-laciŋii	a-ləc-ləcŋ-ani a-lac-lacŋ-aa	a-la-lcəŋə	
turnip	téθo	i-k-teθoo			
yam	tláci	i-k-talacii			
yam, wild sp.	tbáa	i-k-tabaa i-k-tibaa [pm]			
mushroom	tŋarŋarváa	i-k-taŋraŋrav-ni			
gourd	tpúlu tpúllu [pm]	i-k-tapuluu i-k-tapluluu [pm]			
gourd dipper	tpée	i-k-tupee			
sponge gourd	tápli	i-k-tapilii			
pumpkin	tŋótŋə	i-k-taŋitŋəə i-k-taŋtaŋii [pm]			
camphor laurel	ɖkásə	i-k-ɖaksəə			
pine tree	sráŋə / sərŋə [pm]	i-k-sarəŋəə i-k-sərŋəə	a-sar-sarŋ-ani	a-sa-srəŋə	

mulberry	rɖámi	i-k-raɖmii			
Solanum nigrum	amícu	i-k-amcuu			
Melia azedarach	bŋási	i-k-buŋsii i-k-baŋsii			
Asplenium nidus	rukúcu	i-k-rukcuu			
Laportea tree nettle	lpágsi	i-k-lapgasii			
Urtica fissa Pritzel	plíi	i-k-pulii			
Ebulus formosana	lráɖi	i-k-laraɖii			
Lactuca indica	smáa	i-k-simaa			
Alocasia macrorrhiza	bía [bí.a]	i-k-bi.aa			
Alo. cucull	krə́ŋi	i-kəriŋii			
pepper	tváŋlu tŋávlu	i-k-tavŋoloo			
Aralia decaisneana Hance	cŋáa	i-k-ciŋaa			
Liquidambar formosana Hance	ɖoŋrúku	i-k-ɖoŋrukuu			
Alpinia Speciosa Schum.	slée	i-k-salii			

Lagerstroemia S. Koehne	ɖlírsi	i-k-ɖilrsii			
juice, sap	túru	i-k-turuu			
algae	ɖpérŋɔ	i-k-ɖipɔrŋɔɔ i-k-ɖapreŋ-nii			
ginger	lál[i]mi	i-k-lalamii	a-la-lalm-ani sa-lalm-ani	a-la-lalmi	
green onion, garlic	tŋarváa	i-k-taŋrav-nii			
leaves of sweet potato	lmuu	i-k-lumuu			
wood ear	spírŋi	i-k-sapriŋii			

c. ANIMAL		Negation	Plural	Turn into...	Note/Related form
wild animal	u-kluklée u-krukrée	i-kulkulée			
male animal	sovlée ...				
female	abeáa ...				
bear	cmée	i-k-cumee			
anteater	krára	i-kraráa			
deer	slelíbu / slolíbu	i-k-sellibu	a-slelib-wani a-slebub-wani a-slelb-wani	a-sa-slelibu	i/e alternate
deer (male)	sloŋáa				
deer (f.)	θtée				
muntjac	θkíci	i-k-θikcii	a-θki-θkic-ani	a-θa-θkici	
leopard/ tiger	rkúlo	i-k-rikuloo	a-rku-rkul-vani	a-ra-rkulo	
monkey	ɖaɖóŋu	i-k-ɖaɖoŋuu	a-ɖaɖoŋ-ani	a-ɖa-ɖaɖoŋu	maŋiŋiatsi
fox	tkaɖɖimi	ik-takɖiɖimii	a-takɖiɖim-a	a-ta-tkaɖɖimi	
fat meat	smáa	i-k-simaa	a-sim-sim-ani	a-sa-simaa	ma-simaa
fat around the belly	r[u]gúu				
feature/plum e	r[u]múu	i-k-rumuu	a-rmu-rmu-əni sa-rmu-rmu-ani a-rumu-rumu-ani	a-ra-rmuu	

beak	sduŋdúŋcu	i-k-suduŋduŋ[u]cúu			
hair (of animal)	ubáli	i-k-ublii	a-ububl-ani a-ubul-ani		
horn	lóŋu	i-k-loŋuu	a-lo-loŋ-ni a-lu-lwaŋ-ni	a-la-loŋu	
claw	skarócu				
tail	ikívi	i-k-ikivii	a-ki-kv-ani a-ki-kiv-ani a-ki-kikv-ani	a-ka-kivi	
wing	spakipáki	i-k-sapkipkii	sa-pka-pk-ani a-sa-pka-pk-ani		
tooth/fang (of animal)	vlése vlísi [pm]	i-k-valsii	sa-vles-ni	a-va-vlesi	
pig	bíki	i-k-bikii	sa-bi-bik-nə/a	a-ba-biki	
pig (wild)	vlísni vlésni				
goat	ksísi	i-kisisii i-kisii [pm]	sa-ksis-yani a-ki-kis-ani	a-ka-ksisi	u-ŋiŋiatsi
sheep	íu [í.u.]				
cat	ŋíu [ŋyuu]	i-k-ŋiuu	sa-ŋya-vni sa-ŋi-ŋya-vni a-ŋi-ŋia-vani	a-ŋa-ŋiu	u-ŋiŋiu
dog	aθóo	i-k-aθoo	sa-θav-ni sa-θa-θav-ni		o-lili

			sa-θo-θuani		
hunting dog	salúlpu aθóo				
puppy	klúklu aθóo				
cattle	nuóŋi	i-k-nuəŋii	sa-nuəŋ-ni sa-nu-nuəŋni		u-nunuəŋi
horse	rigíi	i-k-rigii			
mouse	tmuθuáa[tmu.θwá:] t-mu-muθwaa	i-k-tamθw-ani	sa-tmuθw-ani a-tam-θu-θw-ana [pm]	a-ta-tmuθwaa	
fieldmouse	k[u]rábo	i-kurabóo			
squirrel	búttu	i-k-buttuu	a-bu-but-ani a-bu-butw-ani sa-bu-but-ni [pm]		
flying squirrel	rváa	ik-raváa			
rabbit, hare	tutúku	i-k-tutukuu	a-tutukw-ani sa-tutuk-ni		
frog	tkorpáŋi	i-k-takropŋaa	sa-tkorpaŋ-ni sa-tkor-tkorpaŋ-ni a-tkor-pa-paŋ-aa[pm]	a-ta-tkorpaŋi	o-tkorparpaŋi
tadpole	tatróra tatróva	i-k-tatroraa			
toad	slabuáa [sla.bwáa]	i-k-salabwaa			
egg	brúccu	i-k-barcucuu	sa-bruccw-ani	a-ba-bruccu	

		i-k-burucucuu	sa-brucucw-ani		
snail	mumuə́li [mwə.li]	i-k-mumuəlii	sa-mumwəl-ni a-mwə-mwəl-aa	a-ma-mumwəli	
snake	s[u]ráa	i-k-suraa	a-su-surani	a-sa-sraa	
One hundred pacer	s[u]ráa pliŋi				
Green snake	θlepacpáce	ik-θalpacpacée			
Turtle shell --	θleɖikɖike	i-k-θalɖikɖikée			
worm	kál[i]ŋə a-kál[i]ŋə akəlŋə	i-ka- kaliŋə́ə	akəlkəlŋani	a-ka-kalŋə akakəlŋə	
earthworm	atórlə [torlə] atórlo	i-k-atraləə	a-tor-torlaa	a-ta-tralə	
caterpillar	kumakumée	i-kamkomee	a-kumkumr-aa sa-kumkum-yani sa-kmakm-ani	a-ka-kmukmee	
(poison sp.)	máma				
bird	rarámi arámi	i-k-raramii i-k-armîi	sa-raram-ani sa-raram-ni	a-rarami	u-ŋiŋiatsi
chicken	tróka	i-k-tarkukaa i-k-torkukaa	a-trokok-ani sa-trok-ani sa-trokok-ani	a-ta-trokuka	o-trokukna
duck, goose	gúŋu	i-k-guŋuu	a-gu-guŋ-ani	a-ga-guŋu	u-gugŋuu

	gŋúu		sa-guŋu-ni		
pigeon (wild)	pnée	i-k-punee	sa-pno-pny-ani sa-pu-pnee	a-pa-pne	u-pnupnee
pigeon	bkóo	i-k-bakoo i-k-bukoo	sa-bko-bkw-ani	a-ba-bkoo	
Eagle	kuóo [ku.ó:]	i-kuoo	a-ku-kw-ani	a-ka-kúo	u-kukúo
owl	tralúpu	i-k-tarlupuu	sa-tralup-ni	a-ta-tralupu	u-tralulupu u-tralupu
crested hawk	aḍ́si	i-k-aḍsii	a-ḍi-ḍisi a-ḍi-ḍis-ani	a-ḍa-ḍisi	
Chinese Goshawk	r[i]kîpi	i-k-rikpii	a-rik-rikp-aa	a-ra-rikipi	
pheasant m.)	tmáθi	i-k-tamθii	a-tam-tamθ-aa	a-ta-tmaθi	
(f.)	tropkáca				
a kind of pheasant	saksáku	i-k-saksakuu	sak-sakw-ani	a-saksaku	
bamboo partridge	tkuə́si	i-k-takwasii i-k-təkwasii	a-tku-tkwas-ani sa-t-ku-kwas-ani	a-ta-tkwasi	
bat	tbáro tbaróo	i-k-tabaroo	a-t-ba-bar-aa a-tba-tbar-ani a-ta-bro-br-ani	a-ta-tbaro	
crow	tgága	i-k-tagagaa	a-t-gag-ani	a-ta-tgaga	
egret (white)	tnakiási [tna.kyá.si] fast [tna.kye.si]	i-k-tanakyasîi			
(black)	tesbóko	i-k-tesbokóo			

swallow	tmarakcáa	i-k-tamarakcaa i-k-tamrakca-nii [p m]	a-tmarakc-ani	a-ta-tmarakcaa a-ta-tmarkaci	
sparrow	kuluəŋə	i-kuluəŋəə	a-ku-lu-luəŋ-əni a-kul-luəŋaa sa-ku-kuluaŋ-ni	a-ka-kuluəŋə	
omen bird	kroŋkóŋa	i-ka-kroŋkoŋani i-kroŋkoŋaa i-korŋakoŋaa [*]	sa-kroŋkoŋ-ni a-kroŋkroŋ-ani	a-ka-kroŋkoŋa	
fish	akáŋi	i-k-akŋəə	a-ka-kaŋ-aa sa-ka-kaŋ-ni	a-ka-kaŋə	
roe	piési /piási [pya]	i-k-pyasii			
type of fish (few bones)	tobúba	i-k-tobubaa			
eel	t[u]láa	i-k-tulaa	a-tu-tl-ani sa-tl-ani sa-tu-tul-ani	a-ta-tlaa	
crab	apási	i-k-apsii	a-pa-ps-ani sa-pa-pas-ni	a-pa-pasi	
shrimp	tkaslúqu	i-k-taksulquu	a-tka-slu-sluq-ni a-tak-sul-sulq-aa	a-ta-tkasluqu	
shell	tbáki	i-k-tabkii i-k-tobkii [pm]	a-tba-tbak-ani	a-ta-tbaki	
shellfish	mumuáli təbáru				
(fish) scales	klipi	i-klipii	a-kli-klip-ani	a-ka-klipi	

		i-kilpii	a-sa-kli-klip-ni		
turtle	cúcku	i-k-cucukuu	a-cuckw-ani a-cu-cuckw-ani	a-ca-cucku	
turtle shell	kráθi	i-karθii			
tortoise	klúbŋu	i-kulbuŋuu	a-klu-klubw-ani	a-ka-klubŋu	
butterfly	svoŋvóŋo	i-k-savŋovŋoo	a-savoŋvŋ-aa sa-svoŋvoŋ-ni sa-svoŋvoŋ-aa	a-sa-svoŋvoŋo	
wasp	tʤíulu [tʤyu.lu]	i-k-tiʤyuluu i-k-taʤyuluu	a-tʤyu-tʤyul-aa	a-ta-tʤyulu	
honeybee	vlóo	i-k-valuu i-k-valoo	a-vlo-vlw-ani	a-va-vloo	
honeycomb	daná-ni vlóo				
dragonfly	tramóro tramwóro	i-k-tarmworoo	a-ta-tramwor-aa sa-tarmwor-ani	a-ta-tramworo	
fly (small)	arígli	i-k-argilii	a-ri-rigl-aa	ararigli	
fly (big)	aŋáro	i-k-aŋaroo i-k-aŋroo	a-ŋar-ŋar-aa	a-ŋa-ŋaro	
maggot	aŋíθo	i-k-aŋiθoo			
mosquito	tatmólo tatmuolo	i-k-tatmoloo i-k-tatamluu i-k-tatamloo	a-tam-taml-aa sa-tatmol-ani a-tam-tammol-aa	a-tatmolo	
louse (body)	gácu	i-ka-gacuu i-k-gacuu	sa-ga-gacw-ani	a-ga-gacu	

louse (head)	kcúu	i-kucuu	sa-kucu-ani sa-kcu-kcu-ani	a-ka-kcuu	
nit	risísi	i-k-risisii	sa-rsis-ani sa-rsirs-ani sa-rsirsy-ani	a-ra-rsisi	
flea	topθáki tapθáki	i-k-topθakii i-k-tapiθkii	a-to-topθaka a-ta-pθi-pθak-ni	a-ta-topθaki	
bedbug	ŋtíŋti	i-k-ŋitŋitii			
tick	agípi	i-k-agpii			
firefly	tlapúi [tla.pwí:]	i-k-talpuii	a-tal-pu-pui-ani	a-ta-tlapui	
cicada	r[ə]sór[ə]sə	i-k-rasrasəə	a-rasrasa	a-ra-rsərsə	
centipede	gromási	i-k-gormasii	a-gromas-ani a-gro-gro-mas-aa	a-ga-gromasi	
(house) lizard	píki	i-k-pikii	a-pi-pik-ani	a-pa-piki	
cockroach	tóbŋə atóbŋə	i-k-tabŋəə	a-tab-tabŋ-aa a-ta-tabŋ-ani	a-ta-tabŋə	
ant	abúŋu	i-k-abŋuu	a-bu-buŋ-ni	a-ba-buŋu	
big ant	arúpsə	i-k-arupsii i-k-arpasii	a-ru-pu-ps-ani a-ru-ru-ps-ani	a-ra-rupsi	
termite	θlemḍóo	ik-θalmaḍúu			
leech (mountain)	l[ə]mátki	i-k-lamtakii	a-la-lma-lmatk-ani a-lam-tak-tak-ni	a-la-lmatki	
leech	vlíi	i-k-vulii i-k-vilii	a-vli-vli-ani a-vil-vily-aa [pm]	a-va-vlii	

bird nest	tliskuáa [tli.skwá:]	i-k-talsukwaa i-k-talsuk-nii [pm]	a-tli-sku-skw-ani sa-tal-su-skw-ani	a-ta-tliskwaa	
spider	tkarváθi	i-k-takravθii	a-tkar-va-vaθ-ani a-tka-va-vθ-aa	a-ta-tkarvaθi	
lion (?)	kukuŋáni	i-kukuŋanii			
kind of animal	rukóo	i-k-rukoo			

d. HUMAN BODY		Negation	Plural	Turn into	Note/related form
arm	tbalŋáni	i-k-tablaŋnii		a-ta-tbalŋai	
lower arm (wrist)	tvatríka	i-k-tavrikaa			
hand	airiríma / ríma	i-k-arimaa		a-ra-rima	
shoulder	isípi	i-k-espii i-k-ispii		a-ispi	
make a fist	u-gmígmi	i-gmigmi			
open fist	o-pcípci				
palm	kpári	i-kaprii			
thumb (?)	tmatmaa tmáa	i-k-tatamaa i-k-tamtamaa i-k-tamaa			
index finger	θtəθpi	i-k-θatiθpii			
middle finger	glovgáva				
ring finger	l[o]módo	i-k-lamduu			
small finger	vlivláa	i-ka-vlivlaa			
finger, toe	gloogáva glovgáva	i-ka-glogavaa			
nail	klúka	i-k-lukaa	a-klu-klukw-ani	a-ka-kluka	
head	a-óru / óru	i-k-aoruu i-k-oruu	a-oru-rwani		

face	tmacáa	i-k-tamca-ni	a-tma-tmac-ani sa-t-ma-mac-ani	a-ta-tmacaa	
cheek	cmíi	i-k-cimii			
eye	mcáa	i-k-macaa	a-mca-mc-ani sa-ma-mca-mc-aa	a-ma-mcaa	
eyeball	sbúku	i-k-subkuu			
eyebrow	rmuərmwáa muromwáa	i-k-rumwərmwaa			
eyelash	sképθi	i-ka-skepθəə			
ear	cŋíra [ts] / [tʃ]	i-k-caŋiraa	a-cŋi-cŋir-ani sa-cŋi-ŋir-ani	a-ca-cŋira	
earlobe	tbalcáa	i-k-tablac-nii			
mouth	ŋdívi	i-k-ŋidvii	a-ŋi-dvi-dv-aa sa-ŋ-di-divi	a-ŋa-ŋdivi	
lip	smítu	i-k-samituu i-k-simituu i-k-simtuu		a-sa-smitu	
upper lip	tílbi smítu				
lower lip	bualáa smítu				
tongue	r[i]dámi	i-k-ridmii	a-ri-ridm-aa sa-r-di-dam-ni	a-ra-rdami	
tooth	vlése	i-k-valsii	sa-vles-ani sa-vles-ni [different meaning]	a-va-vlese	

			sa-vlc-vles-ani sa-vle-vles-ni		
gums	tvalvalsáa				
palate	krîmi	i-karmii			
hair	isívi	i-k-esivii	a-si-siv-ani a-si-siv-ni sa-siv-ni- [meaning differs]	a-sa-sivi	
body hair	ubáli	i-k-ublii	a-u-bu-bl-ani	a-ubli	
pubic hair	ubísi	i-k-ubsii	a-u-bi-bs-ani	a-ubsi	
gray hair	uḍási	i-k-oḍsii i-k-uḍsii 'not ...' i-ka-uḍsii 'no ...' i-uḍsii 'not have ..'	a-u-ḍu-ḍs-ani		
bald	ma-kuníri	i-kunrii			
beard	msámsi	i-k-masmesee i-k-mesmesee[pm]	sa-msems-ani	a-ma-msamsi	
chin	θrîmi	i-k-θarmii	sa-θri-θrim-ni	a-θa-θrimi	
joint	θgóo				
neck	irîi	i-ki-irii i-k-irii	a-iri-r-ani	a-iri	
nape of neck	uḍúnu	i-k-oḍnuu			
throat	tluruáa tluráa [pm]	i-k-tal[u]raa i-k-tuluraa	a-tlu-tlur-ani	a-ta-tlura	

nose	tŋuruáa tŋuráa	i-k-taŋrwani i-k-tuŋruani	a-tŋu-tŋurw-ani sa-tŋu-ŋu-rw-ani	a-ta-tŋurwaa	
nostril	tŋuruáa mobúŋu				
tears	rsîi	i-k-risii	a-ra-rsirs-ani sa-rsis-ani	a-ra-risii	
body, flesh	buáti buáti	i-k-bwətii			
large physique	apkaɖrádo	i-p-kerɖarɖoo			
breast	θúθu	i-k-θuθuu	a-θa-θuθw-ani sa-θuθw-ani	a-θa-θuθu	
nipple	tmúu	i-k-tumuu			
chest	tkúsu	i-k-tukusuu i-k-tuksuu	a-tku-tkus-ani	a-ta-tkusu	
waist	cikukunáa	i-k-cikunaa			
lower back	apíɖi	i-k-apiɖii			
ribs	bkuósi [bkwə.si]	i-k-bakwəsii i-k-bukwasii	a-bku-bkwas-ani	a-ba-bkwəsi	
navel	píki	i-k-pikii	a-pi-pi-k-ani sa-pi-pik-ni	a-pa-piki	
back	koɖŋáa	i-koɖŋaa	a-ko-koɖŋaa	a-ka-koɖŋa	
bone	pɖóro	i-k-paɖroo i-k-paɖruu	a-pɖo-pɖor-naa a-paɖ-paɖ-raa	a-pa-pɖoro	
guts (animal)	búru	i-k-buruu	a-bu-burani	a-ba-buru	

spine	bkúlu				
belly	bráŋi	i-k-barŋii	sa-bra-braŋ-ini	a-ba-braŋi	
stomach	bcúka	i-k-bucukaa	a-bcu-bcuk-ani	a-ba-bcuka	
liver	srúgu	i-k-surguu	a-sru-srugw-ani asrusrug-ani	a-sa-srugu	
lung	abáa	i-k-abaa	a-ba-bani	a-ba-baa	
kidney	r[i]pádi	i-k-ripdii	a-rap-rapd-ani a-rpa-rpad-ani	a-ra-rpadi	
gall	págu	i-k-paguu	a-pa-pagw-ani	a-pa-pagu	
heart (organ)	atúklu	i-k-atukluu	a-tuk-tukl-ani	a-ta-tuklu	margii atuklu-su
heart, mind	kḍiḍimi				margii totto kḍiḍimi
buttocks	lóro	i-k-loroo			
leg	kúku	i-kukuu	a-ku-kukw-ani	a-ka-kuku	
thigh	ḍrosáa	i-k-ḍorosaa	a-ḍros-ani	a-ḍa-ḍrosa	
calf of leg	tbosbósa	i-k-tabsobsaa	sa-tbosbos-ani	a-ta-tbosbosa	
foot	skapŋáa				
ankle	mcáa kúku				
heel	tgúḍu	i-k-tuguḍuu			
sole	kpári	i-karpii			
footprint	kpáŋi	i-kapŋii			
blood	aíḍi	i-k-aiḍii	sa-iḍi-ani	a-a-iḍi	a-bo-iḍi
blood (much)	lóbu ablóbu	i-k-lobuu	a-bo-lobu		
elbow, knee	pkúu	i-k-pukuu	a-puk-pukw-aa	a-pa-pkuu	

excrement	ckée	i-k-cakii	a-cak-cakia	a-ca-ckee	
skin	pcíŋi	i-k-picŋii	a-pci-pciŋ-ni	a-pa-pciŋi	
vein	uváci	i-k-uvacii	sa-uvac-ni	a-uvci	
pus	nána	i-k-nanaa	sa-nan-ani	a-na-nana a-nana	
penis	itíli	i-k-itlii i-k-etlii	sa-ti-tl-ani sa-ti-til-ani	a-itli	
testicles	krúɖlu	i-kurɖuluu i-karɖuluu	a-kru-kruɖlw-ani	a-ka-kruɖlu	
scrotum	bcúu	i-k-bucuu	sa-bucw-ani	a-ba-bcuu	
vulva	ŋtáli	i-k-ŋatlii	sa-ŋta-ŋtal-ni	a-ŋa-ŋtali	
female organ	θelpúgu	i-k-θelpuguu			
urine	isíi	i-k-isii	sa-si-sy-ani	a-sa-sisi	
saliva	ŋrée	i-k-ŋaree	sa-ŋre-ŋry-ani a-ŋa-ŋary-ani	a-ŋa-ŋree	
brains, marrow	ulúsu	i-k-ulsuu i-k-olsuu	sa-uls-ani	a-ulsu a-la-ulsu	
sweat	aribuáa [a.ri.bwá:]	i-k-arbw-ani	sa-ribw-aa sa-aribw-aa sa-ribwa-ribw-aa	a-ra-ribwaa	
goiter	ma-círi	i-k-cirii	a-sa-ci-cir-ani sa-cir-ani sa-macr-ani	acaciri	
fart	píθi	i-ki-pθii	sa-pi-piθ-ani	a-upθi	u-piθi

					i-k-o-pθii sa-u-pi-piθ-ani
tendon	bravci	i-k-baravcii i-k-barvacii	a-bra-bravc-ani	a-babraci	
trachea	gága	i-k-gagaa i-ka-gagaa	sa-gag-ani	a-ga-gaga	
pig's intestine	gígi				

e. PEOPLE		Negation	Plural	turn into...	Note/related form
man	sovlée				
woman	abeáa abayáa		bebee		
spouse	pláŋi	i-k-palŋɔɔ			
	asíra asira-li usiri-ŋkwaa				
family	ska-dáni				
child	vláki		l-valkə		
infant	rulée				
father (or elder man)	mamáa		la máma		
dad	maóo				
father and child	lə-ma-táma		lə-ma-tam-táma		
mother (or elder woman)	nináa		le nína		
mom	naóo				
mother and child	lə-ma-tína		lə-ma-ti-tína tin-tina		
grandfather	mumúu		lo múmu		
grandmother	kakróŋo		lo koká rŋu		
grandma	kroŋóo				

grandchild	agáni				
grandma and grandchild	lə-ma-kárŋu				
grandpa and grandchild	lə-ma-túmu				
older sibling	kakáa				
younger sibling	glíi				
brothers	lə-ma-úse [lə.ma.ú.se]		lə-ma-us-úse [lə.ma.u.sú.se]		
sisters	lə-ma-líi		lə-ma-li-líi		
brothers and sisters	lə-ma-tak-tá ka				
brother's wife	asiráa[-ni glíi / kakáa]				
sister's husband	usíri [gilyáa / kakáa]				
spouse of sibling	plaŋi [-ni glíi / kakáa]				
ancestor (male)	múu múu				
ancestors (male)	lo múu múu				
ancestor (female)	kakrooŋóo				
ancestors (female)	lə kakarŋóo lə kokarŋúu				
human, person	icóo				
aborigine	kcarsiáa [sy				

	áa]				
non-aborigine	pkisiáa [syá a]				
people from outside	ske-cavni				
from outside	ska-bráni				
Hakka Chinese	pútu				
Japanese	kómu				
old (person)	ma-rɖáɲi				
many old people	ma-rúɖɲi ma-rrúɖɲi				
adult, with children (m)	tmatmáa				
adult, with children (f)	titnáa				
adult (30-40) (m)	pat-káni				
(f)	pat-náni				
young adult (about 20)(m)	θpári θpaári (PL)				
(f.)	brobróo				
teenager	bavaválə				
enemy	bráa				
friend (m)	ta-lée (PL) ta-líi				
(f)	aliúu [a.lyú:				

	]				
my friend (m)	sé-li (sg.) rusé-li (pl.)				
my friend (f)	alí-li (sg.) l-alí-li (pl.)				
chief	tlalée	i-k-talalee			
the common people	kakóru kakkoru(PL)	i-kakoruu			
doctor	busbubuáa busbuáa [busbu.áa] busbuáa [busbwá:]				
a fool (real)	pamláni	i-k-milanii inikimilanii (PL)			
pretended fool	pamlimláni				
neighbor	spegísi	i-k-sapegsii			
teacher	u-brubru suláti				
widow, widower	ababrwáa	i-baburaa			
policeman	tecíni [tʃi]	i-k-tecinii			

f. CULTURAL ITEMS		Negation	Plural	turn into	Note/related form
arrow	rvéle	i-k-ravlee	sa-r-vel-vel-ni	a-ra-rvele	
bow	bsúu	i-k-busuu	sa-bsu-bsw-ani a-bu-bus-ni	a-ba-bsuu	
boat/canoe	aváŋi	i-k-avŋii	sa-va-vaŋni	a-va-vaŋi	
bridge	tlódǫ	i-k-talquu	sa-tloǫ-ni	a-ta-tloǫ	o-tloǫ
ladder	sorkakári tlódǫ				
a well	o-kǫóro	i-kardrúu			
dike	u-líŋi	i-il[i]ŋíi i-liŋíi			
charcoal	rŋólə	i-k-raŋii	sa-rŋə-rŋəl-ni	a-ra-rŋələ	
matches	tkísi	i-k-tiksii			
torch	sipdíŋi	i-k-spidŋii			
ember	ǫróo	i-k-ǫoroo i-k-ǫaruu			
clothing	kpíŋi	i-kupŋii i-kipŋii [pm]	sa-kpiiŋ-ni	a-ka-kupiŋi	
coat	ubíli	i-k-iblíi			
hat	trúpŋu	i-k-turpuŋuu	sa-tru-trupuaŋ-ni	a-ta-trupŋu	
bamboo hat	tkúrŋu	i-k-takruŋuu			si-tkurŋu
trousers	kcéŋe	i-kacŋii	sa-kce-kceŋ-ni	a-ka-kceŋe	
skirt (man's)	lbéte	i-k-labtii	sa-lbe-lbet-ini	a-la-lbete	

	lebéte labíti [pm]				
skirt (woman's)	kúnu	i-kunuu	sa-ku-ku-ani	a-ka-kunu	
belt	tbíθi	i-k-tibθii	sa-tbiθ-ni	a-ta-tbiθi	
beads	slívi	i-k-silvii	sa-sli-sliv-ni	a-sa-slivi	
necklace (short)	krîkri	i-krikirii i-kirkirii	sa-kri-kr-ani	a-ka-krikri	
necklace (long)	kd̪ikd̪i	i-kd̪ikd̪i	sa-kd̪i-kd̪-ani	a-ka-kd̪ikd̪i	
bracelet (made with beads)	btîbti	i-k-bitb[i]tii	sa-btibt-ani	a-ba-btibti	
(made of metal), wrist watch	liúlu [li.ú.lu] [lyú.lu]	i-k-liuluu	sa-liu-liul-ani sa-liul-ni	a-la-liulu	
earring	bláci	i-k-balcii	sa-bla-blac-ani sa-bla-blac-ni sa-blac-ni	a-ba-blaci	
leggings	kcábu	i-kacabuu	sa-kca-kcabw-ani	a-ka-kcabu	
door	silbáa	i-k-silib-ani i-k-silibii i-k-silib-nii	sa-sil-silb-ani	a-sa-silbaa	
entrance	blittáva blintáva [pm]	i-k-biltavaa i-k-baltavaa	sa-pli-plitava	a-pa-plitava	
window	tavŋáa	i-k-tavŋ-ani	sa-ta-tavŋ-ani	a-ta-tavŋaa	
house	dáni	i-k-danii	sa-da-dan-ani	a-da-dani	
house (made of slate)	te-dáni sake alápi				

house (made of wood)	te-dáni sake aŋátu				
piling slates to build a house	opor dáni				
hut	tovnáa	i-k-tovanii	sa-tovn-ani sa-to-tovn-ani	a-ta-tovnaa	
roof	cvári	i-k-cavarii	sa-cvary-ani	a-ca-cvari	
thatched roof	o-sóbu dáni				
roof with slates	u-lípi				
empty space under slates	i-lípi				
floor	sdáli	i-k-sadalii			
room	tserîka	i-k-taserk-anii			[t] in ts is very light for both pl alternates ts / s in negation form
elevated place for storing food	cápa	i-k-capaa			
granary	tlimnáa	i-k-talmanii			
kitchen, hearth	te-kan-kannáa	i-k-te-kan-kanna-nii i-k-ta-kan-kannaa			
fire place	te-paluŋáa teparuŋaa??	i-k-ta-ploŋ-nii i-k-ta-plaŋ-nii			
toilet	tocackéa [to.ca.cké.a] [to.ca.ckyá.a]	i-k-ta-to-ckyaa			cf. ckée

table	t-kan-kannáa	i-t-kan-kannaa i-t-kan-kanna-nii			
chair	anúru	i-k-anuruu			
bed	tvincîŋi	i-k-tavnicŋii			
bed (made of slate)	srúru	i-k-sururuu i-k-suruu [pm]			
cradle	srídŋi	i-k-sardiŋii i-k-sirdiŋii [pm]			
field (wet)	tpuccáa [name] tpucc-áni [place] tpucucáni	i-k-tapucanii i-k-tapucucani i-k-tupucanii [pm]	sa-tpucucani sa-tpucani	a-ta-tpuccaa	
field (dry)	tomóma tomúma [pm] tómma	i-k-tomumaa	sa-tomm-ani	a-ta-tomma	okmolo tomma 'work in the field'
hoe	kváa	i-kavaa	sa-kv-ani sa-kva-kv-ani	a-ka-kvaa	
plough (pulled by ox)	pakɖóro	i-pkaɖruu			
knife	sáldu	i-k-saluɖuu	sa-saluɖɖ-ani	a-sa-saldu	
knife (small)	bkáli	i-k-baklii	sa-bka-bkal-ni	a-ba-bkali	
blade	tka-kraŋa tka-kraŋə [pm]	i-k-takraŋ-nii			
sickle	glísi	i-gilisii			
wood chopper	tkóko	i-k-takokoo			

	tkokóo	i-k-tokokoo			
string	tési	i-k-tesii	sa-tes-ni sa-te-tes-ni	a-ta-tesi	u-tesi 'to make...'
rope	sibkáa	i-k-sibkaa i-k-sibk-ɔni	a-sa-bibik-ni a-sa-si-bi-bik-ni sa-si-sibk-ni	a-sa-sibkaa	
thread	vrée	sa-vre-vre-ani sa-vre-ani	a-va-vree		
needle	ɹúme	i-k-numee	sa-nu-nume sa-nu-nume-ani	a-na-nume	
mortar	ckúlu	i-k-cukuluu	sackulni sa-cku-ckul-ni	a-ca-ckulu	
pestle	asúru	i-k-asruu	sa-sur-ni sa-a-sru-srw-ani sa-a-sru-sru-ni	a-sa-suru	
spear	sbáki	i-k-sabkii	sa-sbak-ini sa-sba-sbak-ini	a-sa-sbaki	
name	aráci	i-k-arcii	sa-rac-ni sa-ra-rac-ni	a-ra-raci	
paper, letter, book, writing	s[u]láti	i-k-sultii	sa-sulat-ni sa-sul-sulat-ni	a-sa-sulati	
winnowing basket	bráku	i-k-barakuu	sa-brakw-ani sa-bra-brakw-ani	a-ba-braku	

soup	suruáa				
pan	plóŋo	i-k-palŋuu i-k-paluŋuu	sa-ploŋ-ni sa-plo-ploŋ-ni	a-pa-ploŋo	
spoon	k[i]ŋi	i-kidiŋii	sa-kdiŋ-ni sa-kdi-kdiŋ-ni	a-ka-kdiŋi	
bowl (small)	tkúpli	i-k-takpilii i-k-takuplii	sa-tkuply-ani sa-tku-tkuply-aa	a-ta-tkupli	
bowl (big)	kuóto [kwo.to] kuáto [kwa.to]	i-kwtoo			pm does not accept [koto]
pottery pot, urn	cbáki	i-k-cabkii			
cup	soŋuŋ[u]láa	i-k-soŋuŋul-nii			
plate	θnápe	i-k-θanapee			
jar, bottle	c[u]kkíni ckíni	i-k-cukkinii			
kettle	taciclára	i-k-taciclaraa			
lid	scalíbi	i-k-saclibii			
big lid to cover food	skabúŋu				
stick	skúqu	i-k-sa-skuqu	sa-skuqw-ani sa-sku-skuqw-ani	a-sa-skuqu	
village	cikcikláa	i-k-cikciklii i-k-cikciklaa [pm] i-k-ckickilaa	sa-cikcikl-ani	a-ca-cikciklaa a-ca-ckikckilaa	
village (small)	cikláa	i-k-ciklii	sa-ckil-ni		

	ckíli		sa-ckickil-ni		
market, store	tlaŋlaŋiláa	i-k-taliŋaliŋalnii			tyémi 'store (borrowing_)
school	t-sor-sortáa	i-k-tasrasrat-nîi i-k-tasrasrat-nîi			
wine, liquor	bváa	i-k-bavaa	sa-bv-ani sa-bva-bv-ani	a-ba-bvaa	te-bvaa 'to make wine' te-bva-bvaa 'often make wine'
fish net (big)	arée	ik-arce			
net (small)	kpóco	i-kopcoo i-kapcuu [pm] i-kapcoo			
net (cf. 308 fishweir)	urúŋu	i-k-orŋuu i-k-urŋuu [pm]	sa-u-ru-ruŋ-ni		
net	θédku	i-k-θedkuu			
net bag	kdée	i-kadee	sa-kdy-ani sa-kde-kdy-ani	a-ka-kidee	
ax	rtúku	i-k-ritkuu	sartukni sa-r-tu-tuk-ni	a-ra-rtuku	
jew's harp	tŋátŋu	i-k-taŋtoŋuu i-k-toŋtoŋuu [pm] i-k-toŋtoŋoo [pm]	sa-tŋotŋ-ani a-ta-twaŋ-twaŋ-ni sa-tŋo-tŋot[wa]ŋ-an i	a-ta-tŋatŋu	
mouth harp	lubíli	i-k-lubirii			

	lubíri	i-k-lubirii			
flute	kuráro	i-koraroo i-kuraroo			
gong	skiŋ-kíŋi	i-k-sakŋikŋii			
drum	stoŋ-tóŋo	i-k-satŋotŋoo			
fence	srávḍi [pl-fast spe] sraḍáa	i-k-saravḍii i-k-sarvaḍii	sa-sravḍ-ani sa-sra-sravḍ-ani	a-sa-sravḍaa	
wall	pórḍa pwárḍa [pm, pl]	i-k-porḍani	sa-pro-proḍ-ani sa-por-porḍ-ani	a-pa-porḍa	o-porḍa
cement wall	sḍimŋáa sḍumiŋáa	i-k-suḍmiŋ-ni	sa-s-ḍu-ḍumŋaa sa-ḍmi-ḍmiŋ-ni	a-sa-sḍumŋaa	ti-sḍumŋaa te-sḍumŋaa ti-ḍmiŋi
cement?? wall??	ḍmíŋi	i-k-ḍumŋii	sa-ḍmi-ḍmiŋ-ni	a-ḍa-ḍmiŋi	u-ḍmiŋi
mat	spáa	i-k-sapaa	sa-spa-sp-ani	a-sa-spaa	te-spaa te-spa-spaa
road	dadráni				
cart, vehicle	sḍurḍúru	i-k-saḍruḍruu			
broom	sə́pi / suə́pi	i-k-səpii			
word, language	bkáa	i-k-bakaa			
Maga language	o-tilḍika	i-k-tiliḍikaa i-k-tilḍik-nii			
rifle	kuə́ŋi				
powder	sbúa				
bullet	aḍimi				

saw	sgiθgíθi				
pillar	pláka				
chopsticks	kcépe	i-kacpii			
board	gθígθi	i-k-giθgiθii			
food	a-kan-kannáa				
side dish	sdamráa				
flour, powder	rgómo	i-k-ragmuu			
sugar	kumusyáa	i-kamsya-nii			
juice, honey	isíbi	i-k-isbii			
meat (edible)	[animal]+buátɔ				
smell, odor (verb??)	o-sbáre	i-sbaree			
(cow's) milk (cf. six)	inímɨ [nuáŋɔ]	i-ki-inmii			
taboo	osɖámɨ	i-saɖmii i-suɖmii			
front yard, outside	bláti	i-k-baltii			
rice cake	abée				
tobacco pipe	a-ŋícu / ŋícu	i-k-aŋicuu			
tobacco, cigarette	tmáku	i-k-tamakuu			
fishweir	urúŋu	i-k-orŋuu			
boundary	agísnɨ	i-k-agsanii			
shoes	tkápɨ	i-k-tokpii			
socks	θkápɨ				
scissors	kcía [tʃyáa]	i-kicyaa i-kaci.aa			

comb	gósu	i-gosuu i-k-gosuu			
mirror	liŋúu	i-k-liŋuu			
umbrella	θgóbo	i-k-θagbuu			
basket	sbóro	i-k-sabruu			
sieve	pasísi	i-pasisii			
trap	u-rbáŋi	e-rbaŋii			
poison	ska-múḍu sbuáa				
fortunate, lucky	margíi abák-su				cf. abaki 'soul'
bad luck (your)	ma-kráθi abák-su				
emotions	ma-ka-rgíi				
loving each other	makaḍlámi				
grave, tomb	tabub[u]láa	i-k-tabubulnii			
burial site	tlobiŋa	i-k-talbibiŋaa			
game (hunting)	amára + [animal]				
decorated hat (male)	trúpŋu	i-k-tarpuŋuu			
decorated hat (f)	krávθə	i-k-arvaθii			
head ornament, made of boar's teeth (m)	gomóco	i-gamcuu i-k-gamcuu			
(f)	pledámi	i-k-paldamii			
eagle feather (head ornament)	cic[i]vári	i-k-cicivrii			i-s-civrii i-s-cicivrii 'not wearing --'
water lily (head	titŋási	i-k-titiŋsii			i-s-titiŋsii

ornament)					
coat (m), cloak(?)	sbubuəláa kpíŋi sbubualáa				
tattoo (v.)	u-ckícki	i-ckickii			
color ink used for tattoo	amíso / míso	i-k-amisoo			
house of the ancestors	dáa dáa lo múu mú u dadáa lo mumúu				
festival pre-planting millet	u-vdívdi				
button	spukríŋi	i-k-sapkirŋii			
glove	θkápi	i-k-θukpii i-k-θokpii			
blanket	cîbi	i-k-cibii			
mosquito net	klibúbŋu	i-kalbubuŋuu			
fish hook, fishing equip.	snag[i]páa	i-k-sangep-nii i-k-sangip-nii			
superstition	klisisiáa [syá:]	i-kalsisyanii			
bucket	cípni	i-k-cipanii			
key and lock (Taiwanese?)	sosísu	i-k-sosisuu i-k-sosesuu			
games given to the chief	[po]sórpu	i-psorupuu			
vegetable garden	t-lacŋáa	i-k-talciŋ-nii			

pig sty	t-bikáa / t-bɨ-bikáa				
airplane	e-pkɨ́pkɨ				

g. STATIVE VERBS		Negation	Reduplication
alive	m-odʲípi	i-k-odʲipi	
dead	m-amúdu	i-k-amduu	
all (animate)	ŋurbwáa	i-ŋurbwaa	ŋur-bu-bwaa
(inanimate)	ŋicúru/ ŋicúra	i-ŋicuruu	
bad	ma-kuráci ma-kuraθi	i-kurcii i-kurθii	ma-ku-kuraθi
good	ma-rgíi	i-k-ragii	ma-ra-gragii ma-rgi-rgii
big	tradʲóo	i-k-taradʲoo	tar-tar-dʲo tra-tar-dʲoo
small	tikcáa	i-k-tatikcii i-k-tatitikcii	
hot, spicy	orcíŋi	i-racŋii	o-r-ci-ciŋi
bitter	ma-pácru	i-k-pacuruu	ma-pa-cu-cru
salty	ma-θmíi	i-k-θimii	ma-θmi-θmii
sour	ma-ŋilŋíli	i-k-ŋaliŋlii	ma-ŋli-ŋlili
sweet	ma-lmîmi	i-k-limimii	ma-li-mi-mimi
smell good	ma-csuu ma-tsuu	i-k-tusuu	ma-tsu-suu ma-csu-csuu
blind	ma-lyáci	i-k-lyacii	
seeing not clearly	i-tka-cŋil-níi		

able to see	u-cŋíli	i-ciŋlii	
deaf	ma-ciclíi	i-k-cicilii	
hard-of-hearing	i-tka-pciŋa-níi		
able to hear	u-pcír[i]ŋi	i-bciŋii	
dumb	ma-ŋlúu	i-k-ŋuluu	
able to speak	ma-sobkáa		
lame	ma-plée	i-k-pulee	
walk	o-dvadváci	i-davdavcii	
expensive	ma-kciŋe	i-k-uciŋee	ma-kci-kciŋe
cheap, inexpensive	ma-mríi	i-k-mirii	
cold (weather, water)	ma-ttílki	i-k-tatlikii	ma-til-tilki ma-til-tilki
hot (weather, water)	ma-rpáa	i-k-rapaa	ma-rpa-rpaa
cool (weather)	ma-súvri ma-ssuvri	i-k-sasuvrii	
warm (water)	ma-dladáa		
dark	m-asúŋu	i-k-asŋuu	
bright, light	u-lilípi	i-lilipii	sa-lilyap-ni
drunk	ma-busúku	i-k-buskuu	ma-bsu-bsuku
dry (as clothes)	ma-lóo	i-k-lauu	ma-lo-loo
sun-dried	ma-pcée		
wet (as clothes)	ma-dripípi	i-k-darpipii	
fast, quick	ma-rdée	i-k-rudee	ma-r-di-dee
slow	u-lilíŋi	i-liliŋii	

fat	ma-rcúru	i-k-rucuruu	
skinny	ma-rlée	i-k-rulee	ma-r-rulee
few (thing)	tikcáa		
(person)	ta-bíkli	i-tabiklii	
	ta-piaa	i-tapi.aa i-k-pi.aa	
many (thing)	m-aḍóo	i-k-aḍoo	
(person)	tapúlu	i-tapuluu	
full	ma-líi ma-lwíi	i-k-lu.ii	ma-lu-lwii
hungry	abési	e-besii	a-be-besi
full	sitíi	i-sitii i-stii	
happy	ma-rbirbíri ma-birbíri	i-k-rabrabrii	
hard, laborious (?)			
heavy	ma-ḍikri	i-k-ḍikirii	
light (with things) light-weight (person)	ma-lupe	i-k-lupee	ma-lu-pu-pee
light (with things) (work)	ma-lápe	i-k-lapaee	
high / tall (inanimate)	m-arágri	i-k-aragrii	
tall (person)	tráḍóo		
short (inanimate)	m-alíbi m-allibi	i-k-alibii	

short (person)	tikcáa		
itchy	ma-rcicíŋi	i-k-racicŋii	
long	ma-θŋ̂ida	i-k-θaŋidaa	
short	m-ɔkkîni / m-okkîni	i-k-ɔkiknii	m-ɔ-ki-kkinii
far	m-edávli	i-k-edavlii	m-e-d-davli
near	m-edáli		me-di-dali me-ddali
new	bováa ma-bováa	i-k-bova-nii	ma-bovaa bo-vu-vaa
old	ma-s[u]píri	i-k-suprii	
old (age)	ma-rɖáŋi	i-k-roɖŋii	
other	ɖ[u]máni	i-k-ɖumanii	
non-native	brábra		
native	ckîli		
non-native (known)	ska-ɖmani		
(unknown)	ska-bráni ska-cávni		
raw	ma-ŋtáa	i-k-ŋitaa	
cooked	ma-dúu	i-k-du.uu [du.u:]	ma-du-du-ŋaa
ripe	ma-rîmi	i-k-rimii	
rotten (some still edible)	ma-rbîki	i-k-rubkii	
rotten or overcooked (e.g. rice)	ma-rúcu		
right, true	ma-tka-ɖŋée	i-p-takɖiŋce	

wrong	paslćle	i-psalii	
sharp	ma-graŋi	i-garŋii i-ka-garŋii	
dull	ma-tŋúpru	i-k-tuŋpuruu	
broken	ma-pcúu	i-k-picuu	
sick, ill	ma-cîmi	i-k-cimii	
hurt, pain	u-tlîtli	i-tlitlii	
pitiful (?)	ma-telpúu	i-p-telupuu	
pitiful (?)	ma-gugúcu	i-ka-gugucuu	
healthy	ma-rgi-rgii		
strong	ma-kîcŋi	i-k-iciŋii	ma-ki-kicŋi
weak	ma-mrîi	i-k-mirii	
thick	ma-rímḍi	i-k-rimiḍii	ma-rim-rimḍi-ŋaa
thin	ma-ḍlípsi	i-k-ḍilpisii	ma-ḍ-lip-lipsii
thirsty	m-eḍúu	i-keḍuu	
tired	ma-prée	i-k-piree i-parii	a-pre-re
wide (as road, cloth)	ma-rlápa	i-k-relapaa	
narrow (shape, e.g. melon)	ma-θulúru	i-k-θuluruu	
wide (as field, house)	ma-vnée		
narrow, small (house)	sak-titkcíi		
thick (e.g. tree)	ma-ptúklu		
thin	ma-kule ma-kkule		

black	tmacicrîŋi	i-k-tamcicirŋii	
orange (?)	ma-tlavɖávi	i-k-talvaɖvii	
blue, green	tmaθikθiki	i-k-tamiθikθikii i-k-tamriθikθikii	
blue cloth	smolámi		
red	ma-dlîŋi	i-k-diliŋii	
red (?)	tilyáŋi	i-k-tilyaŋii	
white, clean	ma-plíi	i-k-pulii	
white, blank	tpupulyáa	i-k-tapupulyanii	
yellow (lighter??)	tibróo	i-tburoo	
yellow	θnavivróo	i-k-θanviviroo	
brown	ma-θrábku	i-k-θerbokoo	
dark brown	pecilŋáni	i-k-pecilŋanii	
afraid	a-krúɖu akluɖu	i-kurɖuu	a-kru-kruɖu
frightened (scared by s.o.)	ma-kîrθi ma-kkirθi	i-ka-kirθii	
surprised (hear bad news)	ma-rkîmi	i-k-rikmii	mar-ki-kimi ma-rki-rkimi
angry	ma-ŋricíŋci	i-k-ŋarciŋcii	
scolding (angrily)	*ma-gaúcu* [ga.u.cu]	i-ga.u.cuu	
shout furiously	o-pyárci	e-pyacii	
ashamed, shy	ma-r[u]máli	i-k-romlii	
beautiful	ma-robróo	i-k-bobaruu	

handsome	ma-θpári	i-k-θaprii	
lovable	ska-rgíi		
ugly	ma-kráθi		
calm, quiet	ma-mlíŋi	i-k-milŋii	
noisy	e-lilíŋi	e-liliŋii e-lalilŋii	
loud (singing)	pasrúkra [θíne]		
clean	ma-pláa	i-k-pulaa	
dirty	ma-k[u]lúŋu	i-kuluŋuu	
untidy	ma-rθábru	i-k-reθboroo	
dirty caused by laziness	ma-tpáci	i-k-tapcii	
crooked, bent	aŋθa-kur[i]-kuríŋi	i-k-θakuri[kuri]ŋii i-ŋiθkurkurŋii	
straight	ma-skúru	i-k-sukuruu	
deep (e.g. cave, hole)	m-odʒíŋi	i-vadʒŋii i-k-odʒŋii	
deep (water)	te-bróo	i-tbaruu	
deep (container)	ma-i.kúl[u]ŋu [may.kulŋu]???	i-k-ikulŋuu	
shallow (e.g. river bank)	ma-srapsápi	i-k-sarpispii	
delicious (cooked food)	ma-θlímdi	i-k-θilim[i]dii	
dense	ma-prepépe ma-prepée	i-k-rapepee i-k-parepee	
thin	ma-lŋílo	i-k-liŋiloo	

difficult	ma-kcíŋc	i-kuciŋcc i-kucŋcc	
easy	ma-mríi	i-k-miríi	
suitable (e.g. occasion)	c-rakyáni c-rkyani	i-p-erakyaníi / c-rekyaníi	
matching (couple, clothing)	m-crakyáni		
fitting (size)	ma-ováni / m-ováni	i-p-ovaníi	
flat, smooth	ma-rmarmóo	i-p-ramarmóo	
smooth (face)	m-olísmi / m-olíʃmi	i-k-olisimii	
smooth (surface)	ma-tlípʃi	i-k-tilpisii i-k-tilipsii	
rough (e.g. road w/rocks)	ma-trottógo / ma-trogtógo	ik-tarattogóo/ ik-targatgúu	
up and down of field (e.g. planting vegetable)	ma-tbugbúgru	ip-tibgubturúu	
smooth (e.g. skin)	ma-θθúlpi	ik-θaθulapíi	
rough, coarse (skin)	ma-grosgése	i-gorsagsíi / i-gargesgesée	
mean (temper, etc.)	ma-kaúcu [ka.ú.cu]	i-kaucúu [i.ka.u.cúu]	
quiet (gentle?)	i-sbakáni		
reserved (?)	silmídi	i-slimdíi	
hard, firm	ma-tkúru	i-k-tukuruu	ma-tku-tku-ru
hard (e.g. food, ice)	ma-θúpci	i-k-θupicii	
soft	ma-mríi	i-k-miríi	ma-mri-mrii ma-mir-mrii

important	ma-θalyáta / ma-θále	i-k-θalyatáa / i-k-θalée	
important (e.g. people, necklace, etc.) take care of	kilváki	i-klivkatáa i-klivkii	
important things (treasure?)	kaθalyáta		
rich	sa-peswáni	e-spewanii	
poor	e-s-peswanîi		
poor	m-ililîmi		
round (circle)	ma-rtípli	i-k-ritpilíi	
round (e.g. ball)	tripipníki	i-k-taypipnikîi / i-k-tarpipinkîi	
half round (as cake, moon)	ma-karθáa		
half	ma-pcúku		
same (style, kind)	t[u]maíi [tu.ma.ɨ:]	i-p-tatmaii i-tmaii	
same (measurement)	m-arámo	ip-aramóo	
similar	ma-θormée	i-p-sa-θromaii i-p-θa-θromaii(??)	
different	ip-tatmaíi / i-tmaíi		
warm (weather) ??	ma-rpa-rpáa		
true	ma-tkadŋée	ip-takdŋée	
stinking (corpse, garbage)	ma-pári	i-k-parii	
stinking (garbage, body odor)	ma-ŋáʃi	i-k-ŋa-si-sii	

stinking (e.g. fart)	ma-ŋásri	i-k-ŋasirii	
fragrant, aromatic	ma-csúu / ma-tsúu	i-k-tusúu	
clear (e.g. mountain)	ma-skúro	i-k-sukuroo	
clear (view, e.g. TV)	tik- /tak-ciŋláni	cf. u-cŋíli 'to see'	
clear (hearing)	tik- /tak-bic[i]ríŋni		
??square	tirŋia [tir.ŋi.ya]	i-triŋiáa [i.tri.ŋi.á:]	
??together	irpúu		
together (to do s.t.)	ma-ɖríɖri		
together (many people)	ta-kru-bu-bwáa		
altogether	aŋru-bu-bwáa		
careful	ciŋláa	i-k-ciŋlii	
nervous	a-gíli	i-giglii	
wither	ma-θɖíri	i-k-θaɖrii	
careless			
torn (a little)	ma-plíti	i-k-piltii	
torn (all)	maka-plíti		
torn (a little)			
sharp	ma-kraŋi	i-karŋii	

h. VERBS		Negation	Reduplication	Imperative	Go ... !	Nominalization
able, possible	i-pliŋóo					
it's all right	nu-pleŋveáa [ve.á:]					
mustn't	nu-duriáa					
aim	u-lgilŋi	i-liŋiliŋi	u-lŋi-lgilŋi	liŋliŋ-a	mua liŋliŋi	
answer	u-brli	i-birli	u-bri-brli	biryáa	mua bíri	
climb stairs	mo-damámo			mdamamáva / modamamváa	mua mdamámo	
descend stairs	mo-dalbibli			m-dalbilbáa / m-dalibáa		
climb tree (s t tall)	mo-rgári	i-ragrəə		m[r]ragráa	mua mrákri	
climb down	mo-dídi			mo-didáva / mi-didáva	mua mdídi	
climb uphill	mo-bliŋi			[mo]bliŋáa	mua mbíli	
climb downhill	mo-ródu			[mo]rodáa	mua moródu	
ask	ki-brubrúu	i-k-burburúu	ki-bru-brubrúu	k-burburáa	mua kburbúru	u-brubruu 'teach'
bake (in stone or coals)	u-cíbi / u-icíbi	i-ic[i]bíi [i.i.tʃi.bɛ]	u-ci-cíbi	ic[i]báa [i.tʃi..]	mua ic[i]bi	
bear, give birth	te-vláki					
begin	sa-kródu	i-s-kerodúu		skerodáa / skeródə	mua skeródə	
beginning						
first time						
bent	u-guluśŋni	i-guluɔŋníi / i-gulugníi	u-gulu-luśŋni / guluŋna-ŋáa	guluɔŋnáa / guluŋnáa	mua gulúŋni	
half bent	puguluŋnáa					
bind (tie?)	u-biki	i-bikíi / i-u-bikíi	u-bi-biki	u-bkáa	mua úbki	
boil, broil (with water)	u-0í0i	i-0i0íi	u-0i-0í0i	0i0yáa	mua 0í0i	
deep fry in oil	u-rŋírŋi	i-rŋirŋíi	u-rŋi-rŋírŋi	riŋríŋa / riŋriŋáa	mua riŋríŋi	
roast (over a slow fire)	o-kámi	e-kamíi	o-ka-kámi	o-kmáa	mua ókma	
dry by fire	o-dŋɔ́dŋɔ	e-dŋɔ́dŋɔ	o-dŋɔ-dŋɔ́dŋɔ	doŋdáŋa	mua doŋdáŋi	
cook dishes	te-sdamráa	i-t-sadmar-níi	te-sdam-damráa	tsadmarnáa	mua tsadmárni	
cook meal	te-kánni	i-te-kannîi / e-te-kannîi	te-kan-kánni	te-knána	mua teknáni	
bite	u-títi	i-titíi	u-ti-títi	u-ti-ta-nyáa	mua ítíti	
blossom	o-pŋɔ́pŋɔ	e-pŋɔpŋɔ́ɔ	o-pŋɔ-pŋɔ́pŋɔ [sa-pŋɔpŋ-ani]		e-pŋɔ́pŋɔ not	
bud	u-mumúdu	i-mumudúu	[sa-mumúd-ni]			
blow (breath)	u-bútu	i-butúu	u-bu-bútu	butáa	mua bútu	
blow (wind)	u-bsíbsi	i-bsibsíi	u-bsi-bsíbsi	bsibsáa / bisbisa	mua kbisbísi	
borrow	ke-sdámi	i-k-sedamíi / e-k-sedmíi	ke-s-dam-dami / ke-s-des-dami		mua ksédmi	
lend	pe-sdámi				mua psédmi	
break wind	u-pí0i	i-pi0íi / i-u-p0íi	u-pi-pí0i	u-p0áa	mua úp0i	

break, damage	u-pui [u.pú.i]	i-pufi [i.pu.ɛ́]	u-pu-púi	puyáa	mua pui [pwi:]	
cf broken	ma-púi	ik-pufi				
break (as pencil)	o-rtáki	ik-ratkɔɔ / i-ratkɔɔ	o-r-ta-táki	rotkáa	mua rótkɔ	
break up (with hand/stone)	o-dmáki	ik-damkɔɔ / i-damkɔɔ	o-dma-dmáki	domkáa	mua dómkɔ	adamka-li
breathe	ma-nniki	ip-nanikii	ma-n-ni-niki	m-nanika / m-nanikáa	mua mnaniki	
breathe hard	te-níki			te-nikáa		
pant, gasp	mi-kinni nikli					
bring	u-míci	i-micii [i-u-micii / i-amcii]	u-mi-míci	u-mcáa	mua úmci	
burn	o-lóbu	i-lobúu	u-lo-lóbu	lobwáa / lobáa		
burned	se-lóbu	i-s-lobúu				
(conflagration)	o-ɖaɖápi apúru					
(burn mountain)	mo-lyápsi					
(house burn down)	selóbu dáni					
bury	u-búlu	i-u-blúu	u-bu-búlu	u-bláa	mua óblu	
buy	o-lŋée	i-laŋée	o-lŋe-lŋée	loŋráa	mua lóŋe	
call	o-kóko	e-kokóo	o-ko-kóko	kokáva	mua kóko	
carry with hand(s)	tikkíli	i-tkiklii	ti-kikkili	tikiklaa	mua tkikli	a-tikila-li
hang up (on shoulder, nail)	u-k[i]réc	i-kirée	u-kru-kréc	kiráa	mua kire	
(on shoulder/back)	u-sŋyáli	i-sŋyalii	u-s-ŋi-ŋyáli	suŋyál-a	mua suŋyáli	
catch	u-pwára / u-póra	i-pwaráa / i-poráa	u-pu-puára	pwaráa / poráa	mua puára	
chase	o-slára	e-sal[ə]ráa	o-s-la-lára	soliráa	mua solráa	
cheat	patkóo	i-ptakúu	pa-tko-tkóo	ptakwanyáa	mua ptáku	
chew (not swallow)	u-púu	i-u-púu [i.u.pú:]	u-pu-púu	upwáa	mua úpu	
chew (and swallow)	o-ŋciŋci	e-ŋciŋcii	o-ŋci-ŋciŋci	ŋociŋacáa	mua ŋociŋáci	
choose	u-prfi	i-pirfi	u-pri-prfi	piryáa	mua pfri	
chop	u-θyábi	i-θyabii	u-θi-θyábi	θyabáa	mua θyábi	
chop wood	m-aŋátu	i-p-aŋatúu	maŋ-atŋátu	maŋtwáa	mua maŋtóo	
close (door, drawer)	i-líbi	i-ilbii	i-li-líbi	i-lbaa	mua i-lbi	a-liba-li
closed	ilíbi blintava					
open (door, drawer)	wa-líbi	i-wa-libii		wa-lbaa	mua wa-líbi	
close (box, cabin)	u-clíbi	i-clíbii	o-clilíbi	ciliba	mua cilíbi	a-ciliba-li
open (box)	wa-cilíbaa			wa-cilíbaa	muawa-cilíbi	
come	m-ukáni	ik-ukanfi [??]	mu-kan-káni	muknyáa / naŋáa		
cover	u-krúbŋu	i-krubŋúu	u-kru-bu-bŋu	kurbúŋa	mua kurbúŋu	
count	u-ssípi [ʃi]	i-ʃispíi	u-si-sípi	u-sispáa	mua u-sfspi	
cut (slice, vege, meat)	u-kíti	i-kitii	u-ki-kiti (lcɔŋɔ)	kikitaa / kitaa	mua kiti	
cut (hew)	u-θyaɓi	i-θyabii	u-θi-θyabi	θyabaa / θi-θybaa	mua θi-θyabi	
wounded by knife	ma-cukwali	i-k-cuklii				
-- into pieces	u-ŋtuŋtúlu	i-ŋtuŋtulum		ŋutŋutlaa	mua ŋutŋutlu	a-ŋutŋutla-li
-- bones	u-tkítki	i-tkítkii	u-tkitkitki	tiktika (pa ɖoru)	mua tiktiki	a-tkitka-li

cut weeds	o-0vá0vi	e-0va0vii	o-0va-0va-0vi	0ev0eva (su sroo)	mua 0ev0eve	a-0va0va-li
pull weeds	mu-suro mu-rsuro	i-u-suroo	mo-su-suro	musrava mursrava	mua mu-sroo mua mu-rsroo	mosorva-li mursorva-li
cut (saw)	u-grigri	i-grigrii		girgira	mua girgiri	a-grigra-li
cut (with scissors)	u-kcyáa	i-kciáa	u-k-ci-cia	kucyaa	mua kycia	a-kacya-li
cough	ma-súsu	i-p-susuu	ma-su-susu	m-su-swaa	mua m-susu	ma-suswa-li
dance	0eróbu	i-0robuu	0e-ro-robu	0robaa	mua 0robu / ta 0robu	0eroba-li
depart, leave	giáa [gyáa]	i-giaa		giaa	mua gyaa	nu-gya-ma kiki tildjka nu-giaa kiki tildjka i-giaa kiki tildjka nu-gya-ma kiki mua til--
descend	mo-ródu					
desire, like	apl-					
die	ma-múdu	i-k-amduu		ma-mdaa	mua mamdu	
doze off	o-ldoldóko	e-ldoldokoo	o-ldo-ldo-ldoko			a-ldoldoka-li
do, accomplish (in general)	u-tipi	i-tipii	u-ti-tipi	tipaa	mua tipi	a-tipa-li
to make (e g chair, basket)	o-pé0a	e-pe0aa	o-pe-pe0a	pe0aa	mua pe0a	a-pe0a-li
completion	maka-					
draw, write	u-sláti	i-sultii	u-slu-slu-slati	sultaa	mua sulti	a-sulata-li
dig (earth)	u-krúkru	i-krukuruu		kurkura	mua kurukuru	a-krukra-li
dream	u-spíi	i-supii	u-spi-spii		mua sipi	ma-rgii / ma-kuira0 spi-li
drink	uŋúlu	i-uŋluu	u-ŋu-ŋulu	uŋlaa	mua uŋlu	a-uŋula-li
get drunk	ma-bsúku	i-k-buskuu	ma-bsu-bsuku			mua uŋulu bvaa busku
drown	a-00iti	i-0i0tii			mua a0i0ti	da-0i0-0ita
drown someone	pa-00ita					
dry in sun	o-pvée	i-pavee / i-pa-vaii	o-pa-ve-ve-ani o-pve-ve-vee	pova-ra	mua pove	a-pavea-li
sun tan (stay in the sun)	ki-cŋuruŋúro	i-k-cuŋuruŋuroo	ki-cŋu-ŋur-ŋuro	kcuŋuruŋurava	mua kcuŋruŋroo	
(stay in the shade)	ki-poriri					
dwell, stay	ika-(su)? ikee kiki tomma	i-kaii		ikyaa	mua ikee da-nami	te-ka-li
eat	o-kánni	i-kannii	o-ka-kanni	kwanaa	mua kwəni / kwani	a-kanna-li t-kanna-li
eat and drink, feast	pen-kánni	i-pen-kannii	pen-kan-kanni	pen-kannaa	mua pen-kanni lsesu	a-penkanna-li
embroid	o-ptási	i-patsəa	o-pta-ptasi kiki kpiŋi	pwatsaa	mua pwatsə	a-ptasa-li
enter (building)	mo-dáni			mo-danaa	mua m-dani	a-dana-li
enter (e g a hole)	mo-djŋi			mo-dŋaa	mua mdjŋi / modŋi	
extinguish	ldpi	i-idpii / i-dpii		ldpaa	mua idpi	a-dpa-li
faint	sirmúru	i-sirimruu	sir-mu-muru	sirimraa	mua sirimuru	sirmura-li
shock	ma-rtisi	i-k-ritsii	ma-rti-tisi	m-ritsaa	mua mritsi	ma-rtisa-li
fall (general)	ma-kdamrúŋu	i-p-kadmurŋuu	ma-kda-mru-mruŋu	m-kadmurŋaa	mua mkadmurŋu	ma-kdamruŋa-li

trip and fall	ma-krepápɖi	i-p-karpapaɖii	ma-kre-pa-papɖi	m-karpapaɖa	mua mkarpapaɖi	ma-krepapɖa-li
fall, drop (person)	ibróo	i-buroo	i-bru-broo	i-borvaa / e-borvaa	mua iburo	e-brova-li
drop (inanimate, e g fruit)	m-ulíli	i-ulíli		mu-lilyaa	mua m-ulili	
fall (slowly) (ani /inani)	mu-dídi	i-didii		m-udidava	mua m-udidi	
push someone to fall	o-ɖnórŋu	i-ɖnorŋuu		ɖumruŋaa	mua ɖumruŋu	a-ɖnorŋa-li
push s t to fall (?), pour	u-blúu	i-buluu	u-blu-bluu	bulwaa	mua bulu	a-bulwa-li
splashed (liquid)	m-oblúu	i-k-buluu				
fasten, connect	pa-ccúŋlu	i-p-cacŋuluu	pa-cŋu-cŋulu	cuŋlaa	mua cuŋlu	a-cŋula-li
	u-cŋúlu					
fastened, connected	ma-ccŋúlu					
fear	a-klúɖu	i-kuldɯu	a-klu-kluɖu	a-kuldaa	mua a-kuldu	a-kluɖa-li
frighten	u-kluklúɖu	i-kulkuldɯu				
frighten people w/ties	pa-kluklúɖu					
frightened	ki-kluklúɖu					
feed (make eat)	pa-knii pa-kani	i-p-kanii	pa-kni-knii	p-kanaa	mua p-kani	pa-kana-li
ask someone to eat together	pa káni					
breast feed	pa-0ú0u	i-p-0u0uu	pa-0u0u0u	p-0u0waa	mua p-0u0u	pa-0u0wa-li
feed (make drink)	p-uŋúlu p-oŋúlu	i-p-oŋluu		poŋlaa	mua p-oŋlu	
fight (quarrel)	ma-kavláa	i-pakvilaa	ma-ka-vli-vlaa	makvilaa makavlaa	mua makvila	
fight (with instrument)	ma-satítti	i-psatitii				
fight (with weapon)	ma-0a-0yábi	i-p0a0yabii		0a-0yabaa		
fight (with fists)	ma-ccibni	ipcacibnii		cacbina	mua ca-cbini mua cib-cib-ni	
fight (w/open palm)	ma-típsi	i-p-tatpisii		tipsaa	mua m-tipsi	
war	ma-ccábri	i-p-cacberee	ma-cbe-cbere ma-cab-cab-ri	m-cacberaa	mua m-cacbere	
to be enemies	ma-te-bráa	i-p-tatbaraa	ma-te-bra-braa		mua m-tatbara	
to cut enemy's head	se-bráa				mua sbara	se-bra-na-li
find	u-slápi	i-silpii		silpaa	mua silpi	a-silpa-su
float	u-0bíle	i-0bilee	u-0-bi-bi-le	0iblara	mua 0iblee	a-0bilra-li
flow/drift	m-olúɖu	i-valɖuu	m-o-lu-lu-ɖu	moldaa	mua moldu	moluɖa-li
fly	u-0íl0i	i-0ilbii	u-0li-0libi	0ilbaa	mua 0ilbi	
make fly	pa-0íl0i	i-p-0ilbii		pa-0libaa p-0ilbaa	mua p-0ilbi	
forget	marimúru ma-imúru	i-k-rimruu	ma-rmi-rmuru ma-i-mur-muru	mrimaa		marimura-li ma-imura-li
freeze	ma-tkúru	i-k-tukruu	ma-tku-tkuru			
make frozen	pa-ttúkru	i-p-titkuruu	p-ti-tku-tkura	p-titkura	mua ptitkuru	pa-tkura-li

frown	a-gúcu	i-gug-cuu	a-gugucu	agucaa	mua agugcu	a-guguca-li
gather	u-trági	i-turagii	o-tragragi	trogyaa	mua tragi mua torgee	a-tragya-li a-trogya-li
get, obtain	a-mára	e-araa i-araa	a-mar-mara aɖa i-a-ra-raa	mraa	mua mraa	a-ra-li
give	o-bée	i-baii	o-be-bee aɖa i-ba-baii	boraa	mua bwii	a-bara-li
go	mua / giaa					
grind	u-rɖjrɖj	i-rɖjrɖjii	u-rɖj-rɖj-rɖj	riɖjriɖa	mua riɖjriɖj	a-rɖjrɖa-li
grow (plant)	u-dúku	i-dukuu	u-du-duku	dukaa	mua duku	a-duka-li
raise (animal, human)	o-0dɔ́ɔ	i-0adii	o-0da-0dɔɔ	0odaa 0idaa	mua 0wadi mua 0odi	a-0ada-li
hate (dislike)	ma-ŋricŋʃci	i-k-ŋarciŋcii	ma-ŋri-cŋi-cŋici	m-ŋarciŋcaa	mua m-ŋarciŋci	ma-ŋircŋica-li
hang down	u-krée	i-kiree	u-kri-kree	kiraa	mua kire	a-kira-li
hang boar's teeth	o-bÖéŋe					
hear	u-bcfrŋi	i-beirŋii	u-b-ei-cirŋi	bicriŋa	mua beirŋi	a-bicriŋa-li
help	po-spára pa-spára	i-psoparaa	pa-spar-para	psopraa	mua psopra / psopraa	pospara-li paspara-li
hiccup	a-tatliŋni	i-tatliŋnii	a-ta-tli-tli-ŋni	atatliŋnaa	mua a-ta-tliŋni	atatliŋna-li
hide	kilpíŋi	i-klipŋii	ki-lpi-lpiŋi	klipŋaa	mua klipŋi	kilpiŋa-li
(hide) conceal	o-blee u-blée	i-balee	o-ble-blee	bolyaa	mua bole	abala-li
hit, strike (in general, with instrument)	u-stíti u-stítti	i-stitii	u-sti-ti-ti	sutita	mua sutitti	a-stita-li
hit with fist	u-cbìnì	i-cibnii	u-cbi-cbi-ni	cib-cib-naa	mua cibni	a-cbina-li
hit with open palm	u-tpísi	i-tipsii	u-tpi-tpisi	tipsaa	mua tipsi	a-tpisa-li
hit with small stone	u-tkúru	i-tukruu	u-tkutkuru	tukraa	mua tukru	a-tukra-li
hit with big stone	o-dmáki	e-damkii	o-dma-dmaki	domkaa	mua domki	a-damka-li
hold	u-gmìgmì	i-gmigmii	u-gmi-gmi-gmi	gimgima	mua gimgimi	a-gmigma-li
hold hands	u-rcìŋi					
hold in one's arms (embrass)	u-kbíri	i-kubrii	u-kbi-kbiri	kubraa	mua kubri	a-kbira-li
hold in one's arms (one the lap)	o-kpéle	e-kaplii	o-kpe-kpele	koplaa	mua kopli	a-kapla-li
hunt (with dogs)	ulúpu ullúpu	i-ulpuu i-alpuu	u-lu-lupu	ulupaa	mua ulpu	a-lupa-li
(without dogs)	o-lápi	e-lapii	o-la-lapi	lolpaa	mua lolpi	a-lalapa-li
hurry	a-ribúŋu	e-ribuŋuu	a-ri-bu-buŋu	ribuŋaa ribuŋa	mua ribuŋu	
imitate	a-ŋyaráro	e-ŋyararoo	a-ŋya-ra-raroo	ŋyararara	mua ŋyararoo	a-ŋerarwa-li a-ŋyarava-li
journey (short) (long)	mo-bráni mo-brabráni	e-bar-baranii	mo-bra-bra-brani	m-bar-baraa	mua mbarbara mua mbarbarani	mo-brabarna-li

jump	tilibwáli	i-tlebwalii	tel-bu-bwali	tlibubwala	mua tlebwali mua tlibwali	
kick (slightly)	u-kvá0i	i-kiv0ii	u-kvi-kva0i	kiv0aa	mua kiv0i	a-kiv0a-li
kick (very hard)	u-kdáŋi	e-kadŋəə	o-kda-kdaŋi	kodŋaa	mua kwədŋə	
kill	pa-témdu	i-ptemuduu	pa-te-mu-mdu	ptemuda	mua ptemudu	patemuda-li
kindle fire (start fire)	te-púru	i-tepruu	te-pu-puru	te-praa	mua tepru	a-tepra-li
kiss	u-múmu	i-mumuu	u-mu-mumu	u-mumwaa	mua u-mumu	a-mumwa-li
kneel	o-pkóro	i-pakruu	o-pko-pkoro	pokuraa	mua pokru	a-pkora-li
knock, tap	u-gŋúgŋu	i-gŋugŋuu	u-gŋu-gŋugŋu	guŋguŋa	mua guŋguŋu	a-gŋuguŋa-li
know	u-rgúu	i-riguu	u-rgi-rguu	rigwaa	mua rigu	a-rigwa-li
introduce	tililáa	i-tililaa	tilililaa tililllaa	tililaa	mua tilila	a-tilla-li
laugh	a-ŋriŋrĺi	i-ŋirŋirii	a-ŋri-ŋriŋrii	aŋirŋiryaa	mua aŋirŋiri	a-ŋirŋira-li
guffaw	a-vḍəvḍə	e-vaḍvaḍii	a-vḍə-vḍəvḍə	a-vaḍvaḍa	mua avaḍvaḍi	avḍavḍa-li
smile	paŋurĺci	i-pŋurcii	pa-ŋruŋrici	pŋuricaa	mua pŋurci	paŋurŋurica-li
leak	mu-tḍúu	i-tuḍuu	mu-tḍutḍuu	m-tuḍwaa	mua m-tuḍu	mutḍwa-li
lend (cf. borrow)	pe-sdámi					
lick	u-dnée	i-dinee	u-dni-dnee	dniraa dinyaa	mua dine	a-din-dinra-li
lie down	e-brári	e-barəə	e-bra-brari	e-baraa	mua ebari	e-brabra-li
lift (over head)	porgári	i-pragrii	por-gar-gari	pragraa	mua pragri	porgara-li porgana-li
lift from the ground	u-rúgu	i-urguu	u-ru-rugu	urgaa	mua urgu	a-ruga-li
carry with hand(s)	tikkĺli	i-tkiklii	ti-kikkili	tikiklaa	mua tkikli	a-tikila-li
light fire (for illumination)	u-ptĺŋi	i-ptiŋii	u-p-ti-tiŋi	ptiŋa	mua ptiŋi mua putiŋi	a-ptiŋa-li
light match(es)	u-tklsi	i-tiksii	u-tki-tkisi	tiksaa	mua tiksi	a-tkisa-li
like	ma-ḍlámi	i-k-ḍalməə	ma-ḍla-ḍlami	m-ḍalmaa	mua mḍalmə	ma-ḍlama-li
love (like each other)	maka-ḍlámi	i-pak-ḍalmii	maka-ḍla-ḍlami	mak-ḍalmaa	mua mak-ḍalmi	maka-ḍlama-li
located, find, discover	mo-kunúu	i-kunuu	mo-knu-knuu	m-kunwaa	mua m-kunu	mo-kunwa-li
lose	mu-dídi	i-didii	mu-di-didi			
make lose	po-dídi	i-pdidii		pdidava	mua pdidi	
marry, get married	sa-plâŋni	i-spalaŋnii	sa-pla-plaŋni	spalŋana	mua spalŋani	
marry	u-sírı	i-sirii		siraa	mua siri	a-sira-li
marry	ki-sírı	i-ksirii		k-siraa	mua k-siri	a-kisira-li
marry each other	ma-sa-sírı	i-p-sa-sirii	masa-si-siri			
get engaged	setováni	e-stovanəə	seto-va-vani	stovanaa	mua stovani	setovana-li
divorce	ma-vâge	i-pa-vagee	ma-vag-vage	mavagyaa mavagraa	mua mavgee	
measure	u-kiti u-kkiti	i-kikitii	u-kikiti	i-kiktaa	mua i-kikti	a-kikta-li

meet (each other)	ma-ʤisŋi	i-p-ʤa-ʤisŋii	ma-ʤis-ʤis-ŋi ma-ʤsi-ʤsiŋi			
meet/greet s o , pick up s o	u-ʤsiŋi	i-ʤisŋii	u-ʤsi-ʤsiŋi	ʤisŋaa	mua ʤisŋi	a-ʤisŋa-li
mistake, transgress	pa-slɛ́le	i-psalii	pa-sle-slele	psalilaa	mua psali	paslela-li
mix (stir)	o-nóno	e-nonoo	o-nonono	nonwaa	mua nono	a-nonwa-li
mix things	paibúbu pebubúu	i-paibubuu e-pebubuu		paibubwaa pebubwaa	mua paibubu mua pepebuu	a-paibubwa-li pebubwa-li
mixed	maibúbu mebubúu	i-paibubuu e-pebubuu				
move (things)	apaíla	i-pailaa	a-pa-il-ila	pailaa	mua paila	a-paila-li
move	aíla	i-ilaa	a-il-ila	ailaa	mua aila	aila-li
open	wa-					
pass	u-rbáti	i-ribtɔɔ	u-rbi-rbati	ribtaa	mua ribtɔ	a-ribata-li
patch	o-ckópo	i-cakpuu	o-cko-ckopo	cokpaa	mua cokpu	a-cokpa-li
peel (with hand)	u-ŋcúu	i-uŋcuu	u-ŋcu-ŋcuu	ŋucwaa	mua ŋucu	a-ŋuca-li a-ŋucwa-li
peel (with instrument)	o-k0ábi	i-ka0bɔɔ	o-k-0a-0abi	kwa0baa	mua kwa0bɔ	a-kwa0ba-li
pick up	u-skúlu	i-sukluu i-skuluu	u-sku-skulu	suklaa	mua sukluu	a-skula-li
pierce (with sharp object)	u-cbáki	i-cubkɔɔ	u-cba-cbaki	cubkaa-nyaa	mua cubkɔ	a-cubka-li
pinch	o-krátpi	i-kratpii	o-k-rat-ratpi	kortepa	mua kortepe	a-kratpa-li
play alone / together	malívi / malilívi	i-plilivii	malililivi	mliliva	mua mlilivi	maliliva-ta
pound (rice)	sirbúu	i-stribuu	sirbibuu	sribwaa	mua siribu	asiribwa-li
pout	aŋvalválkɔ	i-ŋevlavlakii	aŋvalvalvalkɔɔ	ŋevlavlakaa	mua ŋevlavlaki	ŋevlavlaka-li
praise	ska-rgíi	ikragii				
pray	u-skúbu	i-sukbuu	u-skuskubu	sukbaa	mua sukbu	a-sukba-li
pull	u-blíbli	i-bliblii	u-bliblibli	bilbila	mua bilbili	a-bilbila-li
drag, pull heavy things	o-grósu	e-grosuu	o-gro-su-su	grossaa grosusa	mua grosusu	a-grosa-li
punish someone	pa-tsávŋu	i-ptesvoŋoo	pat-sav-savŋu	psavŋaa	mua psavŋu	patsavŋa-li
undergo punishment	o-svóŋo	i-savŋuu	o-svo-svoŋo	sovŋaa	mua sovŋu	a-sovŋa-li
push	u-ʤúʤu	i-ʤuʤuu	u-ʤu-ʤuʤu			
put, set	apwáa	i-puaa [i.pu.waa]	a-pu-pwaa			
quarrel, fight	makavlaa					
rain	u-ʤáli	i-uʤii	u-ʤu-ʤali			
raise one's hand	po-gari rima					
read, study	ussipi, sulati					
remember	aŋuríŋo	i-ŋuriŋoo	a-ŋuri-ŋuriŋo			
repair	u-kúla	i-kulaa	u-kulula			
heal, see a doctor	bu-shwáa	i-bsabwanii	bus-bu-bwaa			
replace, change	o-bré0e	i-bar0ii	bar-bre-bre0e	bubar0aa		

rest, repose, stop	e-sasɖáa	e-sasaɖaa	esasasɖaa	esasaɖaa	mua esasaɖa	
rest, be at home	e-bréve	i-barvii	e-bre-breve	ibarvaa	mua ibarvi	
request	u-púŋu	i-upŋuu	u-pu-puŋu	upŋaa	mua upŋu	
return (home)	a-bíri	i-birii	a-bi-biri	abiraa	mua abiri	
return	u-kláa	i-kilaa	u-kli-klaa	klaa	mua la-klaa	
ride (horse, in car)	kiúdu [ki.wu.du]	i-kiuduu	ki-i-udu	kiudaa	mua kiudu	
rub (to clean) object	u-kɖúkɖu	i-kɖukɖuu				
rub to clean clothes	o-ktáktu	i-ktaktuu				
massage	o-momíci o-mimíci	e-momici e-mimicii	o-mo-mmici o-mi-mmici	momica-ŋkwaa mimica-ŋkwaa	mua momici mua mimici	
run	u-ptáki	i-pitakɔɔ	u-pti-ptaki	pitkaa	mua pitkɔ	
say, talk	ma-sobkáa	i-psobakaa	maso-bka-bkaa	msobaka	mua msobaka	
converse (two people)	ma-báka	i-pabakaa				
(many people)	ma-bka-bkáa	i-pa-bak-bakau				
scold	ma-gaúcu [ma.ga.wu.cu]	i-gaucuu	maga-u-ucu [ma.ga.wu.wu.cu] [ma.ga.wu:.cu]	mgaucaa	mua mgaucu	
scratch	o-gcágcɔ	e-gcɔgcɔɔ	o-gcɔ-gcɔgcɔ	gocgaca-ŋkwaa	mua gwacgacɔ mua gwɔcgacɔ	
scratch ground (as bird)	u-krukru 'dig'					
see	u-cŋíli	i-ciŋlii	u-cŋi-cŋili	ciŋlaa	mua ciŋli	
look on all sides	pa-cŋi-cŋíli	i-pa-ciŋ-ciŋlii				
look at each other	ma-ciŋli ma-cacŋíli					
to show	pa-cŋíli					
seek, search for	u-salpi					
search for each other	ma-silpi	i-psasilpii				
seize cf. grasp						
sell, buy	o-lŋée	i-laŋee	o-lŋe-lŋee	loŋaa	mua loŋe	
set free	pa-gyáa					
sew	u-ckúu / u-cikuu	i-cikuu	u-cki-ckuu		mua ciku	
shake	u-lkílki	i-lkilkii	u-lki-lkilki	liklika	mua liklíki	a-liklika-li
shave	o-kmesmése	i-kmesmesee i-kumsamsii		kumsamsyaa	mua ku-msamsi	a-kumsamsa-li
shine, glitter	u-lmilmáci	i-limlimcii	u-lmi-lmilmaci	limlimcaa	mua limlimci	
shoot (with arrow)	o-pnáa	i-panaa	o-pna-pnaa	ponaa	mua pona mua pwana	opona-li
shoot (with firearm)	u-kwáŋi / u-kwɔŋɔ	i-kwɔŋɔɔ	u-ku-kwɔŋɔ	kwɔŋaa	mua kwɔŋɔ	
shoot (spear)	o-sbáki	i-sabkɔɔ	o-sba-sbaki	sobkaa	mua sobkɔ	
shout	o-piárci [o.pi.a.rci] [o.pya.rci]	e-pyarcii				

sing	u-θnée	i-θinee	u-θni-θnee	θiniraa	mua θme	a-θnira-li
sit	innúu	i-nunuu	i-nnu-nuu	i-nunwaa	mua inunu	
sit in chair	innuu akari					
sit on floor	innuu dedaa					
sleep	seríki	i-syerkii i-syarkii	sya-ri-riki	serkaa	mua serki	
sow	probóo	i-prabuu	por-por-boo	purabwaa	mua purabu	
smell	u-sbáre	i-sbaree e-sbaree	u-s-ba-bare o-s-ba-bare	sobryaa	mua sobree	
sneeze	o-rámi	e-ramii	o-ra-rami	ormaa	mua ormwa	
snore	o-ŋráŋru	e-ŋraŋruu	o-ŋra-ŋraŋru	ŋorŋarwaa	mua ŋorŋoro mua ŋorŋaru	
slander	teváa	e-tevaa	te-va-vaa	tyavaa	mua teva tyava	
soak	o-tbɔrɔ	i-tabrɔɔ	o-tbɔ-tbɔ-rɔ	tobraa	mua tobrɔ	
speak	apbáka	epobakaa	ap-bak-baka	apobkaa	mua apobkaa	
talk to oneself	maso-bka-bkaa				mua mabkaa	
discuss (2, 3 people)	ma-bka-bkaa				mua mbakbaka	
discuss (many people)	ma-bak-baka					
spit (saliva)	u-sŋáre	i-syaree	u-s-ŋa-ŋare	soŋryaa	mua soŋree	
spit (things)	u-spáa	i-supaa	u-spu-spaa	supaa	mua supa	a-supa-li
become split	ma-vkáθi	i-k-vakθɔɔ	ma-vka-vkaθi	mvakθaa	mua mvakθɔ	ma-vkaθa-li
to split	u-vkáθi			vokθaa	vokθi	a-vakθa-li
separate, divide	u-vláa o-vláa	i-valaa	u-vla-vlaa	volaa val-valaa	mua vola	a-vala-li
divide into two parts	pa-vala					
divide among many	pa-vvala pa-val-vala					
squeeze with hand/finger	u-mici o-mici	e-micii	o-mi-mici	micaa	mua mici	a-mica-li
squeeze with body	u-ɖkísi	i-ɖiksii				
stand	irŋídli	i-riŋdilii	i-r-ŋid-ŋidli	riŋdila	mua riŋdili	
stand or sit straight	idŋilsi					
stare at	tikuklúŋu	i-tkukulŋuu	tiku-klu-kluŋu	tkukulŋaa	mua tkukulŋu	
steal, rob	kiupáa [ki.yu.pa:] [ki.wu.pa:]	i-kiupaa	kiu-pu-paa	kiupaa	mua kipaa	a-kiupa-li
thief	ki-pupaa	i-kiupupaa				
step, tread	u-ɖiɖi	i-ɖiɖii	u-ɖi-ɖiɖi	ɖiɖaa	mua ɖiɖi	
trample crops	u-fki	i-ikii [yi.yi.kii]	u-i-iki [wu.yi.yi.ki]	ikyaa	mua iki	
sting of bees	u-kpíci	i-kupcii	u-kpi-kpici			
stung by bees	ki-kpíci			kipcaa	mua kpici	
sting of mosquito	o-tatmólo	i-tatamluu	o-ta-tatmolo	totmalaa	mua totamlu	

stung by mosquito	ki-tatmolo ke-tatmolo	i-ktatamluu		ktatamlaa	mua ktatamlu	
suck	u-0pi0pi	i-0pi0pii	u-0pi-0pi0pi	0ip0ipa	mua 0ip0ipi	
swallow	u-ridi	i-uridii	u-ri-ridi	ridaa	mua uridi	a-rida-la
sway	a-vlivli	e-vilvilii	a-vli-vlivli	vilvila	mua avilvili	a-vilvila-li
sweep	u-sópɔ u-swópɔ	i-səpəə	u-səsəpɔ	səpaa	mua səsəpɔ	
swell	a-bráki	e-barkəə	a-bra-braki			
swim	u-lŋée	i-luŋée	uly-ulŋee	luŋ-luŋraa	mua luŋluŋe	
take	mraa					
take off clothing	wa-					
try	me-láva	e-melavaa	me-lav-lava	melvaa	mua melvaa	
teach	u-brubrúu	i-bruburuu	u-bru-brubruu	burburwaa burburaa	mua burbúru	
tear up, rip	u-blíti	i-biltii	u-bli-bliti			
tell, inform (cf. introduce)	tililáa	i-tililaa	ti-lil-laa	tililaa	mua tilila	
think	apak-ɖɖɖimi	i-pakɖɖɖimii				
thread a needle	punumée	i-punumee	pu-nu-nume	punmara	mua punumee	a-punmara-li
throw	o-bóŋu	i-boŋuu	o-bo-boŋu	boŋaa	mua boŋu	a-boŋa-li
tremble	u-rikrikri	i-rikrikrii	u-rik-rikrikri	rikrikraa	mua rikrikri	a-rikrikra-li
tie (cf. bind)	u-biki					
untie	wa-biki					
use	sálke	i-salkaii	sal-ke-kee	salkyaa	mua salkee	salka-li
vomit	u-ttáa	i-tutaa	u-tu-tutaa	u-tutaa	mua ututa	ututa-li
wait	o-ɖoɖóo	e-ɖaɖoo	o-ɖo-ɖɖoo	ɖoɖava	mua ɖoɖo	a-ɖoɖva-su
wake up	pa-cúnu	i-pcunuu	pa-cu-cunu	pcunaa	mua pcunu	pacuna-li
walk	o-dváci	i-davəə				
wash/bathe	a-babnóo	e-babanoo	a-ba-bbanoo	ababanvaa	mua ababano	ababnava-li
bathroom	t-ababnava					
wash (clothes)	u-snisnóo	i-sinsinoo	u-sni-snisnoo	sensenvaa	mua sinsino	a-sensenva-li
place to wash clothes	t-sensenváa					
washing machine	t-pa-snisnava					
wash (utensils)	u-lŋisŋíso	i-lŋisŋisoo		liŋsava	mua liŋsoo	a-liŋsava-li
wash hands	mato-rimáa	i-ptorimaa	mato-ri-rimaa	mtorimaa	mua mtorima	matorimaa-li
wash one's hair	mato-orúu {ma.to.o.ru:} {ma.to:.ru:}	i-ptororuu		mto-orwaa	mua mto-orun	
wash face	mato-mcaa					
wear trousers	si-kceŋe	i-skacŋii		skacŋaa	mua skacŋi	
weave (cloth)	u-tnúnu	i-tnunuu	u-t-nu-nunu	tunwaa	mua tunun	a-tnunwa-li
weave a mat	te-spaa					
weep, cry	u-tbii	i-tubii	ututbii	tubyaa	mua tubi	a-tubya-li

	u-tubii					
weep quietly (tears)	a-pərsə́rsə	i-prəsərsəə	a-pə-rsə-rsərsə	a-pərsərsa	mua apərsərsə	a-pərsərsa-li
win (a race)	a-mára	e-araa	a-ma-mara	maraa	mua mraa	a-raa-li
wind, roll	u-prípri	ik-pirpirii ik-pripríi		pirpira	mua pirpiri	a-pirira-li
winnow	o-tpəsə	i-tapsii	o-tpə-tpəsə	topsa	mua topsi	a-topsa-li
wipe	u-ḍsíḍsi	i-ḍsiḍsii		ḍisḍisa	mua ḍisḍisi	a-ḍisḍisa-li
wound	ma-cukári					
wrap	o-cbóo	i-cabuu	o-cbo-cboo	cobwaa	mua cobu	a-cabwa-li
write	sulati					
yawn	ma-sswábi	i-psuswabii	ma-sasswabi	msaswabaa	mua msaswabi	masuswaba-li