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Patterns in Karitiana: Articulation, Perception, and Grammar


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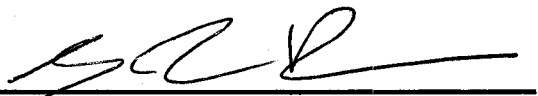
Caleb Everett

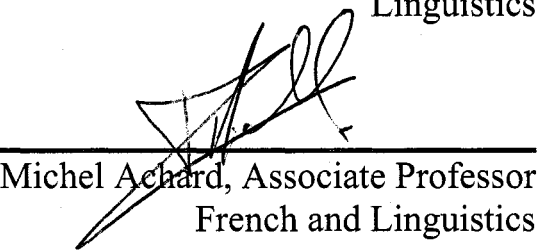
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APPROVED, THESIS COMMITTEE:


Masayoshi Shibatani, Deedee McMurtry Professor of the Humanities, Chair
Linguistics


Claire Bower, Assistant Professor
Linguistics


Michel Achard, Associate Professor
French and Linguistics

HOUSTON, TEXAS

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Abstract

In this study, I present analyses of various aspects of Karitiana, a Tupí-Arikém language spoken in the state of Rondônia, in the Amazon region of Brazil. These analyses range in both methodology and scope, but are unified by the goal of elucidating articulatory, perceptual, and morphosyntactic patterns in the language. These patterns crystallize during the course of each of two parts of the dissertation. In the first part, I focus on the sound system of Karitiana. The investigation of the sound system includes detailed analyses of the phonemic inventory of the language, as well as basic phonological processes. However, the investigation also includes acoustic, quantitatively-oriented examinations of the vowel system, stop-vowel sequences, and patterns of velar lowering, among other phenomena. These studies focus on basic articulatory gestures in the language. Basic perceptual patterns, related to the typologically-unusual patterns of velar lowering in the language, are also considered in Part I, via the discussion of a speech-perception experiment carried out among the Karitiana.

In Part II morphological and syntactic patterns in Karitiana are examined, within a functional-typological framework. Part II includes a grammatical sketch of Karitiana morphology and syntax, as well as more detailed studies of two basic aspects of Karitiana morphosyntax, namely grammatical relations and voice phenomena. I demonstrate that in some cases the latter sorts of phenomena reflect basic conceptual patterns, associated with the construal of event types, which are evident in the grammar of Karitiana.

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Preface

The Karitiana people

The Karitiana are an autochthonous Amazonian group living in the state of Rondônia in northwestern Brazil. Their reservation, demarcated by the *Fundação Nacional do Índio* (FUNAI) in 1977, consists of approximately 90,000 hectares of jungle. The majority of the Karitiana population lives in one village at the northern extreme of this reservation, located 90 km (by road) south of Porto Velho, the capital of Rondônia. The village is located at 9°17 S, 64°00 W. For more specific data regarding the Karitiana land, including a GPS-based map of the Karitiana village, see Appendix A.

Prior to my work, the most recent estimate suggested that there were 292 Karitiana (Jore 2004:9). In Appendix B, I provide evidence that the population is actually somewhat lower than this figure suggests. There are approximately 260 Karitiana alive today. While there are 36 houses in the Karitiana village, as evident in the map in Appendix A, the majority of the Karitiana divide their time between their homes in the village and Porto Velho, a city of about 300,000 inhabitants. They make frequent trips to the *Casa do Índio* ('House of the Indian'), a free dormitory operated by FUNAI in Porto Velho. In fact, there have been several occasions when over 100 Karitiana were at the *Casa do Índio* at one time.¹ There are about two-dozen Karitiana who reside in Porto Velho on a near-permanent basis. As of the time of this writing, two Karitiana families

¹ On one occasion when I visited the village there were only several dozen Karitiana present.

had also begun to settle land near the small town of Candeias, Rondônia, in the hopes of beginning a second village.

Karitiana is a Tupí language. This classification was initially made in 1968 by Aryon Rodrigues, who based his findings on a list of approximately 250 lexical items gathered by Catholic Silesian missionaries visiting the Karitiana in the 1950s. The Tupí language family is one of the largest linguistic groups in South America. It encompasses ten sub-branches, including Tupí-Guarani, likely the most geographically widespread language family branch in South America. The Karitiana language is one of two languages classified in the Arikém branch of Tupí, the other being the extinct language Tupí-Arikém, once spoken along the Candeias and Jamari rivers in Rondônia (Rodrigues 1999). According to Landin (1984:3), in 1926 M. Curt Nimuendaju published a list of five hundred words and phrases in Arikém. This list suggests a high percentage (over 90%) of lexical cognates between Arikém and Karitiana.

Arikém is one of five Tupí branches (the others being Mondé, Puroborá, Ramaráma, and Tuparí) that are spoken within a relatively small area in the state of Rondônia. Rodrigues (1999:108) suggests that this geographic distribution of Tupí languages provides strong evidence that proto-Tupí was likely spoken in what is presently Rondônia.

Many of the Karitiana are bilingual, speaking their language and the national language of Brazil, Portuguese. Proficiency levels in Portuguese vary significantly. Several of the Karitiana attend or have attended Brazilian secondary schools in Porto Velho. Not surprisingly, these Karitiana are fluent in Portuguese. By and large, the Portuguese abilities of the older generations of Karitiana are more limited than those of

the younger generations. However, there are only 14 Karitiana over the age of 50, out of a population of 260. The median Karitiana age is 28, and approximately 40% of the population is less than ten years old. Therefore, the older generations of Karitiana, with less fluency in Portuguese, represent a minority of the population. (See Appendix B for more complete demographic figures.) All of the young adults are at least conversant in Portuguese, however it should also be noted that many of the pre-elementary children are often limited in their Portuguese-speaking abilities. The first language of the people is Karitiana, even in the case of those fluent or nearly fluent in Portuguese. Most of the Karitiana young adults are literate, as there is an elementary school in the village, at which the children are taught to read and write in their language and in Portuguese.²

Apart from the school environment, the Karitiana use their native language almost exclusively when in the village. There is little evidence of the perception of Portuguese as a prestige form, in fact the avoidance of Portuguese in quotidian contexts suggests the opposite. For these reasons, it appears that the linguistic vitality of Karitiana is *relatively* strong given the circumstances. Of course, the future of any language is uncertain when it is spoken by a small number of people residing primarily within one village that is extremely susceptible to disease and other potential disasters. In August of 2004, an outbreak of bat-bites led to the medical treatment of 110 Karitiana in Porto Velho. It is encouraging to note, then, that the figure for the Karitiana population I suggest in Appendix B, 260, represents a growth of 300% since a 1974 survey performed by Rachel Landin. According to Landin (1989), there were only 65 Karitiana living at that time.

² Materials used at the school include a Portuguese-Karitiana reading book, as well as many Karitiana storybooks. The teachers at the school are mainly Karitiana, though Brazilian teachers have previously been appointed to teach in the school, by the relevant government education agency. At present, the Karitiana are petitioning for a new Brazilian teacher, so that the school in the village can offer education up to the 8th grade. At this time it only offers limited instruction to the 5th grade, without a Brazilian instructor.

Nevertheless, the future of the Karitiana language and people is uncertain when one considers the size and distribution of the population, as well as the fact that Brazilian settlements are quickly encroaching upon the Karitiana reservation. One of the primary impetuses that led me to undertake this project was the dubious long-term viability of the Karitiana language. My hope is that this work provides significant insights into various phenomena in the language, while also assisting in the general documentation and preservation of Karitiana.

Abbreviations

1PL.ABS	First person plural absolutive marker
1PL	First person plural pronoun
1PL.EXC	First person plural exclusive pronoun
1S.ABS	First person singular absolutive marker
1S	First person singular pronoun
2PL.ABS	Second person plural absolutive marker
2PL	Second person plural pronoun
2S.ABS	Second person singular absolutive marker
2S	Second person singular pronoun
3	Third person
ACCOM	Accompaniment
ADJ	Adjectivizer
ADJ.PL	Plural adjective
ALL	Allative
CAUS	Causative
COP	Copula
COP.AGR	Copula agreement
DEF	Definite article
DEM.DIST	Distal demonstrative
DEM.MAN	Manual demonstrative
DEM.PROX	Proximate demonstrative
DES	Desiderative
EVID	Hearsay evidential
FUT	Future tense
IMP.INT	Imperative, intransitive verb
IMP.TRANS	Imperative, transitive verb
INT	Intransitive
IRR	Irrealis
NFUT	Non-future tense
NOM	Nominalizer
NSAP	Non-speech act participant voice
OBL	Oblique
OFC	Object-focus construction
PASS	Passive
PROG	Progressive
PROG.PL	Progressive plural
Q	Question particle
REC	Recipient
SAP	Speech act participant voice
TRANS	Transitive
VB.FOC	Verb-focus voice

Part I

Articulatory and perceptual patterns: Phonetics and phonology

Introduction to Part I

§1.1 The general methodology of Part I

In Part I of this study I examine the Karitiana sound system in some detail, considering first the distribution of phonemes and allophones of the language. Basic prosodic and phonotactic phenomena are also examined in Part I, and a significant portion of the attention in this section is devoted to the role of nasalization in Karitiana. As we will see, nasalization and its counterpart, oralization, play a prominent role in Karitiana phonology, as in many other Amazonian languages, especially those of Tupí stock. However, I will suggest that the particular patterns of velic opening and closure found in Karitiana are fairly remarkable typologically.

In the main, the treatments of Part I are oriented according to acoustic foci. That is, most of the chapters involve detailed considerations of acoustic data, which serve to buttress the various accounts propounded. The analysis of the acoustic data often entails basic quantitative methods as well. The analyses focus primarily upon production data, though experimental perception data is crucial to the analysis of nasality. These methods are chosen, in part, because of the increased scepticism among many phoneticians and phonologists regarding transcription-focused methodologies. As various experiments have demonstrated (Port and Leary 2005:15), transcription is generally very inconsistent and errorful, regardless of the level of training of the linguist. Of course transcriptions remain a critical tool in the arsenal of the field linguist, however given the methodologies

now available they alone are insufficient for a comprehensive treatment of the sound patterns of a given language. Many sound patterns (e.g. those described by locus equations, cf. Chapter 3) are not amenable to phonetic transcription. Describing a language's sound system via transcription only is a

...questionable goal because it reflects, at least partly, our very high level of comfort with the alphabetic descriptions of a language. If it is linguistic behavior that we want to account for, then we must let go of the requirement that we also be able to write our linguistic descriptions down. (Port and Leary 2005:33)

So, while phonetic transcriptions must be employed in the description of a sound system such as Karitiana's, transcriptions alone are often insufficient for the description of various relevant sound patterns.

The phonological accounts in Part I are interspersed with the phonetic data, and this is by design, since most of the sound patterns in question are best described by appealing directly to the relevant acoustic data. As we will see in Chapters 8 and 9, for instance, the distribution of nasal consonants in Karitiana can only be accurately described by presenting acoustic data and probabilistic interpretations of such data. This is not to suggest that alphabetic, rule-based apparatuses are not employed at all in Part I. As is evident in Chapters 2, 6, 7, and 10 in particular, I employ such tools in describing phenomena such as syllable structure, stress, and reduplication. However, such tools are relied upon less than in many previous studies of Amazonian languages.

The most comprehensive previous treatment of Karitiana phonetics and phonology is found in Storto (1999). As even cursory examinations of this work and that of Storto suggest, the foci of the two studies are quite different. The primary aims of Part I are two-fold, first to systematically document the sound system of Karitiana via contemporary field methods, and, second, to uncover the basic phonetic underpinnings, both articulatory and perceptual, for the various phonological phenomena uncovered. It

is in part because of these aims that this treatment of the Karitiana sound system is based primarily upon acoustic and perceptual data, appealing extensively to basic quantitative methods and, in some cases, simple experimental tools. Given the different foci and methodologies of this work and that of Storto, it is hoped that the two studies will complement each other. Nevertheless, dissimilarities do arise between the findings in the two studies. In every case, when my findings differ from those made in the literature, I provide what I believe to be ample data buttressing the conclusions represented in this work.

§1.2 The Karitiana sound system in brief

The basic inventory of phonemes in Karitiana consists of eleven consonants and five vowels, as laid out in Chapter 2. The five vowels may contrast according to length and nasality, however, resulting in a system that contains twenty potential vowels, when one considers the possibility of short nasal vowels, short oral vowels, long nasal vowels, and long oral vowels. However, it should be noted that vowel-length contrasts, while not infrequent, do not play an extremely prominent role in the language. In this respect, Karitiana is similar to languages of the Tupí-Mondé branch, e.g. Suruí (Bontkes, p.c.), as well as at least one areally proximate but genetically unaffiliated language, Jarawara, in which vowel length is said to have a low functional load (Dixon 2005:17).

The three phonemic stops of the Karitiana sound system are focused upon in Chapter 3, where I consider their acoustic correlates, focusing primarily upon their effect on following tautosyllabic vowels via an examination of locus equations. The remaining eight consonants are considered in Chapter 4, where I produce relevant phonetic and phonological evidence, characterizing the allophones of the sounds in question.

The vowel system of Karitana is focused upon in Chapter 5, which contains the results of a Labovian-type study of the vowels of eight Karitana speakers, consisting of four male and four female speakers, representing various age groups. Normalized plots of the vowel systems of these speakers are used to investigate the vowel inventory of the language, and to contrast the synchronic state of the Karitana vowel space with the vowel shift that has putatively taken place in the Tupí-Arikém branch, according to the literature (Storto and Baldi 1994, Rodgrigues 1999:111).

The basic syllable structure of Karitana is (C) (C) V (C), with CV being the most frequent of the possible permutations of this template. This structure, along with occurrence restrictions on particular segments relative to the syllabic template, is discussed in Chapter 6.

With respect to prosody, Karitana has been previously described as a pitch accent language (Storto 1999:79). However, the data I have gathered do not corroborate this assessment. Karitana does not exhibit the characteristics of a pitch-accent language. In such languages, accent is typically realized primarily by a change in a vowel's pitch (cf. Hasegawa and Hawa 1995, for example). In fact, as I demonstrate in Chapter 7, word-level accent in Karitana is instantiated primarily by increased perceived loudness as measured in sones, and secondarily by increased vowel length and pitch. The increased loudness is due in part to an increase in *spectral tilt*.

The discussion of nasalization in Karitana, including its interaction with word stress, is left for Chapters 8 and 9. These chapters are perhaps those of greatest typological interest in Part I. In them, I consider acoustic and perceptual evidence, the latter gleaned from a speech perception experiment involving Karitana and Brazilian

speakers, in order to provide a holistic account of nasalization in Karitiana. This account includes a plausible diachronic hypothesis related to the manner in which the nasal consonants in Karitiana appear to be evolving/splitting, leading to the presence of phonemic voiced stops in the language.

Chapter 10 of this study contains an account of particular phonological phenomena not covered naturally in the discussions of the previous chapters, namely processes of lenition, epenthesis, and reduplication.

§1.3 Basic methodology and equipment

Acoustically-oriented studies of Amazonian sound systems are somewhat rare. They include Epps (2005) and Ladefoged and Everett (1996). The investigations in Part I add to the growing body of such Amazonian studies in that they rely significantly on acoustic data. Some of these data, e.g. spectra, spectrograms, and waveforms, are reproduced in Part I, in order to buttress various accounts of Karitiana phonology. However, such acoustic data are also provided in the hope that, should the reader find a particular provided account implausible or inconsistent, possible disparate accounts of the relevant phenomena can be formulated. In that sense, the greatest contribution of this effort is perhaps the presentation, rather than interpretation, of Karitiana acoustic data.³

The phonetic data in Part I were gathered at three locations: the Karitiana village, in a rented office on the outskirts of Porto Velho, and at the Casa do Indio in Porto Velho. (Most of the data were gathered at the latter location.) The office location was employed when a controlled environment was crucial to the study in question, particularly in the

³ The digital sound files on which this study is based have been archived and can be accessed by contacting the author. (In the future many of these files will be available online.)

case of the speech perception experiments. The data were excised primarily from digitally recorded word-lists and clauses.

It is generally agreed that speech recording “should include all frequencies up to 11,000 Hz” (Ladefoged 2003:26). In order to record these frequencies, a sampling rate of 22,000 Hz is required, since the frequencies recorded represent one half the sampling rate of a recording. The data used in this study were recorded with a sampling rate of 44,100 Hz, theoretically preserving all frequencies up to 22,500 Hz. Most recordings were made via a Sony FV-220 dynamic microphone, onto a Sony MZ-N10 minidisc recorder. These recordings were then stored on minidisks. Many of these recordings were transferred onto a Mac G4 laptop via Praat (Boersma & Weenink 2005) software, and archived in .wav format. This same software was employed for the majority of the acoustic analyses. In many cases recordings were also made directly onto the harddrive of the Mac G4 laptop via Praat.

The methodology employed was found to be highly effective in that the acoustic measurements were consistent. To test the consistency of acoustic measurements one need only compare the findings of one recording against those of another similar recording. For instance, one can test the consistency of ascertained formant values by contrasting the formant values of a given vowel in one word with the formant values of another token of the same vowel in a different production of the same word, produced by the same speaker. Ladefoged (2003:128) performs such a contrast with Banawa (Arawa) data, providing a correlation “between two measurements of each of F1 and F2, one measurement in the first token of each of the words, and the other in the second token of the same word.” For instance, when correlating the F1 values of stressed vowels in two

separate tokens of the same word, Ladefoged found that the F1 values of the same vowel in the first and second tokens correlated at a rate of $r^2=.96$. When correlating the F2 values of stressed vowels in the same manner, he found that the first and second tokens of particular vowels correlated at a rate of $r^2=.98$. In order to test the reliability of my acoustic data, I performed the same tests undertaken by Ladefoged with his Banawa data. As Figures 1.1-1.4 demonstrate, these tests suggest that my measurements are as consistent and reliable as the relevant measurements found in Ladefoged (2003). Figures 1.1 and 1.2 present correlations of F1 values for a twenty-two year-old male speaker and a twenty-five year-old female speaker, respectively. Figures 1.3 and 1.4 present similar correlations, this time along the F2 parameter, for the same two speakers. The r^2 values for all four correlations range between .94 and .98.

Judging from the figures below, based on over 200 hundred vowel tokens (each dot representing two tokens), we can conclude that the recordings that form the basis of this study of Karitiana sound patterns are in fact *consistent*. However, it should be noted that mini-disc recordings may potentially distort certain acoustic data, depending on the compression algorithm employed by the particular recorder, affecting their *accuracy*. The recorder in this case employs the most recent version of Sony's patented ATRAC compression system, which theoretically accurately preserves all recorded frequency information below 5 kHz. Therefore, the recorder seemed adequate for my purposes, since most of the acoustic data considered fall well within this range.

To test the accuracy of the mini-disc recordings, they were contrasted with another recording type that did not rely on compression or re-digitization.⁴ After all,

⁴ The data in Figures 1.1-1.4 are based on re-digitized data. Many of the recordings used for Part I were recorded directly onto a Mac and not redigitized. Those recordings made at 44.1 kHz on the mini-disc

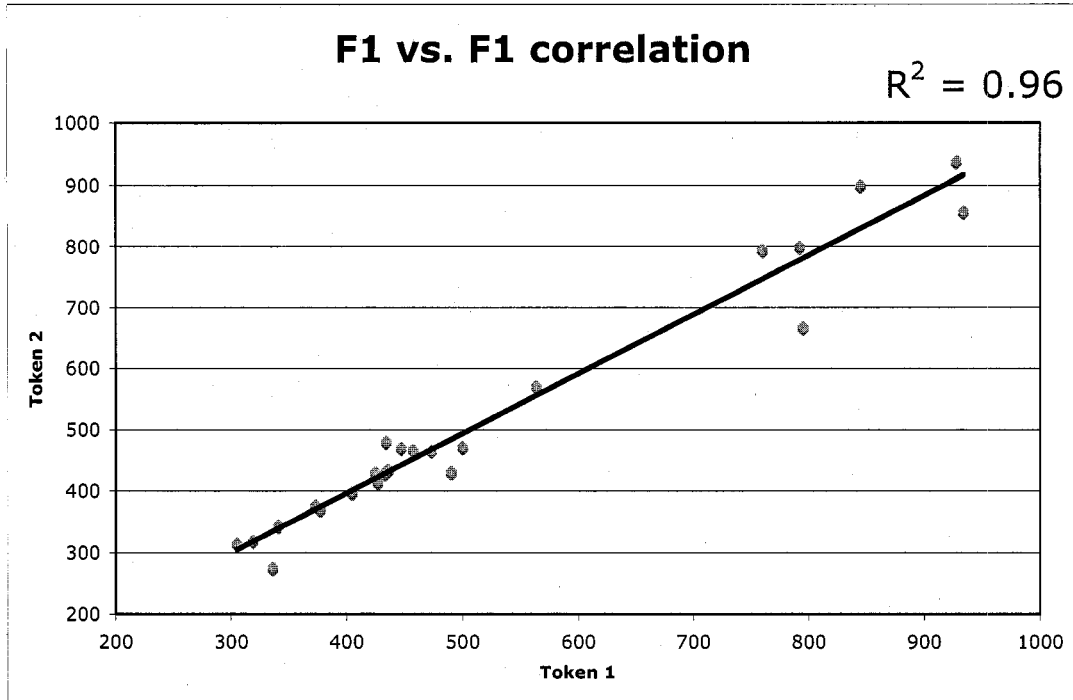


Figure 1.1 Tests of reliability of acoustic measurements based on F1. 22-year-old male.

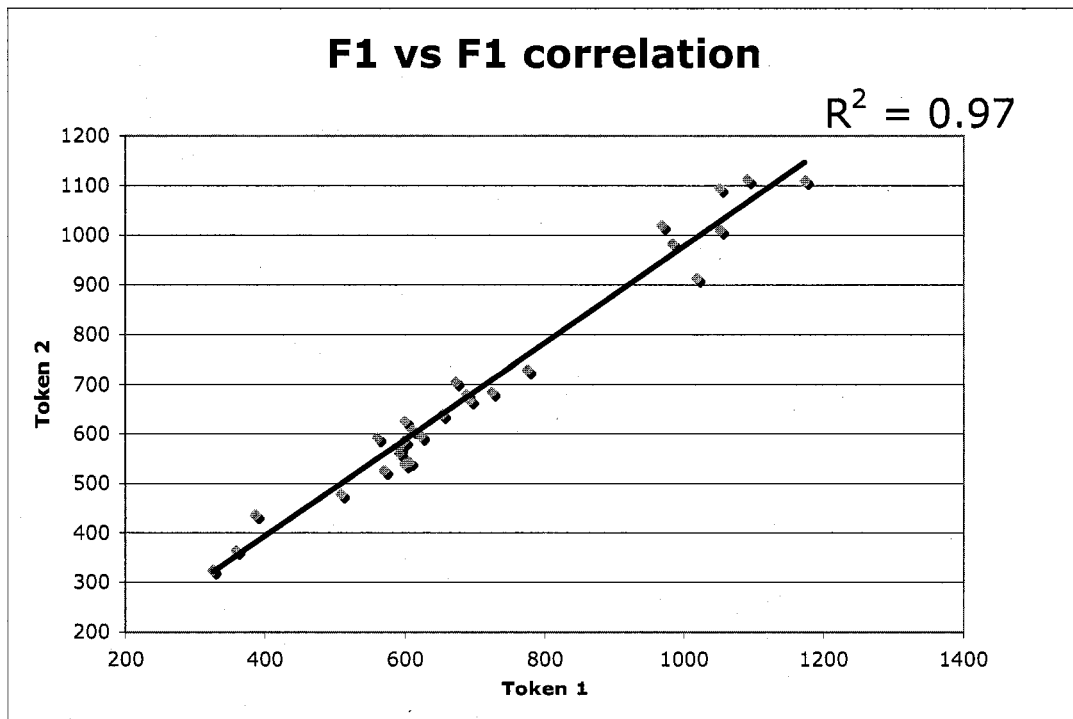


Figure 1.2 Tests of reliability of acoustic measurements based on F1. 25-year-old female.

recorder, however, were then transferred to the Mac, being redigitized at 44.1 kHz. As we see in Figures 1.1-1.4, the recordings were nevertheless highly consistent.

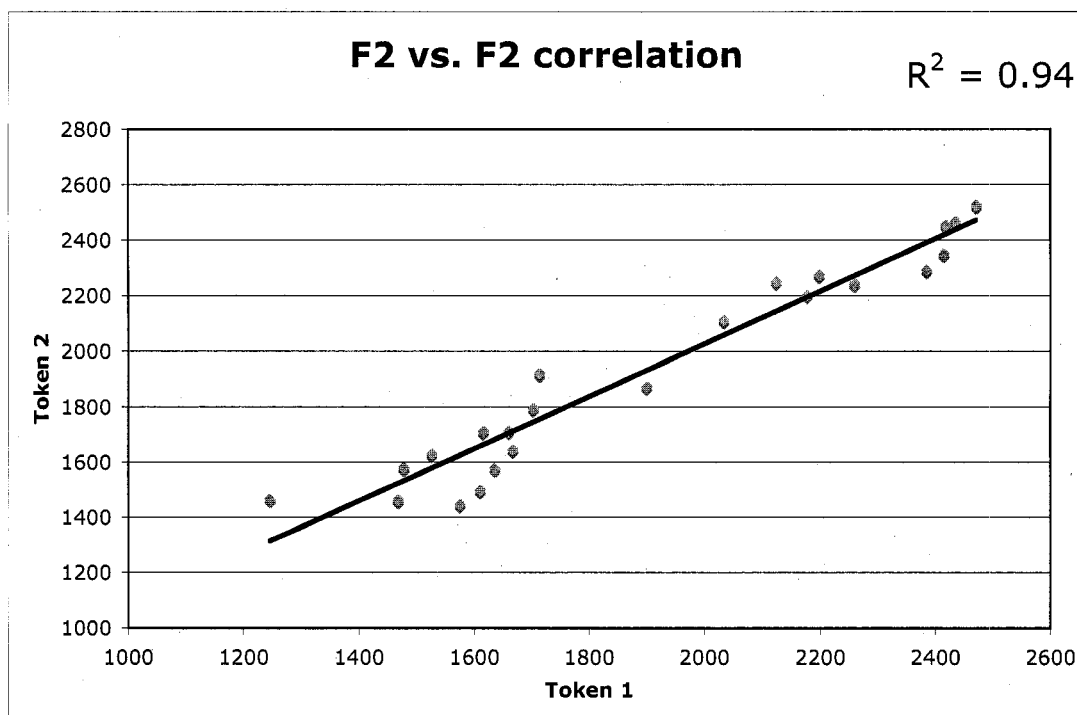


Figure 1.3 Test of reliability of acoustic measurements based on F2. 22-year-old male.

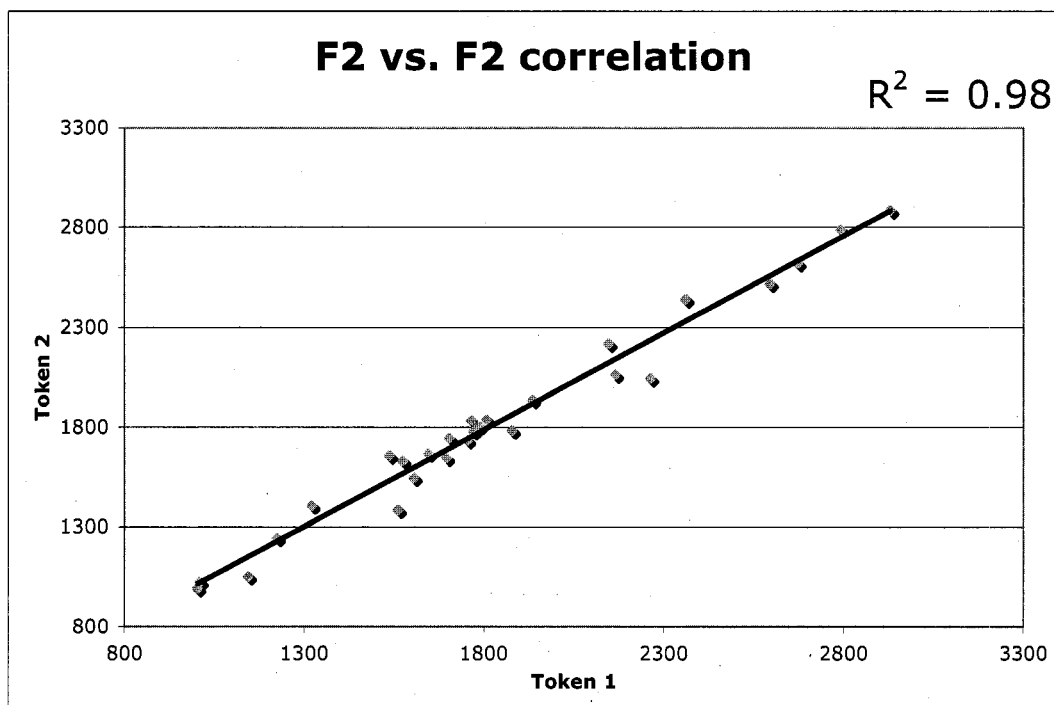


Figure 1.4 Test of reliability of acoustic measurements based on F2. 25-year-old female.

even though the mini-disc recordings were remarkably consistent (as evinced in Figures 1.1-1.4), there was a possibility that they were still flawed, i.e. that the methodology

employed was introducing some error in a consistent fashion. In other words, it was possible that the F1 or F2 values of vowels recorded on the mini-disc recorder were consistently made to seem higher or lower than they were in actuality. In order to test for this possibility, a set of recordings was made simultaneously on the mini-disc recorder and the Mac G4. As Ladefoged (2003:20-21) suggests, recording directly onto a hard drive is perhaps the most accurate method currently available for making digital recordings, and for that reason it served as an adequate contrast to the mini-disc recordings.

For these test recordings, two microphones were placed equidistant to the speaker's mouth, one leading to the mini-disc, the other to the Mac G4. Twenty vowel tokens were recorded, onto both the Mac (via Praat at 44.1 kHz) and onto the mini-disc recorder (at 44.1 kHz). The mini-disc recordings were then transferred to the Mac via re-digitization at 44.1 kHz. The recordings consisted of 4 tokens of each of the 5 Karitiana vowels. The spectrograms based on the mini-disc recordings and the Mac recordings were then contrasted. For each vowel token, an F1 reading and an F2 reading were taken at the same point of the Mac-based and mini-disc-based spectrograms, e.g. 40 ms into a given vowel token (representing the same utterance). These readings were then tabulated, so that in the end there were 20 F1 values and 20 F2 values based on the Mac recordings, and another 20 F1 values and 20 F2 values based on the mini-disc recordings. Since the formant readings were taken from the same utterances, the F1 values based on the mini-disc recordings could be contrasted with the F1 values based on the Mac recordings. Similarly, the F2 values based on the mini-disc recordings could be contrasted with the F2 values based on the Mac recordings.

The result of this test was, in short, that no significant difference surfaced between the Mac and mini-disc recordings. The F1 values of the mini-disc recordings were not consistently lower or higher than the F1 values for the Mac recordings. Similarly, the F2 values for the mini-disc recordings were also not consistently lower or higher than the F2 values for the Mac recordings. The average F1 for the 20 tokens recorded on the Mac was 537 Hz, while the average F1 values for the 20 tokens recorded on the mini-disc was 554 Hz. According to a two-tailed paired T-test, this difference was not significant ($p > .1$). The average F2 value for the 20 tokens recorded on the Mac was 1892 Hz, while the average F2 value for the 20 tokens recorded on the mini-disc was 1887 Hz. This difference was also not significant ($p > .1$). In other words, the mini-disc recordings did not result in higher or lower F1 or F2 values, when contrasted with the recordings made directly onto the Mac. Given their consistency and overall accuracy, then, recordings made by the mini-disc recorder in question were considered more than suitable for the examination of the sound patterns discussed in Part I. This is not to suggest that the drawbacks of mini-disc recordings, re-digitization and compression, do not have any effect on recordings. However, given the ATRAC compression system and a 44.1 KHz initial sampling rate, recording on mini-disc did not adversely affect either the consistency or the accuracy of F1 and F2 measurements, which are so crucial to the studies in Part I, e.g. those on locus-equations, nasalization, and vowel-formants.⁵

⁵ In fact, I should note that in some cases the mini-disc recordings were more consistent than those recordings made directly onto the Mac. The reason for this was that the recordings made on the Mac did not isolate the human speech signal as well. Instead, they often contained some indiscernible background noise that was possibly the result of low-frequency feedback originating in the computer itself.

2

The Phonemic Inventory

§2.1 The Consonants

In this study I adopt a usage-based model of phonology. In such a model, phonemes constitute “sets of phonetically similar variants” or allophones, which “are clustered in groups, such that what we analyze as allophones constitute salient contextually determined prototypes.” (Bybee 2001:53) Given these definitions of phonemes and allophones, I can state that, phonemically, Karitiana has three voiceless stops, four nasal consonants, one flap, two voiceless fricatives, and one labial approximant. The following chart contains the eleven consonantal phonemes of Karitiana:

	Bilabial	Alveolar	Alveolo-palatal	Velar	Glottal
Plosive	p	t		k	
Nasal	m	n	ɲ	ŋ	
Flap		r			
Fricative		s			h
Approximant	w				

Chart 2.1

Storto (1999:16) contains a consonantal chart of the same segments. Before proceeding, I should stress that this chart, while accurate, runs the risk of oversimplifying the consonantal inventory of Karitiana, since it does not account for diachronic trends that appear to be creating new phonemic consonants in the language. Specifically, two voiced stop segments appear to be gaining phonemic status, though it does not seem that

this status has yet been attained. For terminological convenience, I will call these segments “incipient phonemes,” and list them below:

	Bilabial	Alveolar
Plosive	b	d

Chart 2.2

As I will suggest in Chapters 8 and 9, the perceptual and production evidence available is consistent with the idea that these segments, presently allophonic variations of their homorganic nasal counterparts, are on the path toward attaining phonemic status. I set aside that discussion for now, but introduce the segments here in order to stress the point that the consonantal inventory in Karitiana is not quite as simply delineated as tables such as Chart 2.1 suggest.

The allophones of the voiceless stops from Chart 2.1 are examined in Chapter 3, while the allophones of the remaining consonants are considered in Chapter 4.

§2.1.1 Examples of consonantal contrast

The following list of minimal pairs and near-minimal pairs serve as justification for the segments of Chart 2.1, demonstrating that each of the eleven segments in question are meaningful units.⁶ These are not the only minimal pairs evident in my data, but they serve my purposes here sufficiently. The words in the minimal pair lists in this chapter are reproduced in both phonemicization and phonetic form, for the sake of clarity.

/p/, /t/, /k/

/põŋ/	[põŋ]	‘left side’	/kõŋ/	[kõŋ]	‘stomach’
/kerep/	[kerep]	‘grow’	/terep/	[terep]	‘straight,honest’
/otit/	[otit]	‘return’	/oti/	[oti]	‘bathe’
/mi/	[bi]	‘let’s go’	/mit/	[mbit]	‘pan’
/ŋop/	[ŋgop]	‘wasp’	/ŋok/	[ŋgok]	‘manioc’
/oti/	[oti]	‘moon’	/opi/	[opi]	‘ear ring’

⁶ In all cases, the minimal pairs I list in this chapter were verified during sessions with Karitiana language resource persons. A similar set of minimal pairs has previously appeared in the literature, in Storto (1999:14-20). For that reason, I do not provide a more comprehensive list here.

/m/ /n/ /ɲ/ /ŋ/

/nam/	[nām]	‘rotten’	/tam/	[tām]	‘to fly’
/patĩn/	[patʔĩn]	‘sister’	/patit/	[patit]	‘sore/rash’
/mĩ:/	[mĩ:]	‘hit’	/opĩ:/	[opĩ:]	‘cut’
/ŋoki:p/	[goki:p]	‘sun’	/oki:p/	[oki:p]	‘hot’
/ɲõɲ/	[ɲõɲ]	‘tooth’	/põɲ/	[põɲ]	‘left side’

/s/

/si/	[si]	‘urine’	/ti/	[ti]	‘mother (male speaker)’
/sõm/	[sõm]	‘red’	/õm/	[ʔõm]	‘image/picture’

/w/

/owi:t/	[owijt]	‘mother’s father’	/omi:t/	[ombijt]	‘father’s father’
/wak/	[wak]	DES	/tak/	[tak]	‘ground up’

/r/

/ereri/	[ereri]	‘cotton’	/eremi/	[eremi]	‘hammock’
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/h/

/hĩrĩɲa/	[hĩrĩɲā]	‘sing’	/nĩrĩɲa/	[nĩrĩɲā]	‘awaken’
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List 2.1 Examples of minimal pairs for phonemes found in Chart 2.1.

§2.2 The Vowels

There are five contrastive vowel positions in Karitiana: close-front /i/, close-mid-front /e/, close-mid-central /ɨ/, close-mid back /o/, and open central /a/. The vowel chart can therefore be represented most simply as follows:

	Front	Central	Back
High/Close	i		
Close-mid	e	ɨ	o
Low/Open		a	

Chart 2.3. The vowels of Karitiana.

As was mentioned in the introduction, each of these vowels may occur with contrastive nasalization and/or length, creating a vowel system with 20 contrastive units. Examples demonstrating this contrast are found in §2.2.1 below. Before providing those examples, however, I should note that Chart 2.3 is significant in that it contains a close-

mid central vowel (transcribed as [i] in keeping with the literature on Karitiana), but contains no high/close-central vowel. This is significant because previous descriptions of Karitiana vowels, e.g. Storto (1999:13) and Rodrigues (1999:111), have described the /i/ vowel in question as being of the same height as /i/. As the extensive acoustic data in Chapter 5 suggest, however, the vowel in question is somewhat closer in F1 (and articulatory height) to /e/, rather than /i/. It falls between these two vowels, but demonstrates an unequivocal differentiation with respect to the height of /i/. In this respect, the Karitiana vowel system differs synchronically from other Tupí languages, judging from studies on Suruí (Van der Meer 1982), Tupí-Guaraní languages (e.g. Jensen 1999, Cunha 1987), Karo (Gabas 1989), Parintintin (Pease and Betts 1971), and other languages. In fact, the presence of a high/close-central vowel is considered to be one of the shared traits in all Tupí languages, and for this reason Rodrigues and Dietrich (1997:268) consider this vowel to be one of the six vowels of the proto-Tupí system, along with i, e, a, u, and o.⁷

My emphasis on the fact that the previously considered high-central vowel of Karitiana is in fact not as high as /i/ may seem unnecessary. However, this discovery has phonological significance since it requires ramifications to the previous feature-based approach to the vowel system of the language. Storto suggests that, “Phonologically, the features [high], [back], and [round] are sufficient to differentiate all vowels from each other.” (1999:13) This suggestion is then repeated in chart form:

⁷ I should point out, however, that these studies do not contain acoustic data, and there is therefore a possibility that the close-central/high-central vowel mentioned in these studies is more similar to the vowel of Karitiana than the commonly-employed /i/ symbol suggests.

	-bk	+bk
+hi	i	i
-hi	e	o (+rd) a

Chart 2.4. From Storto 1999:13

The approach depicted in Chart 2.4 is not tenable, however, when we consider that, phonetically, /i/ and /i/ cannot be described as having the same height, and in fact /i/ is just as similar, if not more so, to /e/ and /o/ in terms of height (cf §5.1). As a result, it is not accurate to say, for instance, that the feature [\pm hi] is sufficient to distinguish /o/ from /i/ (as in the above chart), since these two vowels are more similar in height than /i/ and /i/. Such an account could perhaps be maintained if /i/ and /i/ demonstrated phonological affiliation of some sort, despite their phonetic dissimilarity. However, there is no phonological evidence of a specific affiliation between /i/ and /i/, either in the literature or in my data. A feature-based approach to Karitiana vowels could restrict itself to three features, however such an approach would need to appeal exclusively to the [\pm round] feature to distinguish between /i/ and /o/, rather than the [\pm hi] feature. Features aside, we can state simply that, in terms of articulation, two of the Karitiana vowels are front vowels, with /i/ being higher than /e/, while two of the vowels are centrally located, with /i/ being higher than /a/, and that one of the vowels is back, central, and rounded, namely /o/.

§2.2.1 Examples of vocalic contrast

The following is a list of some of the minimal pairs and near-minimal pairs that serve to demonstrate the contrastive status of each of the vowels found in Chart 2.3.

/i/

/pi/	[pi]	'foot'	/pi/	[pi]	'hand'
/iso/	[iso]	'fire'	/aso/	[aso]	'face'
/mikipa/	[bikipa]	'chair/bench'	/mikipa/	[bikipa]	'cockroach'

/e/

/ŋe/	[ŋge]	'blood'	/ŋa/	[ŋga]	'field'
/ŋep/	[gep]	'lice'	/ŋipi/	[gipi]	'termite'
/ep/	[ʔep]	'tree/stick'	/ip/	[ʔip]	'fish'

/i/

/ĩn/	[ʔĩn]	1S	/ãn/	[ʔãn]	2S
/piti/	[piti]	'heavy'	/pati/	[pati]	'injury'
/kiri/	[kiri]	'chest'	/kiri/	[kiri]	'later'

/o/

/o/	[ʔo]	'head'	/a/	[a]	2S.ABS
/opo/	[opo]	'penis'	/opi/	[opi]	'ear-ring'
/ot o:p/	[ot o:p]	'bamboo'	/ot ep/	[ot ep]	'bow'
/abijŋa/	[abijã:ŋa]	'to light'	/abijŋo/	[abijõ:ŋa]	'to hang'

/a/

/a/	[a]	2S.ABS	/i/	[i]	3S
/ŋak/	[ŋgak]	'lizzard'	/ŋok/	[ŋgok]	'manioc'
/ota/	[ota]	'friend'	/oti/	[oti]	'moon'

List 2.2 Examples of minimal pairs for phonemes found in Chart 2.3.

Vowels in Karitiana can be phonemically nasal or oral. However, as will be discussed at length in Chapter 9, nasality is not usually restricted to one segment when present in a given Karitiana word. For instance, when a nasal consonant occurs following an unstressed oral vowel, the vowel in question is typically nasalized to some extent or another. (See Chapter 9.) Similarly, nasal vowels affect adjacent consonants. When a nasal vowel occurs following a nasal consonant, the consonant is typically completely nasalized, e.g. [nãm], 'rotten.' However, when oral vowels occur following a nasal consonant, the nasal consonant most frequently takes the form of a pre-nasalized segment, e.g. [pëndot], 'wide.' These and other patterns related to nasality in Karitiana

are explored in depth in Chapters 8 and 9. I mention them here so that the reader may understand that, due to the extensive effects of nasalization at the word level, nasalization behaves more like a prosodic feature rather than a segmental feature. These prosodic characteristics are discussed in greater detail in Chapter 8.

One of the by-products of the non-segmental nature of nasalization in Karitiana is that it is rare to find minimal pairs in the language that are distinguished solely by the presence/absence of nasality on a particular vowel. Nevertheless, some examples are present in my data. Consider the following three minimal or near-minimal pairs, taken from various clause transcriptions:

/oi/	[oʔi]	‘sloth’	/oĩ/	[oʔĩ]	‘no’
/hi/	[hi]	‘thorn’	/hĩ/	[hĩ]	‘Y/N Q particle’
/tek/	[tek]	‘short’	/tẽ/	[tẽ]	‘spit’

List 2.3 Minimal pairs and a near minimal pair based on vowel nasalization.

As was mentioned in Chapter 1, vowel length does not carry a very heavy functional load in Karitiana, as in various other documented Amazonian languages such as Jarawara and Tupí-Mondé languages, e.g. Suruí (Bontkes, p.c.) and Gavião (Moore 1985).⁸ Nevertheless, it is not hard to find minimal pairs in Karitiana that are based on vowel length alone, as we see in the following examples:

/ke:t/	[ke:jt]	‘younger brother’	/ket/	[ket]	‘green, alive’
/o:t/	[o:t]	‘day, during’	/ot/	[ot]	‘fall’
/mi:k/	[bi:k]	‘push’	/mik/	[bik]	‘sit’
/te:rep/	[te:rep]	‘to visit’	/terep/	[terep]	‘straight, honest’
/ŋe:p/	[ge:p]	‘courageous’	/ŋep/	[gep]	‘lice’

List 2.4 Minimal pairs based on vowel length.

⁸ The presence of contrastive vowel length is insufficiently pervasive to have affected the orthography developed by Landin during the 1970’s. In Landin (1983), a Karitiana-Portuguese dictionary, there are very few entries containing long vowels (transcribed simply as geminate vowels).

§2.3 The epenthetic glottal stop

There is another segment, namely the glottal stop, which surfaces in Karitiana, yet is neither a phoneme nor an allophone of any of the above-mentioned segments. This segment can be deemed an epenthetic correlate of stress, since it occurs only prior to stressed vowels. Karitiana stressed syllables do not appear without either a consonant or an epenthetic glottal stop in their onsets. The unique, restricted distribution of the glottal stop is evident in words such as the following:

/patĩn/	[pat.ʔĩn]	‘sister’	/et/	[ʔet]	‘bee’
/it/	[ʔit]	‘father, male speaking’	/hĩm ep/	[hĩm ʔep]	‘bone’
/oi/	[oʔi]	‘sloth’	/it/	[ʔit]	‘be born’
/kinda otiap/	[ki.nda oti.ʔap]	‘medicine’	/ot/	[ʔot]	‘fall’

List 2.5 Tokens with the glottal stop.

Storto (1999:17) notes that “the distribution of the glottal stop seems predictable: it is limited to onset position in stressed syllables.” There are likely articulatory and perceptual motivations for the correlation between stressed vowels and glottal stops. Glottalization appears to be one of the primary articulatory means speakers employ in order to increase the middle frequencies of a vowel, increasing its “spectral tilt” and, concomitantly, its relative loudness (cf. Crosswhite 2004).⁹ The insertion of a glottal stop also allows for greater distinctness of the following stressed vowel, since as a result of glottal-stop insertion the vowel in question experiences fewer co-articulatory effects resulting from the previous phonemic segment’s production. The glottal stop epenthesis, then, leads to increased loudness and clarity of the acoustic signal of the following stressed vowel.

⁹ This idea is further explored in Chapter 7, during the discussion of Karitiana stress.

Having introduced the phonemes of Karitiana, I turn my attention now to a phonetic description of these segments and their allophones, beginning with the series of three voiceless stops.

3

Voiceless stops and their phonetic correlates

§3.1 Distribution

The three voiceless stops of Karitiana, /p/, /t/, and /k/, are not heavily aspirated in onset position, and are unreleased in syllable-final position. Consider these few examples of unreleased stops:

[si:p̚]	‘salty’	[ijpit̚]	‘five’
[hak̚]	‘here’	[hik̚]	‘rich’
[pipop̚]	‘burn’	[ʔit̚]	‘father’
[tat̚]	‘go’	[tap̚]	‘bitter’

List 3.1 Unreleased word-final stops.

Typically, the stops in question are syllabified as onsets of the following vowels. In the absence of such a vowel, the stops are unreleased as in the above examples in which they occur in word-final position. There are some cases, e.g. [pat̚.ʔin], ‘sister,’ in which a stop is assigned to a coda word-medially. These cases are extremely rare, though they do exist. As I suggest in Chapter 7’s discussion of phonotactics, such cases contradict Storto’s (1999:41) suggestion that “the only consonants that may occur word-internally as codas are nasal.”

The released yet unaspirated, and unreleased varieties of the stops in question are the primary allophones of these phonemes. However, /p/, /t/, and /k/ also surface as the lenited forms /w/, /r/, and /y/, respectively. These forms surface in those cases in which

the stops occur at morpheme boundaries prior to vowel-initial morphemes. This process is discussed further in Chapter 10.

The unreleased coda allophones are noteworthy in that they are frequently voiced throughout their production. For instance, consider the following waveform, which depicts the first syllable of the word 'pit.ʔi,' 'to eat.'

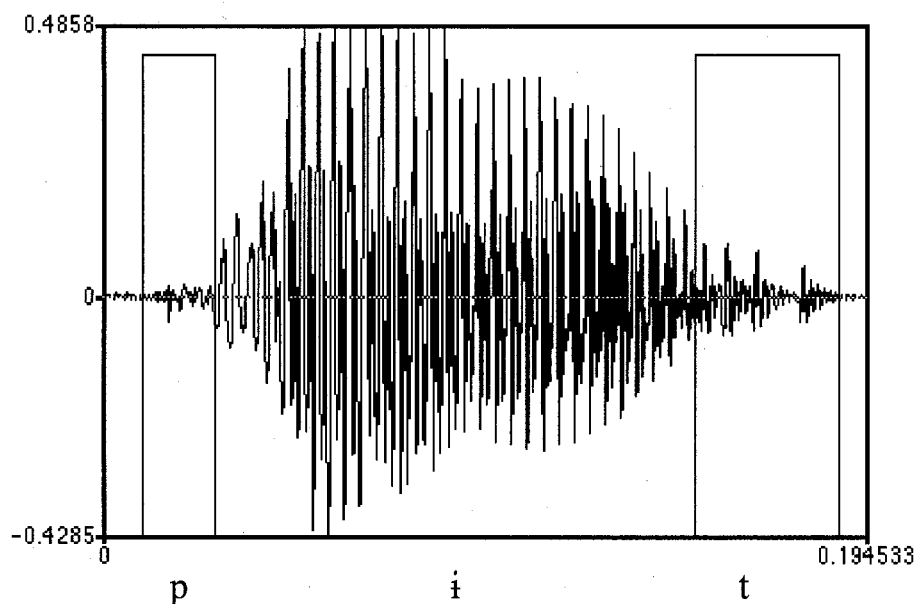


Figure 3.1. Waveform of first syllable of [pit.ʔi], as produced by a twenty-five-year-old female. X-axis represents time in seconds.

In the first rectangle of Figure 3.1, we see evidence of a weak release of the [p] segment. However, there is no high-amplitude aperiodicity, which we might expect were the segment aspirated. This waveform is fairly typical in that sense, and in general none of the three voiceless stops are described by waveforms containing marked segments of loud aperiodicity.

In the second rectangle of Figure 3.1, we see that there is a segment, lasting approximately 32 ms, which occurs after the sonorous vocalic segment, yet exhibits continued periodicity of a much greater amplitude than the segment demarcated by the

first rectangle. The segment in question is the [t] segment, but as this waveform makes clear, the periodic vocal fold movements of the vowel's production continue through the vowel and into the production of the stop. This is true of most of the coda allophones of the bilabial, alveolar, and velar 'voiceless' stops in my data. For instance, consider the following example, containing the spectrogram of a word ending in /p/:

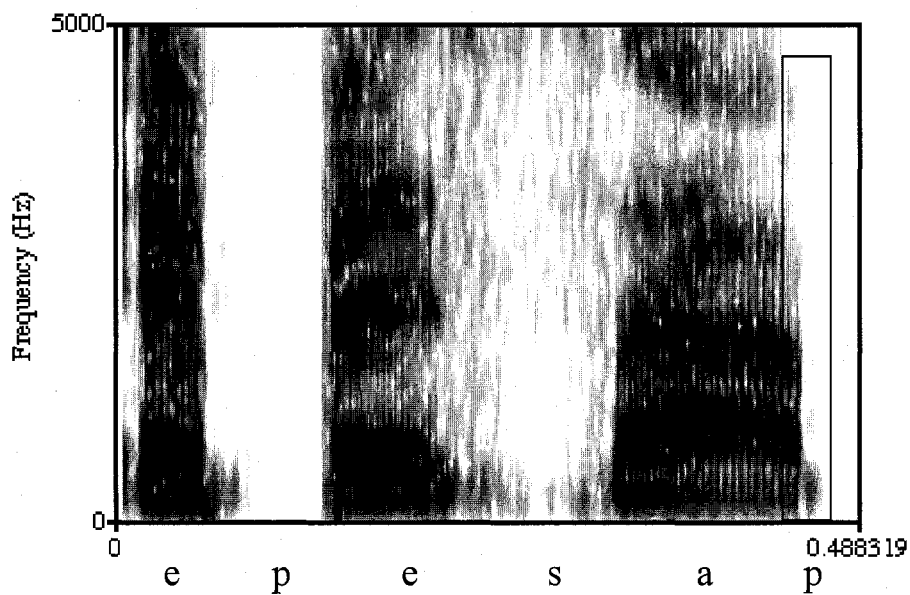


Figure 3.2. [epesap], 'leaf', as produced by a twenty-two-year-old male. X-axis represents time in seconds.

As we see in this example, the word-final /p/ of the word for 'leaf' contains some voicing, reflected by a light grey band across the bottom of the final segment, demarcated by a rectangle. This voicing lasts approximately 15 ms in this case, likely not the duration of the whole segment, since the voiceless stops in question usually approach 50+ ms. This is apparent in the first voiceless bilabial of the word in the figure, which lasts over 50 ms and is clearly not voiced, as reflected by the absence of a grey band at the bottom of the relevant portion of the spectrogram. In the following example, however, we see that the voicing of the word-final /p/ segment lasts approximately 50 ms, likely the whole duration of the closure:

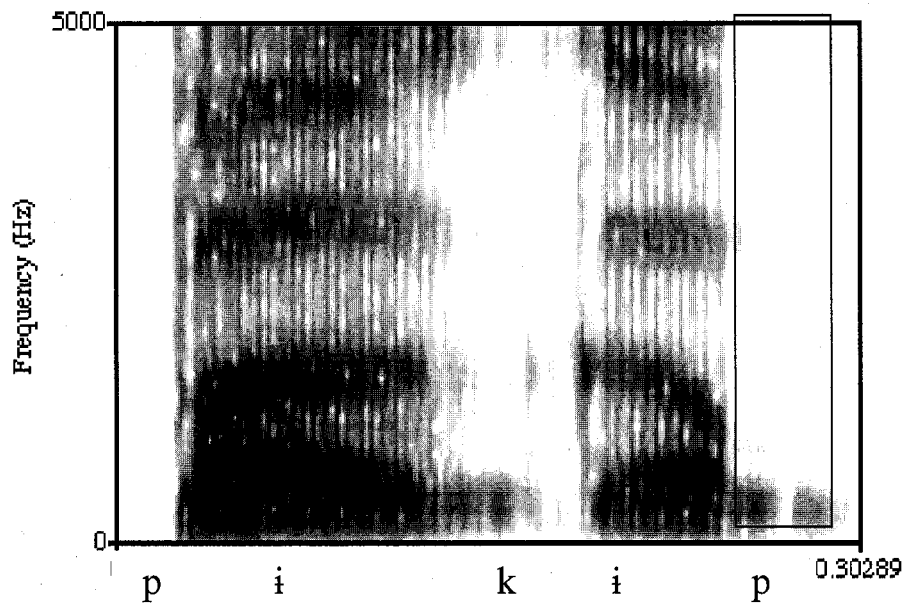


Figure 3.3. [pikip], 'skin,' as produced by a twenty-two-year-old male. X-axis represents time in seconds.

Note that the word-initial [p] in this word does not exhibit voicing. The voicing in the word-final segment in question, again highlighted by a rectangle, is fairly weak in terms of amplitude, as is frequently the case with such word-final stops.

The above waveforms and spectrograms, as well as many others I have collected, suggest that the onset varieties of the Karitiana voiceless stops can be characterized as released yet unaspirated, while the coda variety of these segments can be characterized as unreleased and usually voiced throughout all or part of its duration.

§3.1.1 Introduction to locus equation analyses

Researchers such as Delattre et al. (1955), Lindblom (1963) and Sussman (1991) have produced many studies suggesting that the place of articulation of a given stop is perceived in large part via the stop's characteristic effects on the following vowel's F2 value. The findings of these researchers are summarized succinctly in Cole et. al. (2002:2), who note that:

First Lindblom and then Sussman and his co-authors showed that there is a systematic, linear relationship between F2 measured at the onset of voicing following stop release (F2 onset) and F2 measured at the midpoint of the following vowel in a CV sequence (F2 midpoint). This relationship is characterized by locus equations, which define the slope and y-intercept of the straight line regression fits for plots of F2 onset as a function of F2 midpoint.

Locus equations, then, take the simple linear form of $y=mx+b$, where y represents the onset value of a given F2, x represents the vowel-midpoint value of the F2, m represents the regression's slope, and b represents the intercept point along the y axis, which represents a hypothetical F2 value. Taken together, the slope and intercept values of a locus equation characterizing a particular stop allow one to describe the point of origin or "locus" of that stop's F2. In other words, locus equations describe the way in which stops affect vowels so that the stops in question can be accurately perceived. Idsardi (1998:1) notes that "locus equations are approximately abstract enough to define the upper limit on phonological distinctions for place of articulations," though he also notes that such equations cannot "characterize final consonants or their relation to pre-vocalic consonants."

As an example of previously discovered locus equations, consider that Sussman (1991) demonstrated that the onset F2 of the /b/ of his English-speaking subject could be described as $y=.813x+231$. That is, the onset F2 value could be generally predicted to be .813 times the value of the following vowel-midpoint F2 value, plus 231 Hz. (This correlation held at $r^2=.959$) The locus equation describing /d/ of the same speaker was $.394x +1217$ ($r^2=.915$). Interestingly, the segment /g/ was best described using two equations, one for front velars, $y=.261x+1614$ ($r^2=.831$), and one for back velars, $y=1.223x+169$ ($r^2=.749$). (This bifurcation of the English velar POA has been verified in subsequent studies.)

Locus equations are useful when employed in order to contrast consonantal effects on following vowels. That is, by studying the locus equations associated with various stops of a language, one can better understand the manner in which the stops in that language affect following vowels. When field workers transcribe a sequence such as [pa], [ka], or [ta], nothing in such transcriptions reflects the coarticulatory effects of the stops in question. The manner in which these stops affect following vowels is a significant phonetic correlate worth uncovering, since it forms the perceptual basis of the stops. Furthermore, locus equations can also allow us, in principal, to uncover the effects of a particular vowel on preceding stop(s).

In order to better understand the phonetic realizations of Karitiana stops, we must describe not merely the acoustic correlates of the relevant segments in isolate. We should also consider the perceptual qualities of Karitiana stop-vowel sequences, since voiceless stops are largely imperceivable in the absence of adjacent vowels, which are altered by the stops in ways that reflect the place of articulation of the relevant stops. Given that locus equations explore such relationships between stops and following vowels, it is worth uncovering the locus equations that characterize Karitiana stops. In order to investigate coarticulatory phenomena in Karitiana, I ascertained the locus equations characterizing the voiceless stops of two of the Karitiana speakers represented in my data.

§3.1.2 Methodology

In order to derive the locus equations for /p/, /t/, and /k/, I examined approximately 25 tokens of each segment, for each speaker. In this way, I was able to test the transitions between each of the stops and each of the vowels an average of five times.

The vowels in question were not stressed in all cases,¹⁰ but they were carefully produced, non-reduced vowels taken from elicited words. Once the tokens were transferred to .wav format, they were analyzed according to the same methodology employed by Cole et al. (2002:5):

All acoustic segmentation and measurement was done using Praat software for speech analysis (Boersma & Weenink 2002). F2 values were taken based on Praat's automatic formant analysis using the Burg algorithm with 5 formants. F2-onset measurements were taken at the visible beginning of the second formant in the wide-band spectrogram for both voiced and voiceless stops. F2 midpoint measurements were taken at the visually determined vowel midpoint. Extreme outlier F2 measurements were hand-corrected using visual analysis of the spectrogram.

The onset measurements for this study were taken when the vowel formant first became clearly visible following the release of the consonant in question. In practice, this measurement was usually taken 15-20 ms following the appearance of an F2 formant, when formant tracking in Praat (Boersma & Weenink 2005) clearly suggested that the F2 was that of the vowel. The midpoint F2 value was taken from a point at the visual midpoint of the vowel, in a region of stability, i.e. a place that did not display drastic formant movements.

Unlike most other studies of locus equations, the segments being scrutinized were voiceless rather than voiced stops. This should be borne in mind if one were to contrast these findings with such studies. Since voiceless onsets would of course present greater voice-onset times than their voiced counterparts, it follows that the onset F2 measurements taken in my study fall closer to the vowel-midpoint F2 measurements, when contrasted to analogous measurements in other studies. As a result, we should intuitively expect higher slopes and lower y-intercept values for the locus equations in

¹⁰ Stress has been shown to affect locus equations. In Cole's data (Cole 2002:8), slope values tend to be greater in the locus equations of all stops in stressed syllables, when compared to their homorganic unstressed syllables. This suggests that stops and vowels in stressed stop-vowel sequences exhibit greater coarticulatory effect on each other, when contrasted to non-stressed stop-vowel sequences.

this study, when contrasted with studies on voiced stops. After all, the closer the onset and midpoint F2 points of measurement are, the more similar will the measured values be. (This is in fact the case.) The primary purpose of this study, however, is not to serve as a basis for comparison with previous locus equation studies, though I hope it serves that purpose also, but instead is to contrast the intralinguistic findings vis-à-vis each of the Karitiana stops.

§3.1.3 Results and Discussion

Prior to considering the results of the locus equations, it is important to consider how locus equations might be interpreted. Our expectations should be constrained by the following guidelines, taken from Cole et al. (2002:3):

The F2 value that is taken at voicing onset as part of the locus equation analysis is an indicator of the shape of the oral cavity at a specific point in the transition from the target constriction location of the consonant to that of the vowel. It is therefore in principle sensitive to the phasing of the consonant and vowel gestures. If the consonant and vowel gestures are produced with little coarticulation (a lesser degree of overlap between C and V gestures), then F2 at voicing onset should reflect more of the consonantal constriction location and less of the vowel constriction location. The resulting locus equation will have a less steep slope than in a comparable sequence produced with more coarticulation (more overlap of the C and V gestures), where F2-onset reflects more of the vowel's constriction location. *The prediction is that slope will co-vary with coarticulation: steeper locus equation slope indicates greater CV articulation.* (Italics added.)

This passage clearly states the main point to bear in mind when interpreting locus equations: greater slope equals greater coarticulation, lesser slope indicates less coarticulation between C and V, and therefore, a greater maintenance, on the part of C, of its POA constriction. Since steeper slopes signify greater coarticulation between C and V, they may be suggestive of anticipatory effects in which the place of a given consonant is malleable, and in which the POA consistently adapts to the POA of a following vowel. Steeper slopes may also be due to a combination of adaptation of a consonant's POA *and* the adaptation of the following vowel's POA.

With these correlations in mind, let us consider the locus equation obtained for a 22-year old Karitiana male speaker's /p/ phoneme, based on 25 tokens, 5 for each possible /p/-V sequence. (Nasal vowels were not considered, since nasalization often produces unrelated, somewhat unpredictable effects on F2 measurements--cf. Chapter 8.)

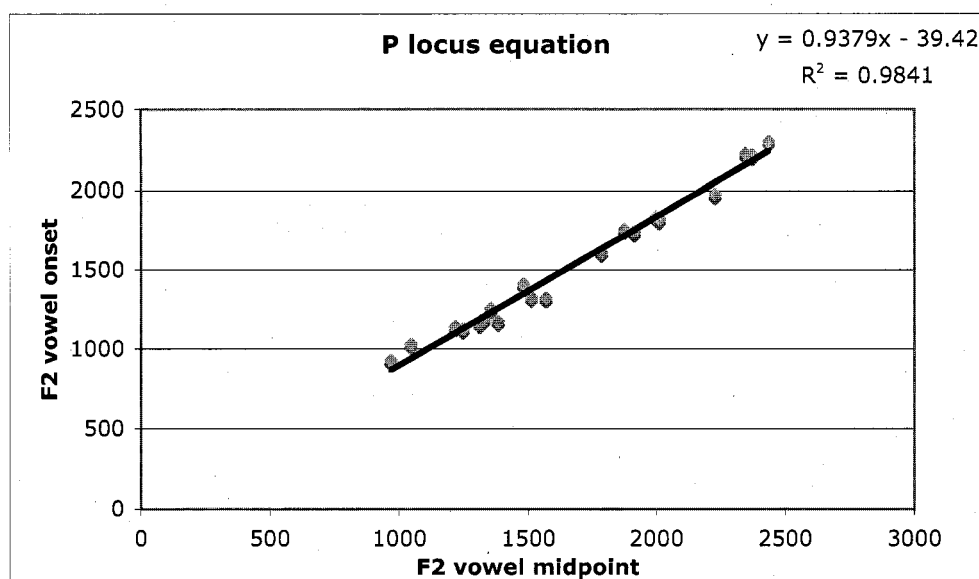


Figure 3.4. /p/ locus equation based on the speech of a 22-year-old male.

The equation based on the F2 measurements contains a slope of 0.9379, a fairly steep slope. After all, a slope of 1.0 represents a one-to-one correspondence between onset and midpoint F2 values, assuming a zero y-intercept. Also, as we will see below, locus-equation slopes are usually less steep. (For instance, the same speaker's /t/ locus equation has a slope of 0.6631.) This suggests that the onset and midpoint values for a given vowel type following /p/ tends to be fairly similar, and this pattern holds regardless of vowel type. The steep locus equation in this case does not imply assimilation on the part of /p/ to the following vowel's position, since the position of the lips cannot be drastically altered and is independent of the position of the tongue. Instead, the steep locus equation in this case simply implies that the consonant does not greatly influence the following vowels position. Nevertheless, there *are* weak coarticulatory effects between /p/ and

following vowels. Specifically, the F2 midpoint values of vowels following /p/ tend to be lower than those of vowels following other consonants. (Compare the onset values in Figure 3.4 with those of Figures 3.5 and 3.6, for example.) This suggests that vowels following /p/ are somewhat labialized as we might expect, and therefore have larger oral chambers and lower F2 values.

When we consider the graph based on this same speaker's /t/-V sequences, we find that the resultant locus equation has a less steep slope, when compared to /p/. This less steep slope suggests that there is relatively little coarticulation effect evident in the behavior of /t/. In other words, the position of /t/ is relatively fixed, unaffected by the position of the following vowel. (This is particularly evident when we compare the locus equation of /t/ with that of /k/ found in Figure 3.6.)

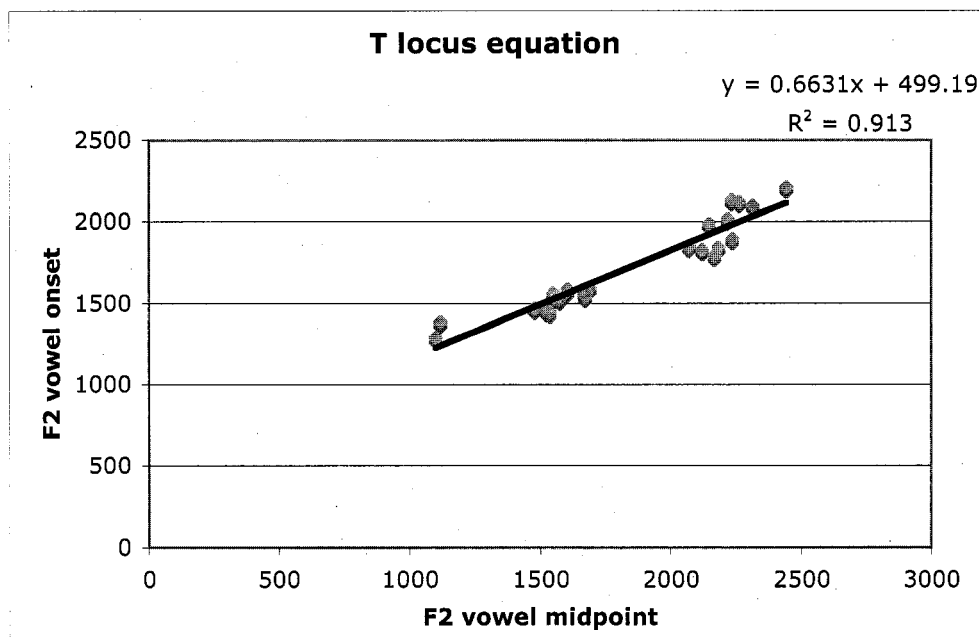


Figure 3.5. /t/ locus equation for the 22-year-old male speaker also represented in Figure 3.4.

As we see in Figure 3.5, the slope for the /t/ locus equation is much less pronounced than that of /p/, at 0.6631. Also, note that the hypothetical y-intercept is much greater than that of the /p/ locus equation. These findings suggest that the second formant and therefore

the tongue position of vowels is affected by a preceding /t/. In other words, the position of /t/ is fairly fixed and does not obviously adapt to the vowel as a result of coarticulation. Instead, /t/ tends to create higher vowel F2's in back vowels, due to the tongue's fixed alveolar placement. On the other hand, vowels with inherently high F2 values, particularly /i/, have lower onset values when following /t/. (These findings are evident by contrasting the vowel tokens of Figures 3.5 and 3.6.) In this sense there *is* coarticulation, but with the consonant affecting the following vowel's production, rather than vice-versa. The r^2 value is fairly robust in this chart, at .91, though less so than that of /p/ findings, which are extremely consistent at $r^2=.98$.

The locus equation for /k/, based on this same speaker's tokens, is interesting in that it exhibits a much greater slope than that of /t/:

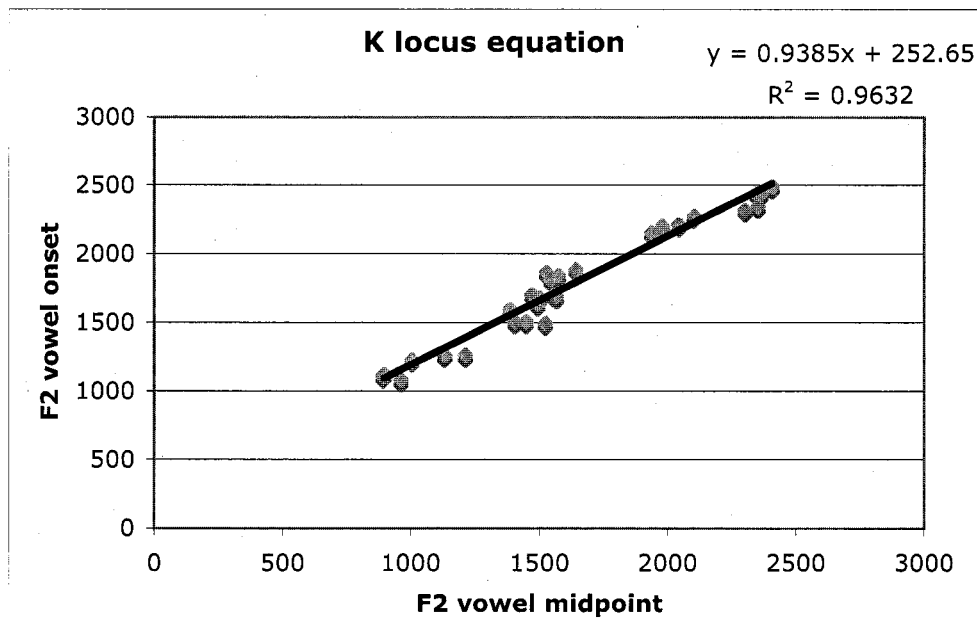


Figure 3.6. /k/ locus equation based on tokens from 22-year-old male.

The slope in this case, .9385, is nearly identical and not significantly different from that of the /p/ locus equation (.9379). Initially, such a slope may suggest that the F2 onset measurements were taken too close to the F2 vowel-midpoint measurements, essentially

resulting in two measurements of the same F2 values. However, the y-intercept value of 253 suggests that, particularly in the case of vowels with low F2 values (especially /o/), /k/ does influence the F2 value and tongue position of the following vowel. In the case of back vowels, then, /k/ tends to draw the tongue position of the vowel-onset further forward, though not to the same extent that /t/ does.

In summary, then, the locus equations for this speaker suggest that /p/ exerts little influence on following vowels, though the F2 vowel-midpoint value of following vowels is somewhat lower than the midpoint values of other vowels. This is due to some labialization of the following vowel, and suggests that the production of following vowels retains some of the lip position characteristic of /p/. The /k/ phoneme exerts some influence on following vowels, especially on back vowels, while /t/ exerts the greatest influence, with this influence also being greatest on back vowels, since such vowels are produced with constrictions furthest from the alveolar POA. Given the low slope of /t/, there is little evidence of a malleable sort of /t/ whose POA is greatly affected by the following vowel. The high slope of /k/ suggests that this segment is more malleable in Karitiana than /t/ is, with greater coarticulation effects on the POA of the segment. If this were not the case, the F2 onset value associated with vowels following /k/ would not be so similar to the F2 vowel-midpoint value of these vowels.

It is interesting to note that in previous locus equation studies on English, it has been found that the voiced velar stop cannot be accurately characterized by one locus equation. In fact, studies such as Sussman (1991) recognize the need for two locus equations to describe English /g/, one for front velars and other for back velars. These findings suggest that English /g/ in fact has two major associated POA's, one more

palatal than velar. It is interesting to note, then, that the velar stop of Karitiana is accurately described by one locus equation. This suggests that the /k/ of Karitiana is less malleable than the velar stop of English, with only one associated POA rather than two.

To this point we have considered data from only one Karitiana speaker. Before suggesting that the tendencies exhibited in Figures 8-10 are due to intra-linguistic, rather than idiolectal, factors, data from another speaker should be examined. To that end, consider the following figure, containing the locus equation for the /p/ phoneme of a 26-year-old female Karitiana speaker.

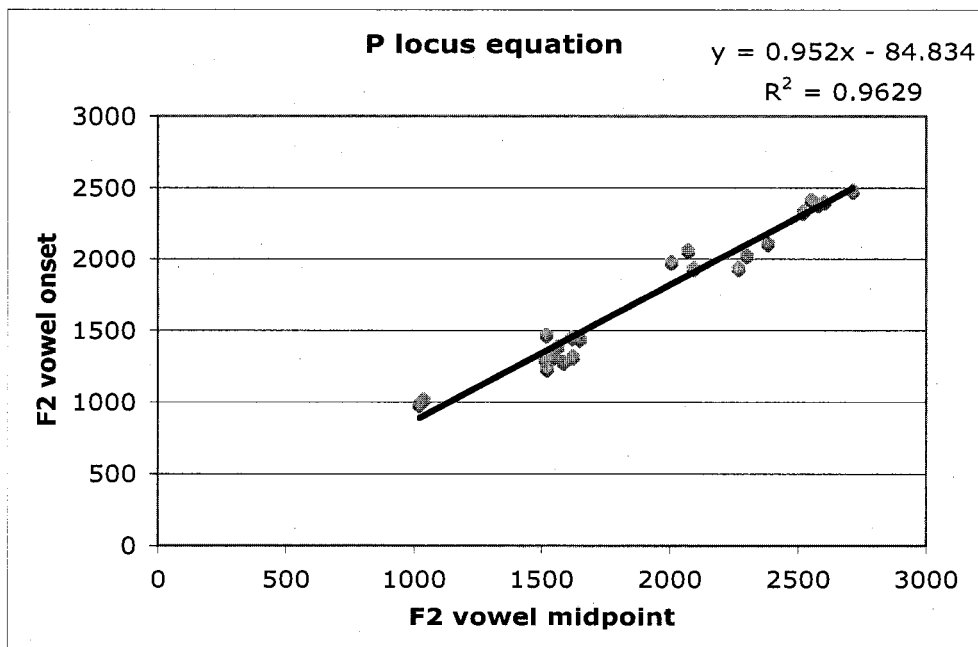


Figure 3.7. Data for /p/, from a 26-year-old female.

This locus equation is quite similar to the /p/ locus equation found in Figure 3.4, representing the male speaker's /p/. In both cases, there is a high slope and a y-intercept close to zero, suggesting that /p/ does not affect following vowel positions to a great extent. However, in both cases, the /p/ locus equation data suggest that the following vowels tend to have slightly lower F2 midpoint values than those following other consonants. (This is apparent if the onset values of Figure 3.7 are contrasted with those of

Figures 3.8 and 3.9). This suggests that vowels following /p/ tend to be slightly labialized in the case of both speakers. There is little coarticulation in that the tongue position of the vowels is, not surprisingly, generally unaffected by a preceding /p/.

Turning now to this speaker's production of /t/-V sequences, we see a similar pattern evinced as that found in the previous subject's speech:

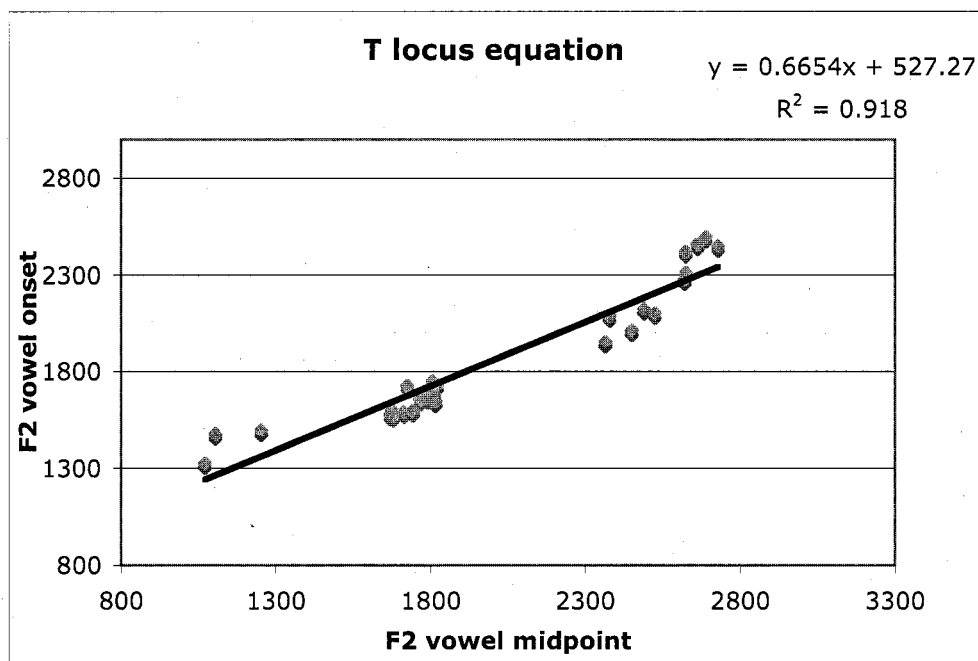


Figure 3.8. T locus equation, 26-year-old-female.

The locus equation in this figure is remarkably similar to that found in Figure 3.5. The locus equation in that case was $y = 0.6631x + 499$. In this case both the slope and y-intercept values are nearly identical. For both speakers, then, /t/ produces similar effects on following vowels. There is little coarticulation in that the position of /t/ does not appear to greatly adapt to the following vowel. Instead, /t/ affects the following vowel by creating greater F2 onset values than midpoint values, in the case of /o/ (represented by the leftmost dots in the diagram), and by decreasing F2 onset values compared to midpoint values, in the case of front vowels. (Consider that /i/ vowels, represented by the

rightmost dots, tends to have onset F2 values of around 2500 Hz, while their midpoint values hover around 2700 Hz.) Combined with the data from the first speaker, we have strong grounds for claiming that, in Karitiana, the position of /t/ is fairly fixed, and does not reflect coarticulatory effects created by the following vowel.

As in the case of the first speaker, however, the /k/ consonant of this speaker *does* exhibit coarticulatory effects, as evidenced by the fact that the F2 onset values of the following vowels are very similar to the F2 midpoint values of the vowels. Consider the relevant locus equation data:

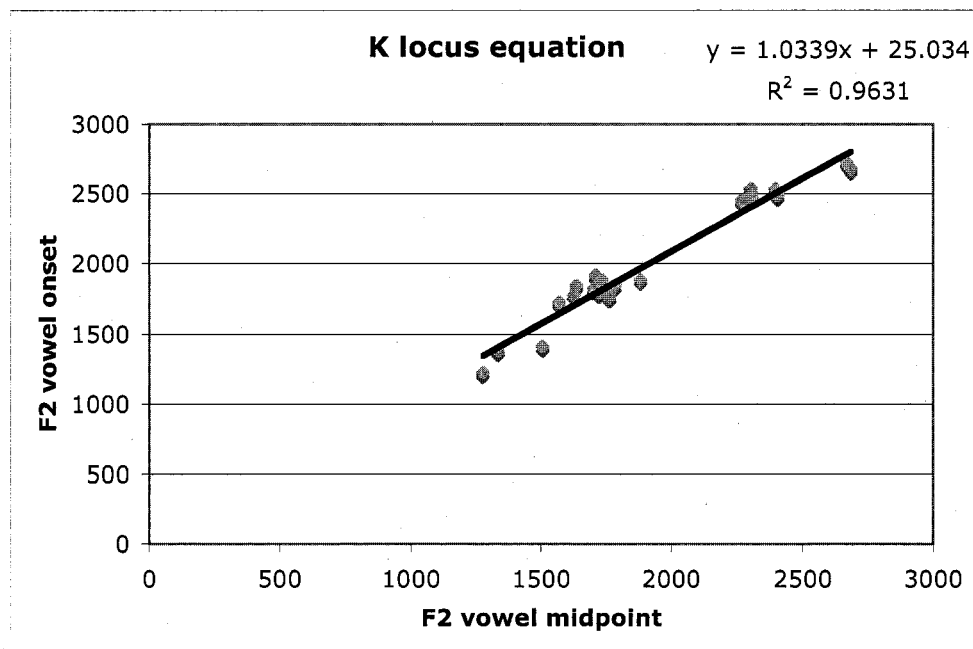


Figure 3.9. Locus equation data for /k/, 26-year-old female speaker.

The slope of the equation in this figure is about 1, suggesting that /k/ affects following vowels very little or, put another way, that the position of /k/ is affected by following vowels in a manner suggestive of coarticulation.

Based on the six locus equation figures taken from the speech of two Karitiana speakers, we can draw some general conclusions. In the case of both speakers, /t/ seems to most greatly affect the vowel onsets of following vowels. This suggests that /t/

generally exhibits less coarticulation or assimilation, when contrasted with /k/, in Karitiana. The latter phoneme presents very little effect on following vowel onset values, suggesting that the positions of /k/ tokens vary according to the place of the following vowel. Finally, the data for /p/ suggest that, not surprisingly, this segment presents little effect on the tongue position of following vowels. However, it does tend to lower the F2 values of following vowels when compared to the other two segments examined. This suggests that there is coarticulation between /p/ and following segments, in the sense that the vowels in question are somewhat labialized.

The consistency of the effects of the segments in question is somewhat remarkable, given that the two speakers of different genders produced speech characterized by very similar locus equations in the case of all three segments. Interpretation of such results calls for a certain degree of circumspection, of course, since similarities could in principle arise from methodological factors. However, if there were methodological variables exerting undue influence on the above results, e.g. the onset and midpoint measurements were taken too close to each other, we would expect these factors to affect each of the locus equations in a similar manner and reduce the differences between locus equations, rather than creating spurious differences between the equations in question. Instead, the attested differences in locus equation slopes seem to clearly result from the articulatory phenomena adduced above.

In order to emphasize the consistency of the effects of /p/, /t/ and /k/ on following vowels, I provide the following two figures, containing summaries of the locus equation data for the two speakers in question:

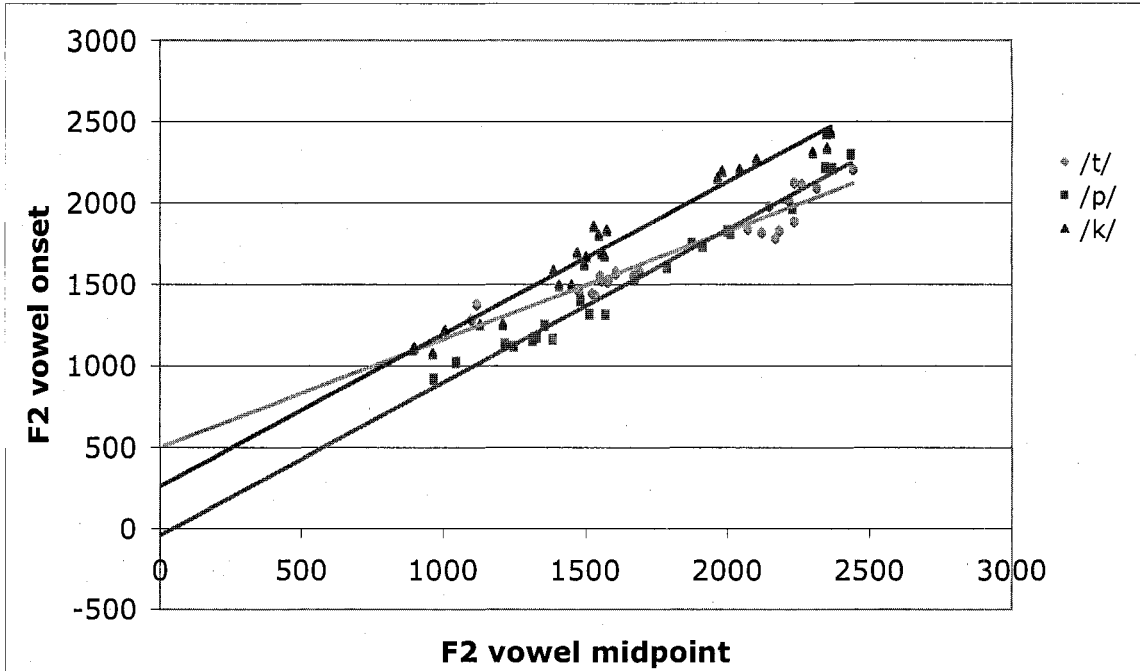


Figure 3.10. Locus equation summary, 22-year-old male.

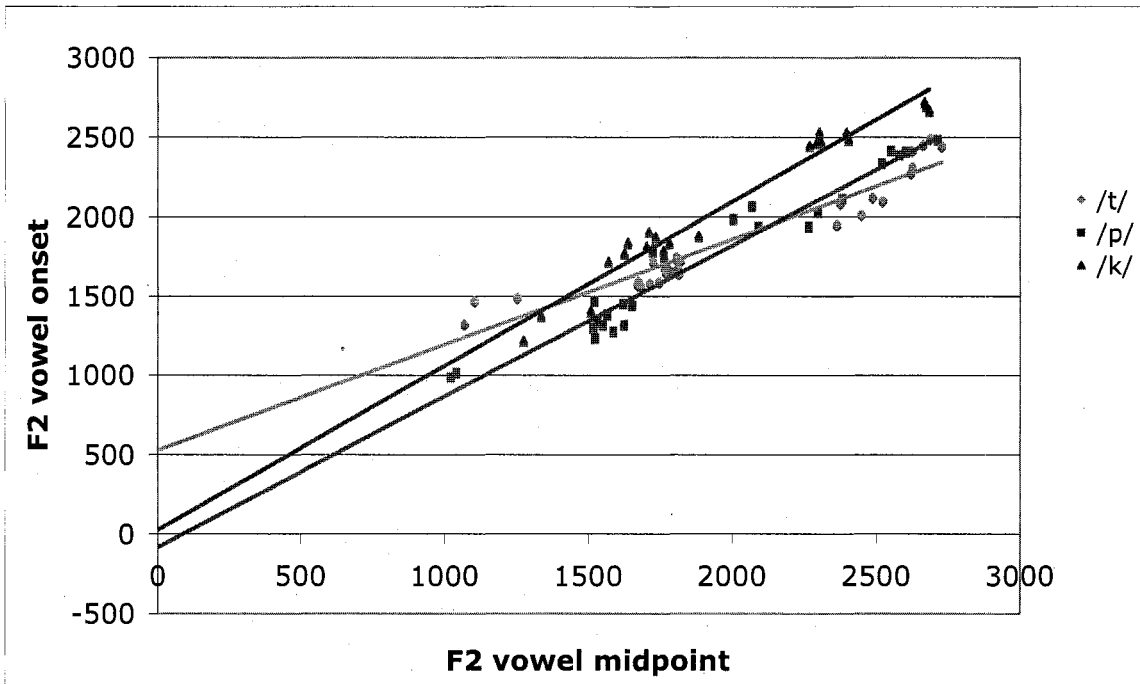


Figure 3.11. Locus equation summary, 26-year-old female.

The above figures recapitulate graphically what has been stated already, namely that there is remarkable consistency in the locus equation findings characterizing the /p/, /t/, and /k/ phonemes of the two speakers.

Before concluding the discussion of this locus equation study, it is worth contrasting the results of this study with those of a similar study's results, to see if any insights can be gleaned. Cole et al. (2002) presents an investigation of locus equations in the speech of a professional radio announcer. The purpose of the study is to investigate the effects of phrasal accent upon locus equations. For that reason the study presents fruitful contrasts with this one, since the researchers in that case separated the results of stressed and unstressed syllables. As I stated at the beginning of this section, the findings of this study are based primarily upon stressed syllables. Therefore, it is worth contrasting Cole et al.'s findings on accented syllables in English with my findings on Karitiana. Consider the following chart. In the first three columns I have placed the locus equations based on Cole et al.'s study (2002:8), and in the remaining columns I've placed the locus equations gathered from this study.

POA	English radio announcer			22-year-old Kar. Male			26-year-old Kar. Fem.		
	Slope	y-inter	r ²	Slope	y-inter	r ²	Slope	y-inter	r ²
Labial	.79	256	.79	.94	-39	.98	.95	-84	.96
Alveolar	.69	762	.60	.66	499	.91	.67	527	.92
F. velar	.48	1381	.67						
B. velar	1.03	72	.53	.94	253	.96	1.03	25	.96

Chart 3.1. Contrast of locus equations with those of Cole et al.

In general the r^2 values in my study are much higher. This greater consistency could be due to the fact that this study is based only upon voiceless stops. The greater VOT of voiceless stops results in onset measurements taken closer to the vowel midpoints, and hence greater consistency in the measurements. The contrast of these findings is actually quite useful, however. The figures related to labial consonants are only somewhat similar, but when examining the figures for alveolar consonants, we find that the slopes of the locus equations in the two studies are nearly identical (.69 for Cole et al., .66 and .67 in my study). This suggests that the tendency of alveolar consonants to

greatly influence the onset position of following vowels is found in Karitiana *and* English. In other words, alveolar consonants tend to be less malleable in terms of POA in both languages, when contrasted to velars, at least with respect to following vowel positions. Turning now to the velar consonant locus equation, there is a striking similarity between the English speaker's production of *back* velar consonants and the production of Karitiana /k/. For instance, consider that the slope of the English speaker's back velar locus equation is 1.03, identical to that of the 26-year-old female Karitiana speaker's /k/ locus equation and similar to the /k/ locus equation for the 22-year-old male. However, the locus equation characterizing the English speaker's *front* velar consonants is quite dissimilar to the Karitiana /k/ locus equations. This finding suggests, then, that Karitiana /k/ is most accurately considered a back velar stop.

Perhaps the most significant finding evident in the locus equation data is that the coronal /t/ consonant exhibits very little assimilation to a following vowel's position, when contrasted with /k/. This is significant since there is a large body of phonological literature suggesting that coronals are the likeliest targets for place assimilation of any consonant type. This is supported by most of the studies in Paradis and Prunet (1991), for example. Languages in which only coronals display place assimilation include Brussels Flemish, Catalan, German, Lithuanian, and Yakut. The fact that coronals are so frequently the target of assimilation has led some researchers to suggest that coronals are underspecified for place of articulation. As Kiparsky (1985:89) states:

By our assumption coronals are not associated with a [+coronal] melody in the lexical phonology... [coronals] can be referred to as consonants that have no specification on the tier of place features.

The findings on coronal assimilation in the literature are based upon assimilation to adjacent consonants, rather than assimilation to adjacent vowel positions.¹¹ Nevertheless, it is interesting to note that the Karitiana coronal stop exhibits *less* assimilation to vowel position, when contrasted to the non-coronal velar segment. (Based on the locus equations in e.g. Cole et al., this is also true of English.) This finding contradicts the suggestion that coronals universally lack specification for place, and supports previous suggestions in the literature, e.g. those in Hume (1992), that coronals are specified for place since in some cases they have been shown to condition the fronting of vowels. This is true in Cantonese, and after considering the results of this study, we can claim that it is also true in Karitiana.

In conclusion, this locus equation study has allowed us to carefully investigate the articulatory effects of /p/, /t/, and /k/ in Karitiana. We have found that /p/ tends to affect following vowels by resulting in their labialization and concomitant F2 lowering, /t/ affects following vowels' tongue position, in a manner that varies according to the vowel in question, while /k/ is somewhat malleable, with the following vowel exerting coarticulatory effects on the consonant. Finally, we found that Karitiana /k/ can most accurately be described as a back velar consonant. These findings better elucidate the nature of the relevant segments in Karitiana. They suggest that, to truly describe the stops, we must consider cline-like articulatory effects that seem to exist within and across the three stop categories. Only by considering the characteristic effects of each of the segments on following vowels (and vice-versa), as has been done above, can we comprehend crucial aspects of the phonetic correlates of the stops of Karitiana.

¹¹ As we will see in §10.2, the alveolar nasal in Karitiana assimilates to preceding POA's in the case of the *-na* derivational suffix.

4

The remaining consonants

§4.1 The flap

One of the areal features common to Amazonian languages is the presence of one liquid in the phonemic inventory. As Dixon and Aikhenvald (1999:8) note, based on their survey of the literature, Amazonian languages typically have “one liquid phoneme, which is frequently a flap”. Two exceptions to this tendency that I have found perusing the literature are Aguaruna (Wise 1999), a language isolate of Peru, and Pirahã, an isolate found in the Brazilian Amazon that presents a wide variety of other typological incongruities (cf. Everett 1991, Everett 2005, Everett and Everett 1984, *inter alia*). All languages of the Tupí family (Rodrigues 1999:113) contain a liquid phoneme, and in all cases the liquid in question is described as a rhotic. In Karitiana, as in most of these languages, the rhotic is best described as a voiced alveolar flap. It is evident in words such as the following:

[i.ri ^h p]	‘tapir’	[bo.ro.ti]	‘paca’ (rodent type)
[i.hĩ.fã ʔa]	‘smell’ (imperative)	[mõ.fã pip]	‘when/where?’

List 4.1 Tokens of alveolar flap.

As we see in these examples, the distribution of the flap is limited to word-medial syllable-onsets. The flap has three allophones, a nasalized variant, a non-nasalized variant, and a non-occluded variant. The first allophone is found in the last two examples above. This nasalized flap appears when the flap occurs adjacent to a nasal vowel,

whether that vowel is tautosyllabic or precedes the flap. This is perhaps not surprising when one considers the duration of the flap, which frequently lasts only 20 ms. As we will see later, velar lowering in Karitiana typically lasts much longer than this and is not structured along temporally refined parameters. The non-occluded variant, unmentioned in the literature to date, is only rarely attested in my data. It does not occur in a predictable environment and is only distinguished by the fact that, when produced, oral airflow is not completely stopped at any point during the segment. While the segment is still perceived, and the tongue tip does seem to make contact with the roof of the mouth, there is no complete occlusion of the oral cavity.

The following figure contains a spectrogram representing a Karitiana speaker's production of the word for 'frog,' *kiriti*.

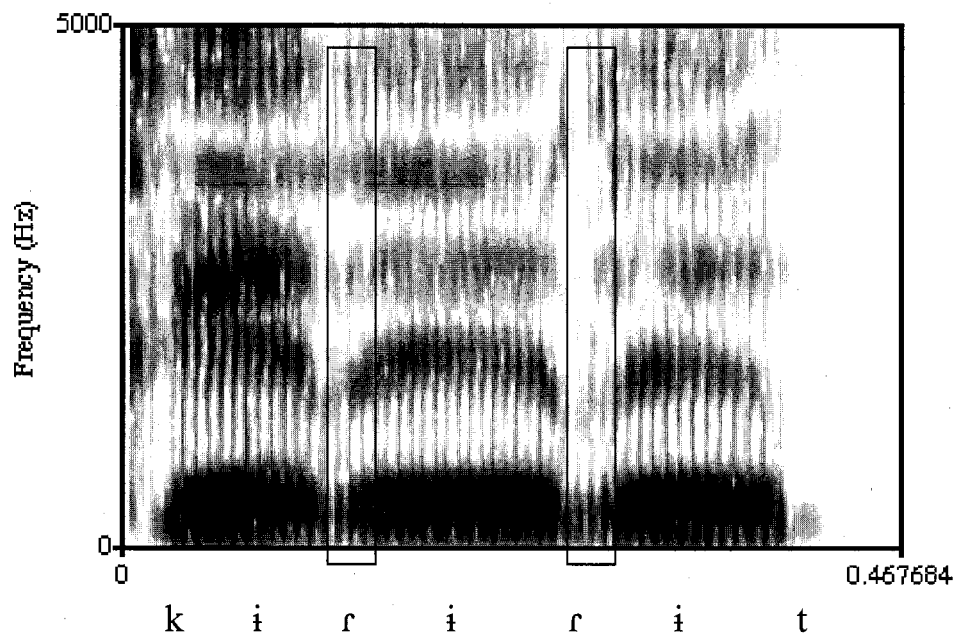


Figure 4.1. Spectrogram for *kiriti*, 'frog.' X-axis represents time in seconds.

The two rectangles in Figure 4.1 delineate flaps. As we can see in this spectrogram, the duration of the /r/ segments is very limited. In general, the flap occlusion lasts about 18-

25 ms, though occasionally it lasts as long as 40 ms. In Figure 4.1 we also observe two other characteristics of the flap. First, the F2 of the following /i/ vowels' midpoints is several hundred Hz higher than their onset F2's. This is in line with the expectations of an onset of approximately alveolar POA, though the POA cannot be precisely ascertained from spectrograms alone. Second, note that the grey band along the bottom of the spectrogram, suggestive of voicing, is present throughout the word, after the production of the first segment. The flap is, as we would expect, completely voiced.

The occluded non-nasalized variant of the flap¹² is fairly unremarkable typologically. For instance, all of the characteristics discussed above are true of the Brazilian Portuguese flap (Everett 2004), and largely true for English flaps also (Ladefoged and Maddieson 1996:231).

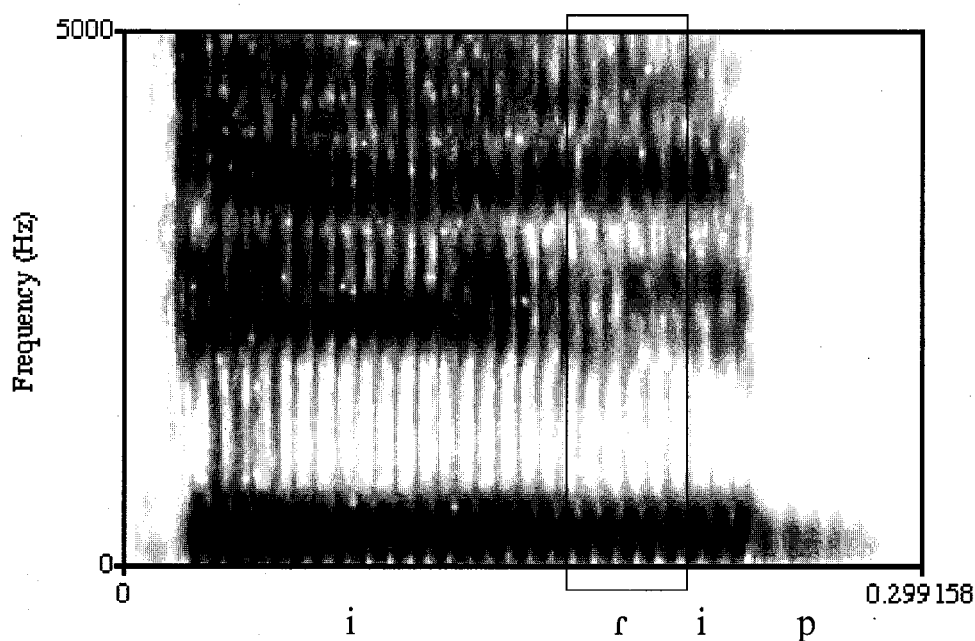


Figure 4.2. Spectrogram for *itip*, 'tapir.' X-axis represents time in seconds.

¹² I am choosing to ignore, at least for the present investigation, the distinction between taps and flaps proposed by Ladefoged and Maddieson (1996:231). Perceptually, it seems that the Karitiana /r/ could most accurately be described as a flap. However, I have not undertaken any studies (e.g. X-ray based) ruling out the possibility of a tap.

As I mentioned previously, there are instances in which the Karitiana flap does not result in total oral occlusion. Consider the above spectrogram of /i:rip/, ‘tapir’, for instance. In other tokens of this word, there is complete occlusion in the analogous location of the spectrogram that is highlighted in this case by a rectangle. In such cases, there is primarily white space where /r/ occurs, with only a grey band of voicing along the bottom, similar to those of Figure 4.1. In this case, however, the /r/, while easily perceived when the relevant sound file is played, is barely perceivable in the spectrogram. The area within the rectangle does exhibit weaker amplitude and a slight drop in F2, but definitely no complete oral occlusion. On hearing the sound file, it does appear that there is at least some occlusion, perhaps only caused by the tongue tip. Regardless, it is clear from examples such as this that the flap of Karitiana does not exceptionlessly result in total oral occlusion, though it does in most cases. This phenomenon seems to be fairly remarkable typologically.

§4.2 The labial approximant

There are two phonemes in Karitiana that do not occur word-initially, nor in coda position, even in word-final codas. The first of these is the flap, the second is the labial approximant. Much like the flap, the labial approximant is also nasalized when occurring between two nasal vowels, and more generally when occurring adjacent to a nasal vowel.

Landin (1983:67), in his dictionary, lists two words which begin with /w/. However, both of these words, *wagɪwa*, ‘wantingly’ and *wak*, ‘wanting/almost’ appear to function as enclitics. Given this fact, and given the absence of word-initial /w/ in my data,

the restriction against word-initial [w] seems exceptionless. (Excepting those cases where /p/ is reduced to [w] at morpheme boundaries, cf. Chapter 10.)

The labial approximant and the flap phoneme share similar restricted distribution patterns. In this sense the phonemes are somewhat anomalous when compared to the other Karitiana consonants. They are also anomalous in that each of the sounds is the solitary member of a particular consonant class. There are three stops in Karitiana (p,t,k), two fricatives (s,h), and four nasals (m, n, ɲ, ŋ). However, there is only one liquid (r) and one approximant (w). Karitiana approximants and liquids are anomalous intra-linguistically given their limited distribution and limited class membership. (They are not generally anomalous crosslinguistically, with the exception of the non-occluded variant of the flap.)

§4.3 Fricatives

Superficially at least, there are two fricatives in Karitiana, both voiceless. One of these is alveolar and one glottal. However, the articulatory and acoustic correlates of this latter segment are very un-fricative like, in that the shape of the vocal tract during the production of the segment is quite malleable, simply taking the form of the following vowel. This is true of /h/ in many languages, as is apparent in Keating (1988) and Ladefoged and Maddieson (1996:325). Due to this fact, L&M suggest that it “is more appropriate to regard /h/ and /ɦ/ as segments that have only a laryngeal specification [voiceless] and are unmarked for other features.” The /h/ segment in Karitiana exhibits all of the main characteristics normally associated with such laryngeal consonants, characteristics which are described in in L&M (1996) and discussed below in relation to acoustic data from Karitiana.

Despite its malleable vocal tract configuration, the /h/ segment is definitely consonantal in Karitiana. Its consonantal nature is evidenced by the fact that it cannot serve as a syllable nucleus, and by the fact that it is restricted to onset contexts, much like the other fricative. However, unlike the /s/, /h/ is characterized not by a particular place of constriction, but by the simple presence of voicelessness, in keeping with L&M's findings. The vocal tract configuration of /h/ varies in accordance with adjacent vowels, particularly tautosyllabic vowels. Lingual placement characterizing such following vowels is implemented during the preceding production of /h/. While air is expelled from the glottis during /h/'s production, the location of the bands of frication associated with this segment varies, depending on the lingual movement associated with the following vowel. This is evident in spectrograms such as the following, in which the formants of the following vowel are clearly evident, though weakly due to /h/'s voicelessness, in the preceding /h/ segment:

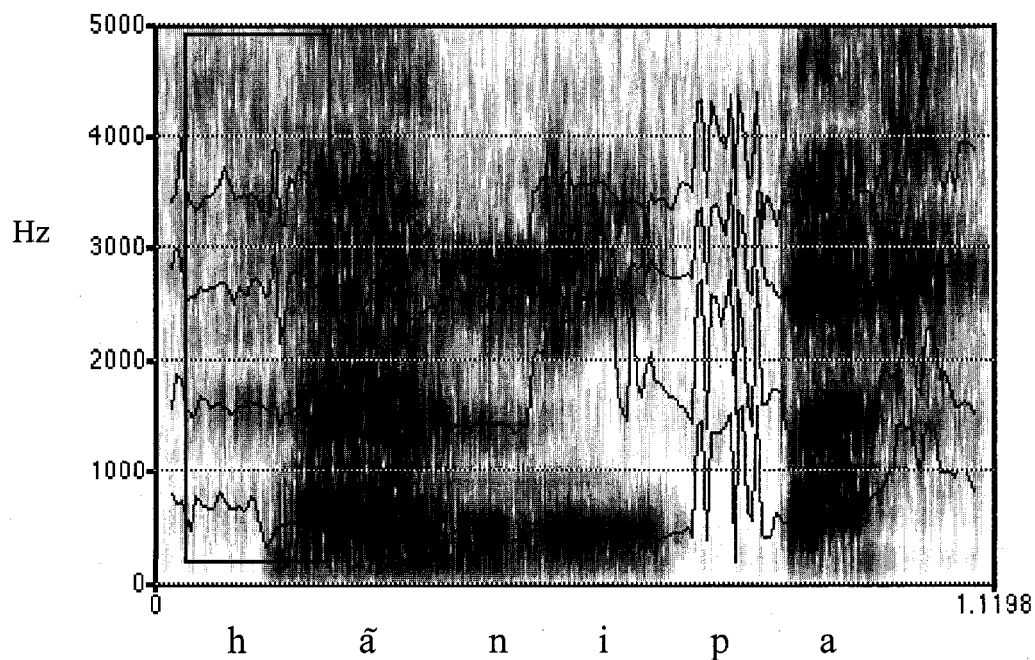


Figure 4.3. Spectrogram for [hãnipa], 'heart', as uttered by 22-year-old male. X-axis represents time in s.

The /h/ segment in the above spectrogram is highlighted by a solid rectangle. The frequency ranges of the greatest amplitude are those occurring in the same range as the formants of the following /ã/ vowel. This is evident from the formant tracks displayed for the /h/ segment, which are generally consistent with those of the following vowel despite the absence of voicing, which makes formant tracking less precise. As we will see momentarily, “true” fricatives such as /s/ do not exhibit such formants since their frication occurs primarily in a higher range of the spectrum.

While I have stated that the /h/ phoneme is restricted to onset environments, I should note that I have also observed cases in which a similar segment occurs following word-final long vowels. For instance, the word for ‘fear,’ /pi:/, may surface as [pih]. However, in such cases the period of word-final voicelessness is marked by lower amplitude and shorter duration, when contrasted to the segment being analyzed here. The /h/ in Figure 4.3, and many others I have examined, last over 100 ms, while the word-final [h] segment associated with some long vowels is less than half that length. It appears that the resulting [h] segment in such cases is the by-product of an early stoppage of voicing. That is, voicing ends while the vowel vocal tract configuration is maintained momentarily.

Storto (1999:21) suggests that a nasalized version of [h] surfaces in nasal environments. There are no obvious cases of such a variant attested in my data, though it is indeed possible that such cases exist.¹³ As L&M (1996:132) note, “There is very little auditory difference between nasalized and non-nasalized voiceless fricatives and approximants; and it seems likely that articulatory assimilation of voiceless sounds to

¹³ Storto provides one example of a nasalized /h/, in the token [õhĩ]. I have not been able to elicit this form with a clearly nasalized /h/.

adjacent nasal or nasalized segments is more common than is usually reported.” Until I am able to examine the nasal airflow patterns of /h/ when adjacent to nasal vowels, I will reserve judgment on this issue.

The other voiceless fricative, unlike the putative glottal “fricative,” is characterized by a constriction in one particular region of the mouth, regardless of the tongue position in adjacent vowels. The POA of this stop appears to be alveolar, judging from perceptual evidence. This finding is consonant with acoustic data also. The approximate POA of fricatives is discernible from spectral data. For instance, Lindblad (1980), in a study of Swedish voiceless fricatives, found that spectra representing the alveolar fricative have amplitude maxima in the range of 4,000 Hz. Jassem (1968), in a crosslinguistic study, reported a similar spectral maximum for /s/, midway between three and four thousand Hz. The /s/ fricative of Karitiana demonstrates similar spectral maxima. For instance, consider the following spectrum, smoothed with Praat’s linear predictive coding feature (10 peaks), based upon a 7ms portion of a production of [s]:

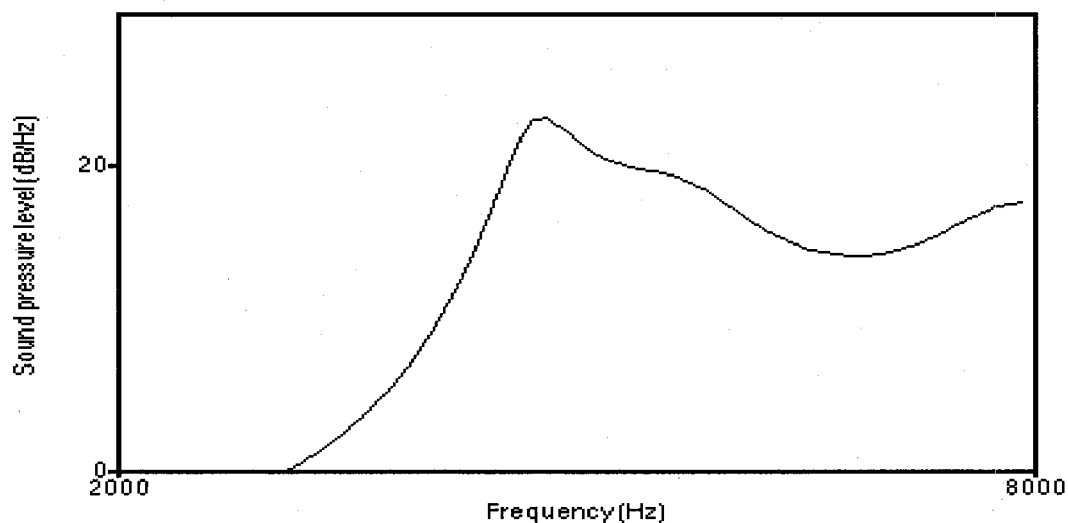


Figure 4.4. LPC-smoothed spectrum of /s/, taken from 30-year-old male’s production of *taso*, ‘man.’

As this figure suggests, the frequency maximum for the spectrum of this speaker's /s/ is around 4,500 Hz. (Other spectra not shown here have demonstrated similar maxima, both slightly lower and slightly higher.) This is very similar to the maxima in Lindblad's study. Also, the overall shape of this spectrum is similar to that obtained by Jassem for /s/. Jassem found that a dental variety of /s/, for instance, tends to exhibit flatter spectra, without the pronounced peak evident in Figure 4.4 and in Jassem's spectrum for alveolar /s/. Also, according to Jassem's data, the voiceless palatal fricative has its greatest amplitude beginning before 3000 Hz, unlike the 3500+Hz range characteristic of the alveolar fricative. In summary, then, spectra based on Karitiana /s/ are consistent with previous studies' findings on voiceless alveolar fricatives. The findings are *not* consistent with the findings in the literature based on dental or palatal voiceless fricatives. This corroborates the perceptual findings of Storto (1999) and myself.

§4.4 An overview of nasal consonant distribution

Nasality plays a crucial and pervasive role in Karitiana phonology. In general, this is true of Tupí languages. As Dooley (1984:7) notes, speaking of Guaraní: “Em Guaraní, o fator mais importante que condiciona as variantes fonéticas dos segmentos fonológicos é a nasalização.” (“In Guaraní, the most important factor conditioning the phonetic variation of phonological segments is nasalization.”) This has been found to be the case in many phonological studies in Tupí languages. For that reason, I devote Chapters 8 and 9 to the discussion of nasalization in Karitiana. In this section, however, my aim is simply to present a very basic introduction to nasal consonants. In Chapters 8 and 9, I present a holistic account of the alveolar, velar, and bilabial nasal consonants in Karitiana, paying attention to comparative data, perceptual data, and acoustic data, while developing a

phonological account of nasality that accounts for the variants of the segments in question. For now, however, I will simply describe the basic distribution and POA information for the four nasal consonants in Karitiana. The account I present here differs in some respects from that of Storto (1999), but I do not contrast the two accounts until Chapter 8.

The distribution of nasal segments is fairly complex in Karitiana. At the most basic level, we can say that, generally¹⁴, nasal consonants are instantiated by a nasal-stop sequence when preceding an oral vowel. For instance:

- | | | |
|-----|--------------------|---------|
| 4.1 | /kina/⇒[kĩnda] | ‘thing’ |
| 4.2 | /koromo/⇒[korõmbo] | ‘mouth’ |
| 4.3 | /eŋi/⇒[eŋgi] | ‘vomit’ |

Word-initially, /m/ and /n/ are typically instantiated by [b] and [d], unless they precede a nasal vowel, in which case [m] and [n] surface:

- | | | |
|-----|--------------------|--------------------------|
| 4.4 | /miki+pa/⇒[bikipa] | ‘seat’ (sit+nominalizer) |
| 4.5 | /neso/⇒[deso] | ‘mountain’ |

The velar nasal, on the other hand, typically surfaces as a pre-nasal segment even in word-initial environment.

- | | | |
|-----|------------|---------|
| 4.6 | /ŋe/⇒[ŋge] | ‘blood’ |
|-----|------------|---------|

It also surfaces as a velar stop, however:

- | | | |
|-----|--------------------------|--------|
| 4.7 | /ŋisi/⇒[gisi] or [ŋgisi] | ‘wind’ |
|-----|--------------------------|--------|

Given that the velar nasal surfaces as a pre-nasalized segment even word-initially (unless it precedes a nasal vowel), the velar nasal presents a different distribution than /m/ and /n/, a fact that will be discussed at length in Chapters 8 and 9. For now, I simply

¹⁴ Terms such as “generally” and “usually” are employed here, in the outline of nasal consonant distribution, since many of the relevant patterns that surface are not rule-like but are best described by appealing to tendencies. These tendencies are described in greater detail in Chapter 8. For now, I employ terms such as these to emphasize the fact that the relevant patterns cannot be described by a set of inviolable rules.

note that the /ŋ/ segment exhibits free variation word-initially, sometimes surfacing as a voiced stop, other times surfacing as a pre-nasal stop.

The velar nasal, the alveolar nasal, and the bilabial nasal all surface as nasal consonants, rather than pre-nasal consonants, when occurring between two nasal vowels word-medially, and when preceding a nasal vowel word-initially or following a nasal vowel word-finally. Consider the following bilabial examples:

- 4.8 /mĩʔĩ/⇒[mĩʔĩ] 'peanut'
 4.9 /põmã/⇒[põmã] 'play'
 4.10 /pikõm/⇒[pikõm] 'woolly monkey'

When following a stressed oral vowel, all three of these nasals typically surface as a pre-oralized segment:

- 4.11 /ɲi:ŋa/⇒[ˈdʒi:ŋa] 'stop'
 4.12 /'kam/⇒[ˈkɑbm] 'now'
 4.13 /o'ta:namin/⇒[o'ta:dnamin] 'four'

The above synopsis of the distribution of /m/, /n/, and /ŋ/ implies that vowel nasality exerts a strong influence on the distribution of nasal consonants. If a nasal consonant occurs adjacent to a nasal vowel, the consonant will surface as a nasal at least at the boundary of the two segments. If a stressed oral vowel occurs adjacent to a nasal consonant, the consonant will surface as a voiced-stop segment, at least at the boundary of the two segments. (The same is not true of unstressed oral vowels, a fact that results in oral vowel-nasal consonant sequences and the frequent nasalization of such unstressed oral vowels. This results in a three way surface distinction between nasal vowels, nasalized vowels, and oral vowels. This issue is taken up in Chapter 8 as well.)

Having quickly examined the distribution of /m/, /n/, and /ŋ/, I turn now to /ɲ/, a phoneme that presents very different distribution patterns. To begin with, the palatal nasal

does not typically surface as a pre-nasalized or pre-oralized segment, as we might expect.¹⁵ Instead, what we find is that the palatal nasal consonant surfaces in all cases in which there is at least one adjacent nasal vowel:

- 4.14 /põŋ/⇒[põŋ] 'left'
 4.15 /ŋõŋ/⇒[ŋõŋ] 'teeth'

If there is an oral vowel following it and no nasal vowel preceding it, however, /ŋ/ surfaces as a palatal affricate or, less frequently, an approximant (which is discussed below). This is evident in words such as the following:

- 4.16 /ŋopiop/⇒[dʒopiʔop] or [jopiʔop] 'nose'
 4.17 /ŋiŋã/⇒[dʒiŋã] or [jiŋã] 'stop'

There is also a voiceless alveolo-palatal affricate that surfaces in a few Karitiana words.

For instance, consider the following two words:

- 4.18 [tʃak] 'bite'
 4.19 [i:tʃa] 1PL

As we will see shortly, both the voiced and voiceless affricates are characterized by periods of oral occlusion, followed by periods of frication, rather than mere aspiration.

Storto (1999:22) suggests that the voiceless affricate is not an allophone of the palatal nasal. She states that in her data the segment only surfaces in seven words, and that most of these are onomatopoeic. The presence of the voiceless palatal affricate in the first singular pronoun, doubtless a very frequent word in the language, is explained by suggesting that the underlying form of that word is /i+i+ta/. The surface form, according to her, is explained by the fact that /i/ becomes a palatal stop in between vowels and consonants, and that /t/ then becomes palatalized, as an affricate.

¹⁵ Landin (1983:5) suggests that such sequences do surface at the same rate as other stop-nasal sequences. Perhaps this suggests a diachronic change has taken place in the last two decades.

Storto's suggestion that the voiceless affricate is not an allophone of /ɲ/ seems warranted, if words such as [tʃak] 'bite' are in fact onomatopoeic. However, they may not be, and it is worth mentioning, then, that the voiced and voiceless affricates display complementary distribution in that the voiceless affricate only occurs prior to the low /a/ vowel, while the voiced affricate occurs prior to the remaining vowels. If we choose to consider the two affricates allophonic variants due to this complementary distribution, we can posit the following distribution: /ɲ/ surfaces as [ɲ] when adjacent to at least one nasal vowel. /ɲ/ surfaces as [dʒ] when in an entirely-oral environment, followed by a non-low vowel. Finally, /ɲ/ surfaces as [tʃ] in an entirely-oral environment followed by a low vowel, namely /a/. For the moment I consider this analysis slightly more elegant given the complementary distributions of the two affricates. However, given the infrequency (in terms of type frequency) with which [tʃ] surfaces, I do not ascribe much importance to this decision, nor to Storto's decision to consider [tʃ] an onomatopoeic/iconic phenomenon.

In discussing the affricate, it is worth mentioning the phonetic correlates of these segments, while the findings on frication related to /s/ and /h/ can be easily recalled. Both affricates are fairly normal from a typological perspective, consisting of a period of closure lasting as long as 110ms, followed by a period of frication, which is often around 50+ ms. The POA of the affricates can be corroborated by examining spectral data, as in the case of /s/. Recall from Figure 4.4 above that the spectrum characteristic of the /s/ segment has amplitude peaks around 4500 Hz. In the following Figure, I present a similar

LPC-smoothed (10 peaks) spectrum, this time representing the frication of a 5 ms portion of a [tʃ] affricate.

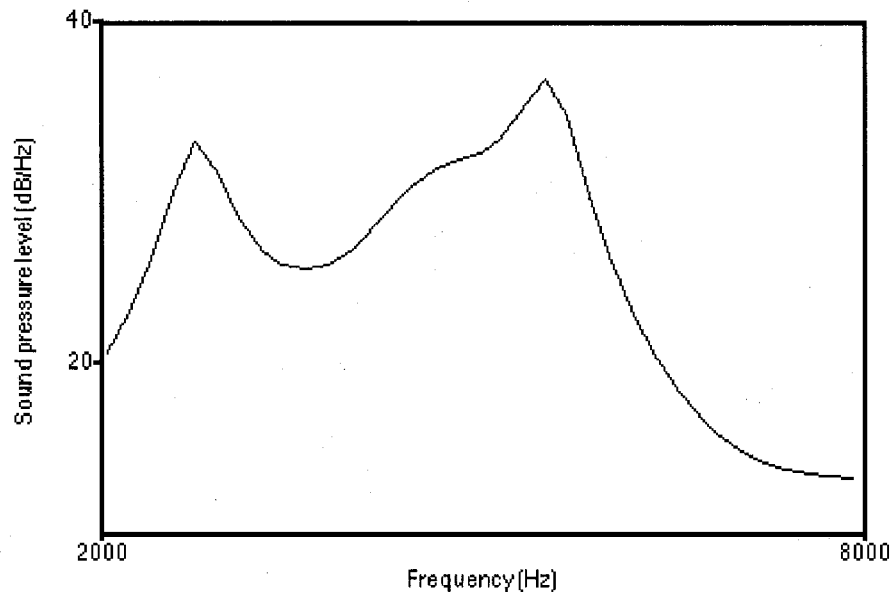


Figure 4.5. LPC-smoothed spectrum for frication portion of voiceless affricate. From a 22-year old male's production of [i:tʃa].

As we see in this figure, the spectral characteristics of the frication portion of the affricate are much different from those of /s/. In fact, they are remarkably similar to those obtained in Jassem (1968) for the voiceless palatal fricative. Jassem found that the voiceless palatal fricative had a spectrum with high amplitude peaks at two points, just as we see in Figure 4.5. The first of these peaks occurred around the 3000 Hz mark, as in this case. The second peak occurred around 7000 Hz in Jassem's data. Here the second peak occurs around 5500 Hz. Nevertheless, a visual comparison of the spectrum presented in Figure 4.5 and the spectrum for /ʃ/ presented by Jassem suggests remarkable similarity, much greater than that yielded by a comparison of Figure 4.5 with any other spectrum found in Jassem's study. This suggests that the Karitiana affricate can in fact best be described as palatal-aveolar.

As was noted above, the palatal nasal occasionally surfaces as a palatal approximant. In some cases, the approximant and affricate allophones occur in free variation. For example, consider the example of /ɲiŋa/, which as suggested above is instantiated as either [dʒiŋa] or [jiŋa]. In such cases, the [j] segment is clearly an allophone of the palatal nasal phoneme, just as the affricate is. However, the [j] segment also surfaces elsewhere. These environments are discussed in Chapter 10, where it is noted, for example, that the /i/ vowel is reduced to /j/ in certain environments.

The approximant variant of the palatal nasal is also fairly typical phonetically, from a typological perspective, consisting of a brief movement to a location in the vowel space which approximates that of the /i/ vowel. To better understand the phonetic correlates of the /j/ segment in Karitiana, consider the following spectrogram, containing the first two syllables of the word /oŋomakap/, [oɲombakap] ‘lover.’

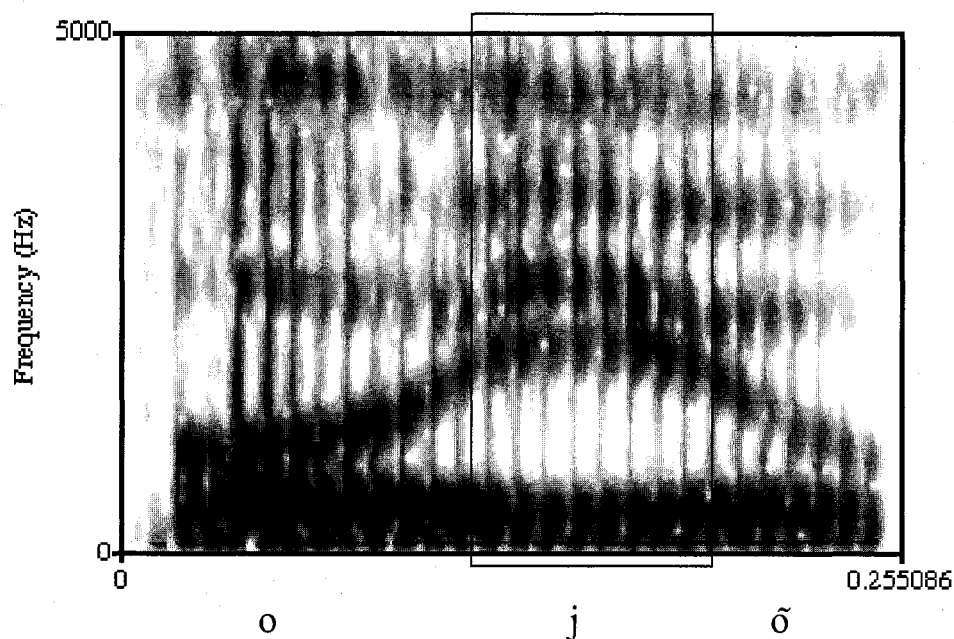


Figure 4.6. First two syllables of [oɲombakap], ‘lover,’ produced by same speaker as that of Figure 4.5. X-axis represents time in seconds.

As we see in this figure, the [j] segment consists of a short production of a vowel-like segment containing formant transitions similar to that of /i/. A typical duration of the [j] segment is approximately 50 ms, shorter than a vowel's which is usually at least 80 ms. In the case of this speaker, the maximum F2 value for [j] is around 2070 Hz, while the average F2 maxima for 6 tokens of this speaker's /i/ vowel is 2319 Hz. In other words, the [j] approximant is characterized by a shorter movement to a less forward location in the oral cavity, when contrasted to /i/. It is also clearly consonantal in that it serves as a syllable onset in words such as that depicted in Figure 4.6.

As in the case of segments with frication, spectra are useful in buttressing claims regarding the places of articulation of nasal consonants. This is true because nasal consonants have characteristic anti-formants, much like vowels have characteristic formants, created by the characteristic resonances of the area between the oral occlusion and the vocal folds. Johnson (2003:154) makes the following observations:

The resonant frequencies of the mouth cavity in nasals are not like resonant frequencies we've seen before, because the mouth cavity is a side branch of a larger resonant tube. It doesn't open directly to the atmosphere. So frequency components in the sound source that are near the resonant frequencies of a side cavity resonate in the side branch without making an appearance in the acoustic output of the acoustic tube system. They are "absorbed" in the side branch. So the frequency components in [m] that are near the resonant frequencies of the mouth are cancelled, and become anti-resonances (also called "anti-formants") in the acoustic output. Formants show up in the spectrum as peaks of sound energy, and anti-formants show up as pronounced spectral valleys.

The predicted anti-formants of a particular nasal consonant are arrived at if we take the formula for finding the resonances of a tube closed at one end (an approximation of the oral chamber) and include expected measurements for the distance between articulators (the closed end of the tube) and the uvula (the open end of the tube). The formula takes the form of $xc/4L$, where x is an odd integer, c is the speed of sound, and L is the length of the tube/oral chamber. So, "assuming that the mouth cavity is an 8 cm long uniform tube that is closed at one end and open at the other, its lowest frequency is

$c/4L=35,000/(4 \times 8)=1,094$ Hz, and the second resonant frequency is $3c/4L=3,281$ Hz.” (Johnson 2003:152-154) These figures suggest that, in the case of the /m/ consonant, we should expect to find spectral valleys around 1100 Hz and 3300 Hz. Of course, such figures are based upon an idealization of the vocal tract, since it is not a perfectly cylindrical tube closed at one end and open at another. Nevertheless, the figures give us some idea of where to expect nasal anti-formants in the spectra of Karitiana /m/. Similarly, we can predict where anti-formants might occur in the spectra of /n/, /ɲ/, and /ŋ/, if we estimate the length between the relevant POA’s and the uvula. As Johnson notes (2003:155),

“the mouth cavity in [n] is about 5.5 cm long. A uniform tube that is closed at one end and open at the other and that has a length of 5.5 cm has resonant frequencies at 1,591 Hz and 4,773 Hz; thus we expect the spectrum of [n] to have an anti-formant at about 1,600 Hz and another at about 4,800 Hz...In this way the frequencies of the anti-formants are cues to the place of articulation in these nasals.”

Unfortunately, it is not always clear in spectral data exactly where the anti-formants are located. In measuring the anti-formants of Eastern Arrernte, Ladefoged and Maddieson (1996:117) found the first nasal anti-formant or zero of various nasals by simply noting “the largest negative peak located between F1 and F2 in the spectral display.” The spectral display was “computed over a 10 ms window located midway through the closure of the nasal.”

In attempting to ascertain the characteristic anti-formants of Karitiana nasals, I followed a similar methodology. Using Praat (Boersma & Weenink 2005), I computed the long-term average spectrum for a portion of several tokens of each nasal. I then noted where dips in the LTAS occurred that might be consistent with anti-formant locations. I also examined the spectrograms of the respective nasals visually, in order to decipher whether a white band characteristic of low energy appeared where the anti-formant was

found. I resorted to this methodology after my attempts to gather anti-formant values from simple spectral slices yielded erratic results. Nevertheless, I still found high variability among the nasal zeroes of the consonants in question, even in long-term average spectra. For this reason I do not present nasal zero means in the data below. Instead, in Chart 4.1 I present the values of specific nasal consonants that presented clear cases of nasal zeroes. I reproduce the values along with the values taken from Recasens (1983) and L&M (1996:117) for Catalan and Eastern Arrernte, respectively. Figure 4.7 contains an example LTAS, demonstrating how the values in Chart 4.1 were ascertained.

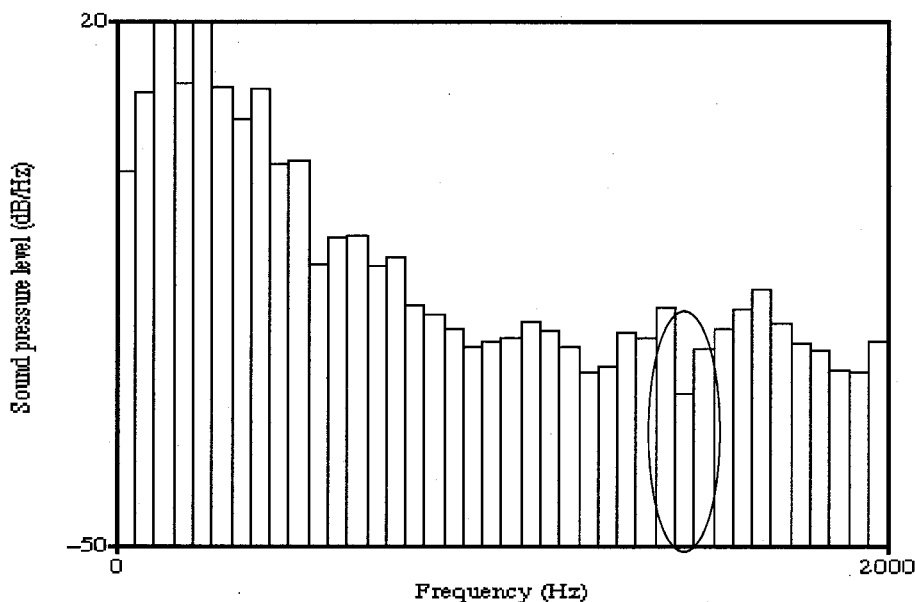


Figure 4.7 The LTAS for one token of /n/, produced by a Karitiana. The encircled bar represents the 1450-1500 Hz band of the spectrogram. This band is the region of minimum amplitude for the LTAS, and likely the region of a nasal zero.

POA	Catalan	Eastern Arrernte	Karitiana
Bilabial	n/a	n/a	1000-1050
Alveolar	1780	1403	1450-1500
Retroflex	n/a	1634	n/a
Palato-Alveolar	n/a	2094	2150-2200
Palatal	2650	n/a	n/a
Velar	3700	n/a	3150-3200

Chart 4.1 Antiformant values for nasals in three languages.

Two facts, apparent in Chart 4.1, are worth stressing. The first is that the anti-formant value for the Karitiana bilabial nasal is consistent with expectations based on the tube model. The tube model predicted a nasal anti-formant around 1100 Hz, and in Chart 4.1 we see that one of the bilabial nasal anti-formants in my data was found at around 1000-1050 Hz. The second fact that is worth stressing is that the “palatal” nasal in Karitiana appears to have an anti-formant that is more characteristic of a palato-alveolar nasal, when contrasted with the Catalan and Eastern Arrernte values. This might explain why the allophones of this nasal (affricates and approximant) are palato-alveolar in terms of POA.

The data in Figure 4.7 should be considered with some circumspection since, as I mentioned, they only include data from particular clear instances of anti-formants. Nevertheless, each of the tokens is representative of several other clear tokens of anti-formants, for the speaker in question. It should be stressed, though, that finding anti-formants is an inexact practice. However, given this caveat it is interesting to note that the palatal nasal of Karitiana appears to present anti-formants that are characteristic of a palatal-alveolar place of articulation, as we might expect given the distribution of allophones evinced by this phoneme.

An investigation of the Karitiana vowel system

§5.1 The putative Arikém shift

In this chapter I provide synchronic data on Karitiana vowels. More specifically, I provide normalized vowel data for eight adult speakers. I suggest that these data are consistent with vowel movements in the case of three vowels, movements that are evident primarily in the speech of young adult Karitiana females. Before delving into the acoustic data, however, it is worth providing some background on the Karitiana vowel system, especially since a previous study has been performed on vowel shift in Tupí-Arikém.

Storto and Baldi (1994) suggest that there was a vowel shift in the Tupí-Arikém branch of Tupí, of which Karitiana is the sole survivor. Based on their findings, Rodrigues (1999:111) suggests, “Comparing cognates in languages from other languages we find many examples of each of the shifts $e > a$, $a > o$, and $o > i$; and some examples of the shifts $i > e$, $u > i$, and $i > i$. It appears that i has remained unchanged.” Such a shift would have resulted in a reduction of vowel types from 6 to 5. Rodrigues presents nine examples of the putative shift, contrasting cognates from Karitiana and various other Tupí languages. These cognates are the clearest examples of the shift available in a more comprehensive, but still modest, list of approximately 40 cognates found in Storto and Baldi (1994). The cognate list found in Storto and Baldi (1994) includes data from

Karitiana and Arikém, as well as the non-Arikém Tupí languages Gavião, Mundurukú, Proto-Tupí-Guaraní, and Proto-Tupari.

Many of the vowel contrasts presented in Storto and Baldi (1994) are found by contrasting Karitiana words and cognates based upon reconstructions of proto-Tupari. Perhaps the best example of the shift is the Karitiana word *ombaki*, ‘jaguar.’ The word for ‘jaguar’ in Karo and Tupari is *ameko*. This word presents an example of each the following vowel changes suggested by the shift: $e > a$, $a > o$, and $o > i$. (In Suruí, the word for ‘jaguar’ is *meko* [Bontkes, p.c.].) More examples such as these are needed before the Arikém vowel shift is conclusively demonstrated. To date, many of the examples provided are of monosyllabic words (27 of the 37 cognates in Storto and Baldi 1994).¹⁶ As Rodrigues suggests, “Systematic comparative work across all branches of the family will be needed to fully validate and contextualize the proposed Arikém vowel shifts.”

(1999:112)

¹⁶ Such examples taken in isolate are, not surprisingly, much more easily arrived at since the probabilities against two languages having monosyllabic cognates differing by only vowel type are not great. Therefore, monosyllabic data alone can be specious. For instance, in supporting the vowel shift of Karitiana I could point to the fact that the demonstrative used when referring to items found in the speaker’s hand is *ka*. This is similar to a reconstructed form of the demonstrative used to refer to items near the speaker in proto-Tupí-Guaraní, **ke*. (Jensen 1998:601) This example is consistent with the vowel shift suggested, i.e. $e > a$. However, it ignores the fact that there is another proto-Tupí-Guaraní form for a demonstrative referring to visible items found near the speaker, **ko*. (Jensen 1998:601) It is unclear which, if either, of these forms Karitiana *ka* is related to. However, were we to selectively choose monosyllabic correspondences, we could simply add **ke* and *ka* to our list of forms buttressing the vowel shift. Such forms do not necessarily reflect any systematic correspondence, however. If we were to include such forms, we would be forced to consider correspondences such as **a*, a proto-Tupí-Guaraní first-person singular marker (Jensen 1998:588), and *i*, the Karitiana 1S.ABS marker.

It should also be noted that the list of cognates supporting the shift is quite small. For instance, there are only two clear cognates that support an /i/ to /e/ shift, and five that support an /o/ to /i/ shift. I am not disputing Storto and Baldi’s findings, which are elucidative and likely do reveal a shift in the Arikém branch. However, it is worth noting that, given the paucity of data available on Tupí-Arikém, as well as the small number of relevant cognates, it is difficult to be certain of the shift.

The Proto-Arikém vowel shift suggested by Storto and Baldi is represented by the following diagram:

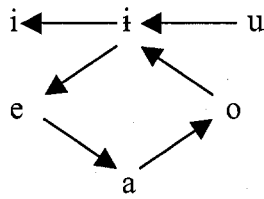


Diagram 5.1 Proto-Arikém vowel shift.

Based on the normalized vowel spaces discussed below, it appears that there are three vowels presently moving in Karitiana. These movements are evident in the speech of the young adult females. The movements can be represented as follows:

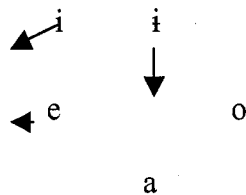


Diagram 5.2 Current vowel movements in Karitiana.

These vowel movements are supported and discussed in detail below. For now, I simply present the previous vowel shift affecting Karitiana, as well as the current vowel movements in the language, by way of introduction to the Karitiana vowel system.

Prior to considering the normalized vowel space data, which is based entirely on normal unreduced (oral) vowels, it is worth examining the effects of reduction and nasality on Karitiana vowel positions. These effects are considered in sections §5.2 and §5.3, respectively.

§5.2 Stress effects on vowel position

The topic of word stress is taken up in Chapter 7. However, before considering the vowel positions of Karitiana it is worth mentioning that one of the vowels in

Karitiana is frequently reduced in unstressed positions. This is not an uncommon process crosslinguistically. Crosswhite (1999) presents an extensive study of vowel reduction crosslinguistically.

Frequently, reductive processes result in vowel neutralization in unstressed syllables. This leads to a situation in which there are fewer contrastive positions in unstressed vowels. For example, Italian has seven vowels that contrast with each other in stressed vowels, but only five of these vowels contrast in unstressed vowels. (Flemming 2005:2) Similarly, Russian and Catalan have five-vowel systems in stressed syllables, but only three-way contrasts in unstressed syllables. Vowel reduction in Karitiana has not led to fewer contrastive positions in unstressed vowels, since there are five contrastive vowel positions in stressed vowels, and five in unstressed vowels. However, the /a/ vowel is greatly reduced in unstressed environments, along the F1 parameter.

The possible motivations for vowel reductions are investigated in Flemming (2005). Flemming, who builds upon previous research by Liljencrants and Lindblom (1972), suggests that it is the “correlates of lack of stress that condition neutralization, not stress per se, the relevant correlates being short vowel duration and perhaps reduction in articulatory effort.” (2005:3) In other words, the truncated length of unstressed vowels does not allow the articulators to reach the same position that they do in the non-truncated versions of the same vowels. Formant undershoot is the result.

According to Crosswhite’s (1999) survey of vowel reduction in various languages, vowel reduction typically operates along the F1 or height parameter. In Flemming’s (2005:5) words, “Vowel reduction primarily eliminates height contrasts, and only eliminates backness or rounding contrasts under restricted conditions.” The

motivation for this is also encapsulated by Flemming: “Height contrasts are neutralized first because it is low vowels in particular that become more difficult to produce in short unstressed syllables, so it is particularly difficult to keep height contrasts distinct.” (2005:5) It is easy to see why this might be the case in a language like Karitiana, which only presents one low vowel, /a/. Since only this vowel is produced in a low position, the majority of syllables in Karitiana are characterized by nuclei that are high. This means that most nuclei, stressed or unstressed, occur in a non-low position. As a result of this, the position of the tongue in most Karitiana syllables is generally high. We might expect, then, that the only vowel that is distinguished by a low position should be reduced in many cases, since the tongue must travel further, relative to the other vowels, along the height dimension. The tongue must also travel further in the case of low vowels since consonantal POA’s tend to be located higher in the oral chamber. In other words, the tongue has further to travel between low vowels and consonants as well. In shorter productions of such vowels, then, we might expect clear examples of undershoot. This suggestion is supported by Flemming’s findings:

This interpretation is further supported by the fact that the amount of undershoot increased as the distance between the vowel and the consonants increased—the greater the transition between vowel and consonant, the faster the articulator must move for any given vowel duration. *For example, much more F1 undershoot is observed in low vowels than in high vowels because producing the low tongue and jaw position for a low vowel requires greater articulator movement from the constricted positions of adjacent consonants than the production of a high vowel.* (Flemming 2005:6, Italics added)

These articulatory motivations are entirely consistent with the behavior of Karitiana vowels. For example, consider the following chart of a 22-year-old’s non-normalized vowel system. This figure does not distinguish between stressed and unstressed vowels and consonantal environment (to be distinguished in later charts):

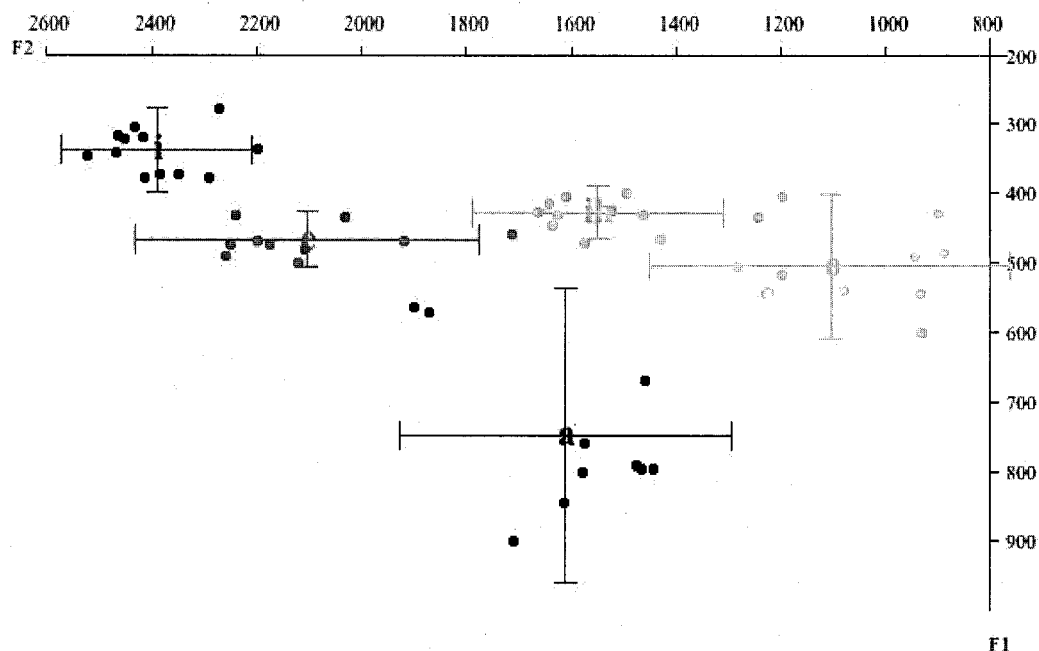


Figure 5.1 The vowel space of a twenty-two-year-old Karitima. *ih* represents /i/. Y-axis represents F1 values, in Hz. X-axis represents F2 values, in Hz.¹⁷

The above vowel chart contains 10-11 tokens of each vowel.¹⁸ These vowels were excised from words contained in recorded elicited carrier clauses. The values of particular vowel tokens vary greatly along the F2 dimension. (As we will see below F2 variance can be explained largely in terms of the POA of preceding consonants.) However, in the case of /a/, the vowel tokens also vary considerably along the F1 dimension. This is mainly the result of F1 undershoot in the case of unstressed /a/ vowels, such as those represented by the two highest dots of the /a/ region, which is demarcated by bars along the Y-axis (F1) and X-axis (F2).

¹⁷ Figures 5.1 and 5.2 represent the X-axis and Y-axis values in absolute Hz, rather than log-type scales, since these charts do not represent normalized tokens. The vowel charts in §5.5.2 contain normalized tokens, and therefore the X and Y axes on those charts are not based on absolute Hz values, and the relevant vowel charts therefore more clearly distinguish the Karitiana vowel clusters.

¹⁸ This number of tokens was large enough to include at least two vowel tokens that followed each of the main consonantal POA's, as well as two tokens following pauses. The number of tokens is comparable or greater to the number of tokens used in other studies with similar methodologies. For instance, Adank et al. (2004) examine two tokens each of the relevant vowels.

The reduction of unstressed Karitiana vowels is more readily apparent in Figure 5.2 below. In that figure, the means of the relevant vowels are represented by their respective symbols. Means for stressed vowels are preceded by a / ' / diacritic, while means for the unstressed vowels are not preceded by any diacritic. Around each symbol there is an ellipse, which circumscribes the regions in which the particular tokens occurred, for each stressed or unstressed vowel type. As in the previous figure, consonantal environment is not accounted for. However, in each case the vowels are represented by tokens with systematically varied preceding consonantal POAs, so the disparities within vowel pairs can safely be assumed to be the result of stress rather than environment. (The speaker who uttered the tokens in question is the same as the one whose tokens are represented in Figure 5.1. Those were different tokens, however.)

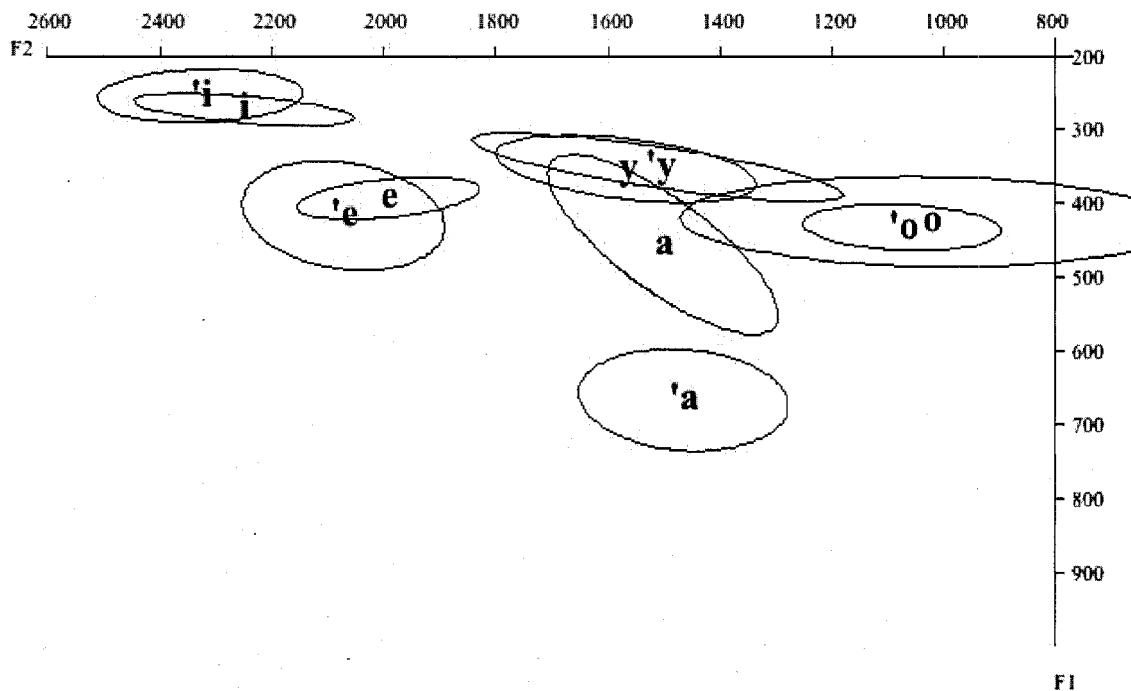


Figure 5.2 Vowel chart based on means of stressed and unstressed vowel tokens. Here *y* represents /i/. Y-axis represents F1 values, in Hz. X-axis represents F2 values, in Hz. See footnote 17.

Several noteworthy observations can be made based on Figure 5.2. One is that the positions of /i/, /i/, and /e/ appear to be consistent across stress categories. Another is that /o/ seems to present greater variation along the F2 axis, when compared to the other vowels. However, it should be noted that the normalized vowel chart for the same speaker, represented in Figure 5.3 below, suggests that the normalized variation of /o/ along the F2 axis is not as great as the variation found in Figure 5.2. Also, it is worth noting that /o/ does not vary more than /i/ along the F2 axis, on an inter-speaker basis. This is evident in Figure 5.6, in which normalized vowel spaces for various speakers are contrasted. Nevertheless, Figure 5.2 does suggest that, in the case of this speaker's /o/, the stressed variety of the vowel appears to be restricted to a narrower region of the vowel space. The stressed /o/ tokens occur within a restricted ellipse, when contrasted to the ellipse containing the unstressed tokens.

Much of the stress differentiation found in Figure 5.2's /o/ distribution is due to the fact that two of the unstressed /o/ tokens following bilabial consonants were several hundred Hz lower, in terms of F2, when contrasted with stressed /o/ tokens following bilabials. Also, two of the unstressed /o/ tokens following velar consonants were located forward (i.e. had a higher F2 value) of their stressed /o/ counterparts. This suggests that, at least for this speaker, /o/ is more susceptible to environmental effects on its position when it occurs in unstressed syllables. For example, as we saw in Chapter 3, vowels following bilabial consonants have lower F2 values. This is true even in the case of /o/, which is inherently labialized. Figure 5.2 suggests that, in the case of this speaker, unstressed /o/ vowels are more labialized than their stressed counterparts, when following

a labial consonant. It also suggests that unstressed /o/ vowels are more greatly affected by a preceding velar consonant than stressed /o/ vowels are.

The most important observation that can be gleaned from Figure 5.2, however, relates to the behavior of /a/. Unlike the other vowels in question, the unstressed variety of this vowel appears in a different region altogether than its stressed counterpart. The unstressed variant of this vowel could more accurately be described as schwa. The F1 values for the unstressed tokens range from approximately 350-600 Hz, much lower than typical values for an /a/ vowel. Since /a/ vowels are produced with a low tongue position, the F1 values associated with them are usually quite high (since the first formant is based on laryngeal, rather than oral, resonance) crosslinguistically, typically around 700 Hz. In fact, as is evident in Figure 5.2, the Karitiana speaker in question produced stressed /a/ tokens with F1 values ranging from 620-750 Hz. These F1 values differed significantly from those of the unstressed values. ($p < .001$, based on a two-tailed t-test) Since Figure 5.2 only represents data from one Karitiana speaker, it should be emphasized that the distribution of /a/ along the F1 parameter evident in Figure 5.2 is also apparent in the speech of each of the Karitiana so far recorded in my data.

These data suggest that there is phonetic undershoot in the case of unstressed Karitiana /a/ vowels. Flemming's suggestion that low vowels tend to be more susceptible to undershoot is buttressed by this finding. Again, this undershoot is due, at least in part, to the brevity of unstressed vowels. As we will see in Chapter 7, stressed vowels in Karitiana tend to be longer. Their shorter unstressed counterparts are more likely to be reduced since the tongue has less time to achieve the target region of articulation for a particular vowel. As was mentioned above, this reduction is more likely to surface in the

behavior of low vowels since the tongue has further to travel in such cases, when contrasted to other vowels, given that most other sounds are produced in a higher region of the oral chamber.

The behavior of /a/ suggests that it is the only vowel in Karitiana that can accurately be described phonologically as [-hi]. According to Storto's classification of Karitiana vowels (see Chart 2.4 in Chapter 2), /e/, /a/, and /o/ can be described as [-hi], while /i/ and /ɨ/ can be described as [+hi]. In contradistinction to this parsimonious account, however, the acoustic evidence suggests that there is no phonetic basis for grouping /e/ and /o/ with /a/. As we see in Figure 5.2, /e/ and /o/ are very close to /i/ along the F1 dimension (see normalized data below as well). Also, the F1 values of these vowels are quite disparate from those of non-reduced varieties of /a/. This suggests that a phonological account that posits the same height features for /a/, /e/, and /o/, but different height features for /ɨ/ and /i/, is untenable. Such an account might be defensible if there were behavioural similarities between /a/, /e/, and /o/, which followed from their similar feature for height. For instance, if all three of these vowels demonstrated similar vowel reduction along the F1 parameter in unstressed vowels, we might posit that this behavior was due to a shared [-hi] feature. However, as we have seen, /a/ patterns quite differently from /e/ and /o/ with respect to vowel reduction. In other words, /a/ differs markedly in terms of vowel height, when contrasted to the other vowels of Karitiana. The phonetic distribution of the vowels suggests that one vowel, /i/, is located somewhat higher in the vowel space than the others. Another vowel, /a/, is located much lower in the vowel space, when contrasted to the others. The other three vowels /e/, /ɨ/, and /o/, have similar vowel heights.

Since the vowels of Karitiana cannot accurately be described by a feature-based approach that employs only one binary feature for height, it is worth creating a more accurate feature-based chart of Karitiana vowels. I have done so in Chart 5.1, nearly a recapitulation of Chart 2.3:

	-back, -round	+back, -round	+back, +round
+high	i		
-low, -high	e	ɨ	o
+low		a	

Chart 5.1 A feature-based account of Karitiana vowels.

This chart serves as a simple yet accurate descriptive formalism. Whether the relevant features have a cognitive basis among the Karitiana is another matter entirely, a matter that has yet to be investigated. Chart 5.1 merely presents the most parsimonious feature-based description that can accurately group the phonemic vowels of Karitiana.

Having considered the effects of undershoot on Karitiana vowels, as well as their general distribution, I will now describe the results of a study of normalized vowels among various Karitiana speakers, after briefly describing the effects of nasalization on Karitiana vowels.

§5.3 Nasal vowels

Karitiana, like all Tupí languages, makes heavy use of vowel nasalization. Typologically, the feature of nasalization is also quite common. As Ladefoged and Maddieson (1996:298) note, more than one in five languages appeal to vowel nasalization, making it the most common minor vowel feature appealed to cross-linguistically.

In the previous chapter we mentioned that the spectra of nasal consonants often have anti-formants in them. The same is true of nasal vowels. The spectra of nasal vowels are even more complex than those of nasal consonants, however, since they also contain

the resonances of the nasal *and* oral tracts. Johnson (2003:163) makes the following observation:

The pharynx plus mouth system—the oral tract—modeled as a uniform tube has resonances at about 500, 1,500, and 2,500 Hz; whereas the pharynx plus nose system—the nasal tract—modeled as a uniform tube has resonances at about 400, 1,200, and 2,000 Hz. All these formants are present in the spectrum of nasalized vowels.

The patterns of formants in the spectrograms of vowels with nasalization are quite complex, then: there are oral formants, nasal formants, and anti-formants. The presence of nasal formants and anti-formants affects different vowels in different, sometimes unpredictable ways. For instance, if the vowel formants of a particular vowel occur near the nasal formants of that vowel, the perceptual result may be individual formants with large bandwidths. Also, the “amplitudes of the formants are decreased because of the presence of an anti-formant.” (Johnson 2003:165) In general, the perceptual vowel space shrinks for a set of nasal vowels, when contrasted to oral vowels (cf. Wright 1986). However, F1 and F2 values are not always affected, at least not in significant ways, by nasalization.

Due to the irregular effects of nasalization on vowel formant values, I do not reproduce vowel charts of nasal vowels here. As we will see in the discussion of nasality in Chapter 8, nasalization of vowels most predictably affects the *bandwidths* of F1, F2, and F3 in Karitiana vowels. These bandwidth effects are somewhat unpredictable. Nevertheless, bandwidth modulation due to nasalization is often easily discernible in the spectrogram of a given vowel. The bandwidth changes of particular nasalized-vowel formants allow us to ascertain the time at which the velum is lowered or raised during the production of the vowel, as we will see in Chapter 8.

§5.4 Oral vowels in Tupí languages

As we saw in §5.1, it has been postulated that Karitiana and Arikém, the other, now extinct, member of Tupí-Arikém, underwent a vowel shift that reduced the number of vowels in their inventory, eliminating /u/. Another interpretation of the cross-Tupí data suggest that proto-Tupí had only five vowel phonemes, and that /o/ and /u/ were in complementary distribution. This interpretation is supported by the fact that /o/ in proto-Tupí tends to occur before labial or labialized consonants. (Nevertheless, there are some proto-Tupí reconstructions that present contrasts between *u* and *o*. Cf. Rodrigues 1999:111) If these two sounds were in fact allophones in Proto-Tupí, the vowel shift in Tupí-Arikém would have involved an $o/u \Rightarrow i$ shift, rather than separate $u \Rightarrow i$ and $o \Rightarrow i$ shifts.

Most Amazonian languages, even non-Tupí languages, tend to have similar vowel inventories. A cursory examination of an assortment of phonetic/phonological studies suggests that this is the case. Within the Tupí languages, Karo, a Tupí-Ramarama language, is said to have the largest inventory with seven oral vowels. Rodrigues (1999:110) suggests that:

The Aweti, Mawe and Tupí-Guaraní branches have six oral vowels (omitting schwa from the Karo system) and six nasal vowels. The remaining branches have just five oral vowels (*i*, *e*, *ɨ*, *a*, *o*) and a corresponding set of five nasal vowels.

With these facts in mind, we might say that the vowel system of Karitiana, despite the supposed shift that has occurred in Tupí-Arikém, represents a typical Tupí vowel system.

Surprisingly, perhaps, there have been no systematic investigations of the acoustic properties of the Tupí vowels. In the following section, I present such a study of the Karitiana vowels. It is hoped that future studies of other Tupí vowel systems will reveal

just how typical the Karitiana system is. It is possible, after all, that the similarity of the symbols used to represent Tupí vowels masks actual important acoustic and articulatory dissimilarities in the positions of vowels such as *i*, *e*, *ɨ*, *a*, and *o*.

§5.5 Normalized vowels in Karitiana

§5.5.1 Discussion of normalization procedures

When contrasting the vowels of different speakers in a language, it is crucial that one find a way of normalizing the formant data of each speaker. Contemporary quantitatively-oriented sociolinguistic studies, such as those performed by Labov (2001) in his consideration of linguistic change in Philadelphia, appeal primarily to normalized vowel data. The motivations for this are obvious when we consider that formant values vary inversely with the size of the resonance chamber from which they stem. For instance, if we appeal to the oversimplified-yet-useful assumption, as we did in Chapter 4, that the human vocal tract is a tube open at one end and closed at another, the resonant frequencies of that tube depend on its length according to the following formula: $F_n = (nc/2L)$. (Johnson 2003:106) In this formula, *n* equals the number of a given resonance, *c* equals the speed of sound, and *L* equals the length of the tube. The crucial fact is that length varies inversely with formant values. So people with longer vocal tracts (tubes) have lower resonance frequencies or formants, and those with shorter vocal tracts tend to have higher resonance frequencies. When comparing vowels among speakers in Karitiana, we are interested in the *relative* vowel positions for each speaker. Demonstrating absolute Hz values for F1 and F2, while useful, is insufficient methodologically if one hopes to contrast the relative vowel positions on an inter-speaker basis. If we only contrasted such values, we would produce findings that resulted in large

part from differences in anatomy between, for instance, females and males. In this study we are less interested in anatomical differences and more interested in actual differences in vowel positions, removing those differences that result solely from differences in oral tract length. Given this fact, we are left with various “normalization” procedures (ways in which to remove such anatomical influences) to select from.

Adank et al. (2004) and Adank (2002) contain the results of an extensive study in which the researchers contrast various vowel normalization procedures, in an effort to discover those procedures that most effectively reduce physiological effects while simultaneously maintaining non-anatomical variation in vowel positions. That is, they aimed to discover which procedures best preserve phonemic and sociolinguistic information. The studies were based on the speech of 160 Dutch speakers, divided equally according to gender. Normalization procedures were applied to the vowels of these speakers, and statistical pattern analysis tests then evaluated these procedures. The details of the study are not pertinent here, however, it is worth mentioning that there are two main sorts of vowel normalization procedures, vowel-intrinsic and vowel-extrinsic. The former sort “typically consist of a nonlinear transformation of the frequency scale (log, mel, bark), and/or a transformation based on a combination of formant frequencies.” (Adank 2002:1) The latter type of procedures, “assume that information is required that is distributed across more than one vowel of a talker; e.g., the formant frequencies of the point vowels for that talker.” (2004:1)

Adank et al. (2004) present contrasts among 6 vowel-intrinsic procedures and 6 vowel-extrinsic procedures. Generally speaking, the researchers found that vowel-extrinsic procedures outperformed vowel-intrinsic procedures. Among the vowel-

extrinsic procedures, they found that the LOBANOV (Lobanov 1971) procedure, to be described shortly, outperformed all other normalization strategies. In their words, “LOBANOV (92%) and NEAREY 1 (90%) preserved the phonemic variation in the data best of all procedures.” (2004:4) It was also found that LOBANOV was the best procedure, along with NEAREY1 (Nearey 1978) and GERSTMAN’s, (Gerstman 1968) at reducing anatomical variation. Finally, the researchers noted the following:

when comparing the three sources of variation (vowel phonemes, gender, and vowel by gender) by multivariate analysis, LOBANOV turned out to be the best procedure.

For these reasons I have chosen to employ the LOBANOV normalization procedure in my examination of Karitiana vowels.

The LOBANOV procedure entails inserting a particular formant for a given vowel token into a formula that considers the average value for that formant for all the vowels in the given speaker’s inventory. The formula is as follows (Adank et al. 2004:1):

$$F_{ti}^{Lobanov} = \frac{F_{ti} - \mu_{ti}}{\delta_{ti}}$$

In words, this formula states that, in order to find the normalized value for a particular formant value, we must do the following: First, we must take the measurement (in Hz) of a particular formant. Next, we subtract from that formant measurement the mean (μ_{ti}) of a set of formant measurements for that formant type (F1, F2...), for all of a speaker’s vowels (*a, e, o, i* in Karitiana). We then take the result of this subtraction and divide it by the standard deviation (δ_{ti}) of the formant type for all of the given speaker’s vowels. This process can be exemplified by the following normalization of a Karitiana F2 value for a thirty-two-year-old male’s token of /a/:

1. F2 value for specific /a/ token following /t/: 1527 Hz (F_{ti})
2. Mean F2 value for this speaker’s *a, e, i, o*, and *i* (2 tokens each, after glottal stop): 1640 Hz (μ_{ti})

3. $(F_n) - (\mu_n)$ $1527-1640 = -113$ Hz
4. Standard deviation of the set of F2 values from step 2. above: 402 Hz (δ_n)
5. -113 Hz divided by result of step 4., in this case 402 Hz. This equals -0.28, the **z-score** for this F2 value.

As we see in this example, the result of the LOBANOV transformation is not a formant value but a **z-score**, in this case -0.28. The z-scores of formant values typically range from -1.8 to +1.8, in the case of both F1 and F2. These z-score values resulting from normalizations can then be plotted in a manner analogous to F1 and F2 Hz values, resulting in vowel charts that can be contrasted on an inter-speaker basis.

In this study of Karitiana vowels, the normalized vowel spaces of eight Karitiana speakers were plotted. For each of the speakers, mean F1 and F2 values were ascertained based on two tokens of each of their vowels. These values represented the entire vowel space, since they were based on all five of the vowels. As we saw above, such mean values are necessary for the LOBANOV procedure. In the case of these mean values, vowels were considered that occurred after glottal environments, either [ʔ] or [h]. In this way, the means themselves were not affected unduly by environmental effects. Once the means and standard deviations from these means were collected, particular vowel tokens were examined for each speaker. For the purposes of this study, only non-reduced vowels were considered. For each speaker, twenty to forty vowel tokens were considered, equally divided among the five vowels. For each vowel considered, at least four tokens were considered, divided equally according to preceding consonantal place of articulation. For example, if four tokens of a speaker's /a/ vowel were considered, one of these followed a bilabial consonant, one a glottal consonant, one an alveolar consonant, and one a velar consonant. If eight tokens were considered, two followed a bilabial consonant, two an alveolar, and so forth. The purpose of employing this methodology

was two fold: to reduce the effects of one particular environment on the grand means for particular normalized vowels, and to be able to examine the effects on normalized vowel locations by preceding POA's.

§5.5.2 Results of normalization study

The following figure contains a normalized vowel chart for the same speaker represented in Figure 5.2 above. The forty tokens on which this chart is based are different from those tokens described by Figure 5.2, however. (Notice that /i/ is less restricted in scope in this chart). As we see in the chart, the normalized vowel space of this speaker reflects two of the generalizations so far treated: the non-high position of /i/, and the very low position of /a/ when compared to /e/ and /o/.

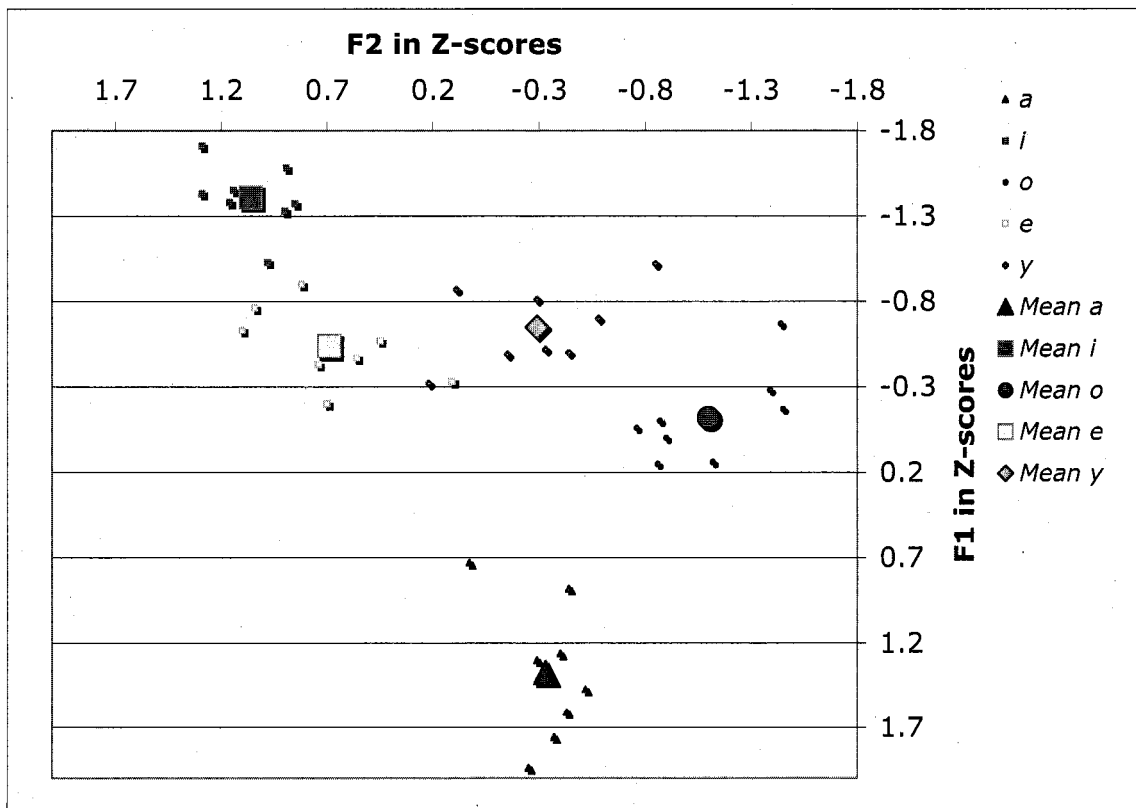


Figure 5.3 Normalized vowel chart for twenty-two-year-old Karitiana male. Y axis represents F1 z-scores, x-axis represents F2 z-scores.

In this figure, the minor shapes represent particular vowel tokens, while the larger ones represent means for the particular vowels. As we see, the minor shapes are distributed over large segments of the F2 continuum (the x axis as in a regular vowel chart). In the case of /a/, the distribution of the tokens occurs more along the F1 dimension, however. This is consistent with the non-normalized data from Figure 5.2. Recall, though, that reduced tokens were purposefully avoided in this case. This suggests that even stressed /a/ vowels appear to vary more along the F1 dimension than the other Karitiana vowels do.

When we cross-reference the tokens of Figure 5.3 according to preceding place of articulation, we find clear effects on vowel location. This is apparent in Figure 5.4:

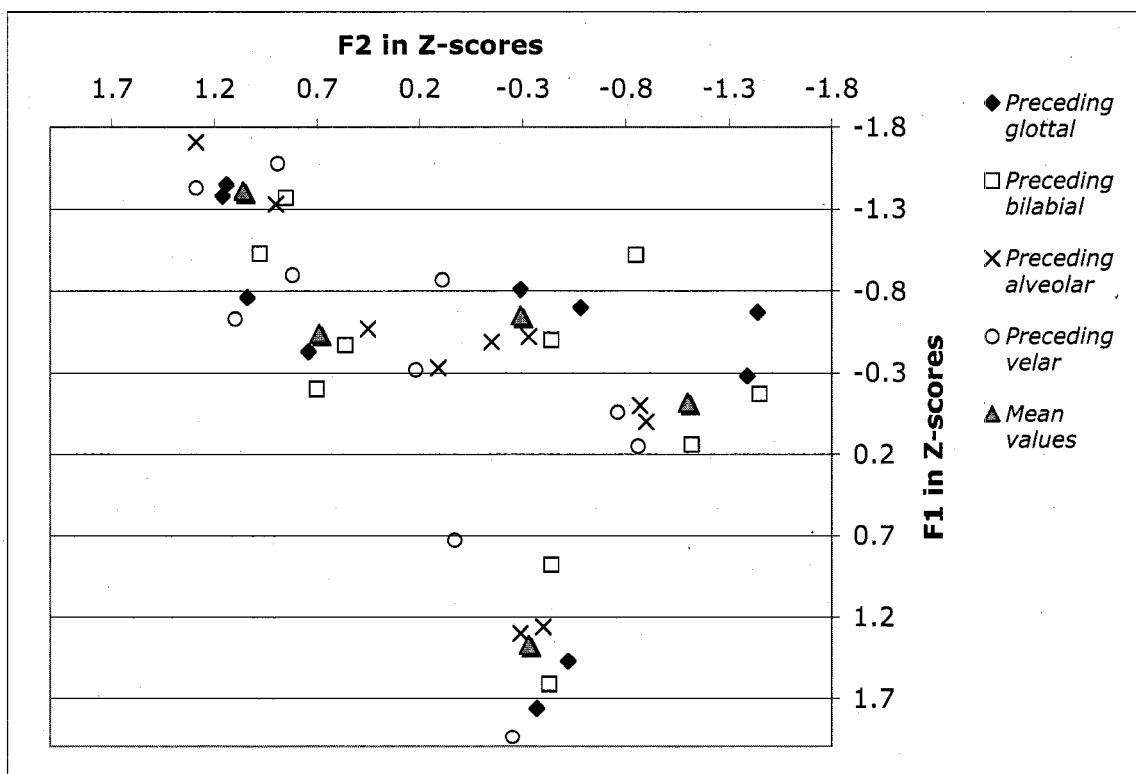


Figure 5.4 Normalized tokens, with preceding place of articulation.

Several observations about Karitiana vowel positions are apparent in this figure. The first is that vowels following bilabials tend to have lower normalized F2 values. Notice that

the squares, representing tokens that occurred after a bilabial, almost always fall to the right of the vowel means, as represented by the solid triangles. This finding is consistent with the suggestion already made in Chapter 3, based on locus equations.

The second observation that is worth noting is that vowels following velar consonants tend to occur to the left of the vowel means. In other words, vowels following velars tend to have higher F2's. This is also consistent with the findings from Chapter 3, in which it was noted that /k/ sometimes leads to greater F2 values in the following vowel, though the rate of coarticulation between /k/ and following vowels is overall quite high. Interestingly, Figure 5.4 suggests that velar and bilabial consonants have no predictable effects on the following vowels' F1 values.

The third observation is based on a more subtle pattern, and relates to those vowels following alveolar consonants. If Figure 5.4 is examined carefully, it is apparent that, in nine out of ten tokens, vowels occurring after alveolar consonants tend to be located toward the "inside" of the vowel means. That is, vowels following alveolars tend to be located more centrally within the entire vowel space, when contrasted to the mean vowel positions. The motivation for this phenomenon, I would suggest, is the resistance of alveolar consonants towards assimilating to following vowels. (This recalcitrance was noted in Chapter 3 with respect to F2, but not with respect to F1.) In other words, alveolar consonants appear to draw vowels toward their somewhat central POA. Both the F2 and F1 values of the nine tokens in question are more centrally located, when contrasted to the F2 and F1 values of other vowels with differing preceding POA's.

Interestingly, vowels following glottal consonants, which presumably have no discernible effect on tongue position, display the converse phenomenon. That is, in

contrast to vowels following alveolars, vowels following glottal consonants tend to be located in more extreme positions in the vowel space. In fact this is the case in ten out of the ten relevant tokens in Figure 5.4. In other words, the /i/ vowels with preceding glottal consonants are located further forward and slightly higher than the mean value for the /i/ vowels. Similarly, the /e/ vowels with preceding glottals are also located forward of the mean position of /e/. The /i/ vowels with preceding glottals are located slightly higher than the mean for /i/. The /o/ vowels with preceding glottals are located to the right of (behind, in terms of tongue position) the mean for /o/, while the /a/ vowels following glottals are located below the mean placement of /a/. In the case of each vowel, then, vowels following glottal consonants are located in more extreme positions within the vowel space, when contrasted with vowels not following glottal consonants.

The above finding suggests that, in the absence of preceding consonantal effects on vowel *tongue* position, the vowels of Karitiana are located at the extremities of the vowel space. We might say that the extremities in question represent the target regions of Karitiana vowels. Interestingly, these regions seem to maximally exploit the vowel space characterized by these five vowels. This finding fits well with Lindblom's (1990) deductive approach to the analysis of vowel inventories. According to this approach, a language seeks to maximize the distinctions between its vowels. This appears to be true in the case of Karitiana, since the vowels that are not influenced by preceding POA's are maximally displaced one from another. That is, given the vowel inventory present in Karitiana, vowels without preceding oral consonants tend to appear as far as possible from the center of the vowel space and, therefore, from each other. *This maximal displacement creates maximal contrast and therefore, facilitates perception.*

§5.5.3 Normalized vowel systems, with tests for difference

Having considered the effects of preceding POA's on vowel placement, I turn now to a more holistic examination, considering the vowel systems of eight Karitiana. The methodology employed in describing the vowels of these speakers was identical to that described above for the speaker represented in Figures 5.1-5.4. That is, in the case of each speaker four to eight tokens of each vowel were considered. All of the vowel tokens were non-nasal and non-reduced. Furthermore, the vowel tokens for each respective vowel were equally divided according to whether the preceding POA in the token word was alveolar, velar, bilabial, or glottal. The primary purpose of doing this was, again, to ensure that the vowel means were not unduly affected by one specific POA. After all of the vowel tokens for each speaker were examined, with their F1 and F2 values entered into a database, the values were normalized using LOBANOV's formula. The vowels that formed the basis of the vowel space F1 and F2 means, required for the normalization of the actual tokens, included two of each of the five Karitiana vowels. These ten vowels were taken from separate recordings altogether, and in each case these vowels occurred after glottal consonants.

The recordings that formed the basis of these vowel charts consisted of words that I elicited from the Karitiana speakers represented. Some of these words were excised from short clauses that the Karitiana provided spontaneously. In other cases they were uttered in isolate. In all cases, the tokens were fairly non-remarkable in terms of length, that is the words were not produced with either abnormal rapidity or slowness. The vowel-token recordings were taken from a subset of a larger set of recordings that consisted of word-list elicitation and participant interviews. Each of these sessions with

the eight Karitiana in question lasted approximately one hour, and were recorded on mini-disc and transferred to a laptop. (See the methodology outline in Chapter 1.)

At present, I am continuing to record different Karitiana speakers. Thus, it is hoped that future studies will include data from a greater cross-section of the Karitiana population of approximately 260. However, even with only eight speakers so far represented, almost 10% of the *adult* population is represented directly in the study (see figures below). The following table contains the Brazilian names, ages, and genders of the Karitiana recorded. It also notes whether the Karitiana in question typically reside at the Casa do Indio in Porto Velho (therefore having more exposure to Portuguese), or usually reside in the village. Each speaker's level of proficiency in Portuguese is also noted. (These proficiency levels were decided upon in an entirely subjective manner by myself, after at least one interview with the Karitiana in question.)

Name	Sarita	Marilena	Elivar	Francisco	Julia	Milena	Valdemar	Rogério
Age	25	26	22	52	60's	25	45	32
Gender	F	F	M	M	F	F	M	M
Residence	Split	Casa	Casa	Village	Village	Split	Village	Split
Portuguese	High	High	High	Medium	Low	High	Medium	High

Chart 5.2. Participants in the investigation of Karitiana vowels.

As we see in this chart, the speakers represent various adult age groups, though young adults are best represented, for reasons that will become clear below. The primary purpose in choosing speakers from different age brackets was to test the possibility that certain Karitiana vowels are moving. As was suggested in §5.1, it appears some are.

It is generally accepted that, in order to test ongoing diachronic changes, it is important to consider socioeconomic variables. This fact follows from the work of Labov and others, as reflected in his influential curvilinear hypothesis:

Stable sociolinguistic variables combine flat age distribution for adults with a monotonic social class stratification; changes in progress combine a monotonic distribution in adult age groups with a curvilinear pattern in the socioeconomic hierarchy. (Labov 2001:460)

However, in the case of my Karitiana investigation, it is difficult to derive quantifiable socioeconomic variables of the sorts characterizing North American sociolinguistic studies. The vast majority of the Karitiana have similar if not identical occupations, and only a few of them have significantly more financial resources than their peers. Education levels vary somewhat, particularly in that most of the older Karitiana do not have formal educations. Certainly there are particular Karitiana, e.g. the *pajé* (shaman), the pastors, and the head of the artifact-selling association, that appear to wield a greater influence within the community. However, it would be inaccurate to claim that there are socioeconomic *classes*, comprising various members, among the population. Nevertheless, the findings of Labov and others, reflected in the curvilinear hypothesis, are worth considering. The hypothesis suggests, after all, that stable variables will exhibit a flat age distribution among adults, while changes in progress will exhibit a monotonic age distribution among adults. This formulation of the curvilinear hypothesis explicitly excludes the performance of children and adolescents, since the latter frequently exhibit higher rates of socially-stigmatized variables in their speech, even in the case of stable variables.

Based on Labov's work, we can predict that, if a variable exhibits flat age distribution *among adults*, it is most likely a stable variable. If a variable exhibits a monotonic age distribution *among adults*, it likely represents a change in progress. Though this is not necessarily the case, it seems likely in a situation devoid of clear socioeconomic classes, such as that of the Karitiana. As we see in Chart 5.2, in the present study I only consider the vowel positions of eight adults. One of the goals of the

study, then, is to test whether the F2 and F1 values for particular vowels demonstrate monotonic or flat distributions among these adults. If a monotonic distribution of such values is uncovered, we would then have some evidence of a shift in progress. Of course, this assumes that a monotonic distribution along the age axis is due to a change in progress, rather than to some other factor (e.g a social pressure among the Karitiana to change vowel positions as they age). This appears to be a safe assumption given the robust nature of the correlation between monotonic age distribution and changes in progress, supported by many studies.

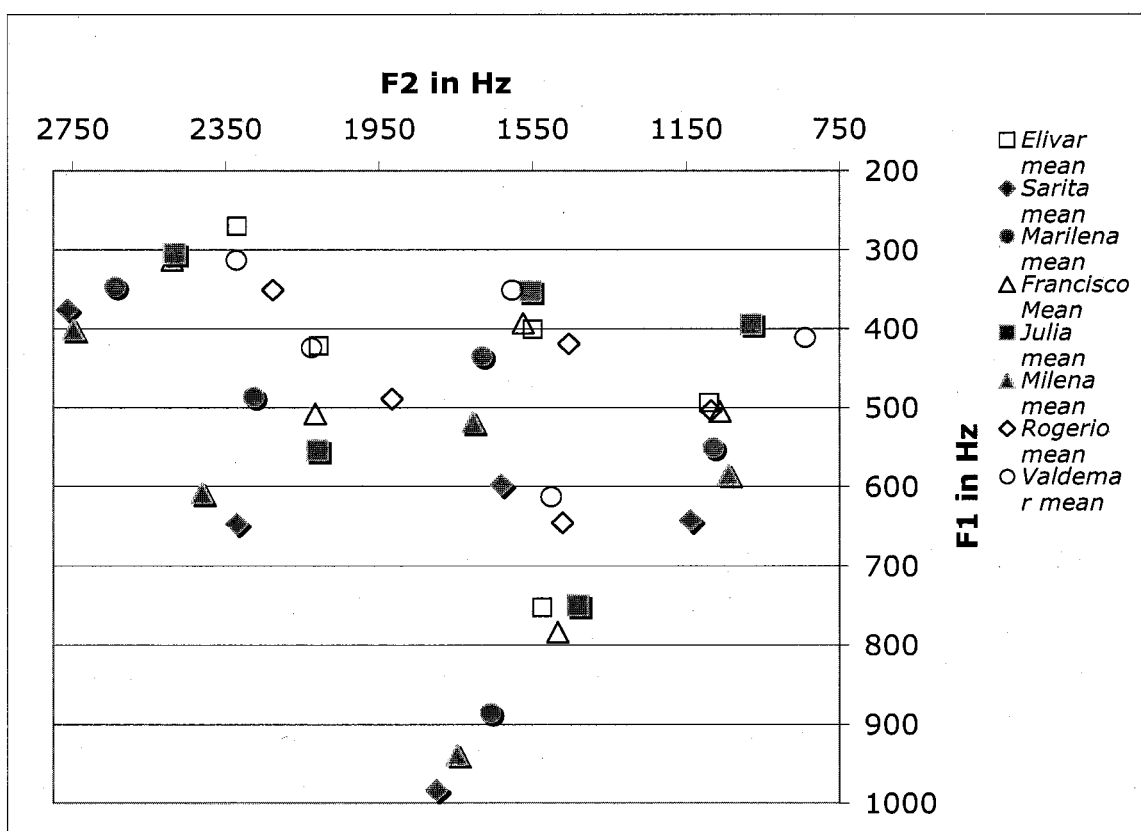


Figure 5.5 Means of non-normalized vowels for eight speakers. Female speakers are represented by shaded figures, males by non-shaded figures.

Figure 5.5 contains the means of the non-normalized vowels for each of the speakers in the study. The names of the speakers are provided in the legend. (The ages of these speakers can be found by cross-referencing Chart 5.2.)

Figure 5.5 demonstrates the vowels of the speakers according to absolute Hz values of F1 and F2. The figure is provided to illustrate the necessity of normalizing the vowels in order to understand their true positioning relative to each individual speaker's vowel space. When the vowels are charted in a non-normalized fashion, the Karitiana vowel system appears disordered. In fact, in Figure 5.5 it is difficult in most cases to decipher the boundaries between the vowels in question. However, when the normalized vowels are considered, the vowel systems of the speakers in question appear to be much more regular. Consider the following normalized vowel spaces:

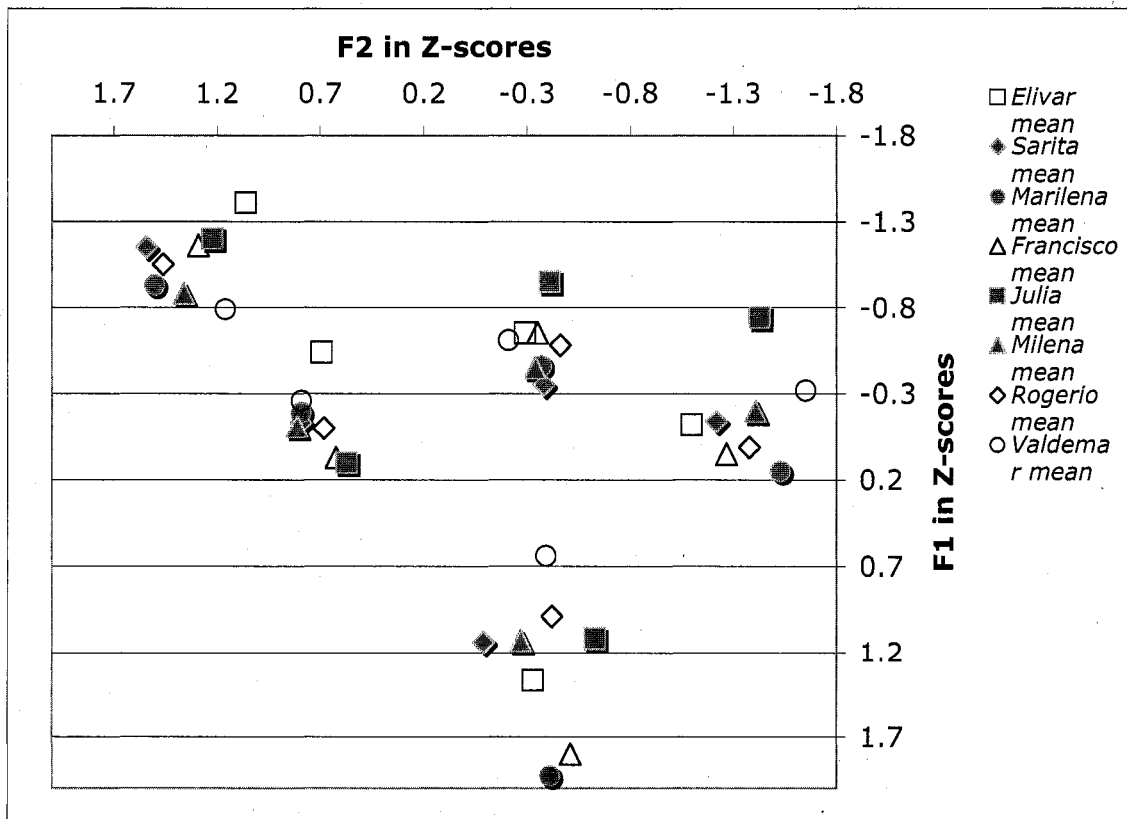


Figure 5.6 The means of normalized vowels for eight Karitiana speakers. Females are represented by shaded figures, males by non-shaded figures.

Initially, there may seem to be few discernible patterns in these vowel positions. However, close inspection reveals some vowel differences according to age stratification.

For example, the /e/ vowel of the three young females appears to be fronted, when contrasted to the vowels of the other speakers. In the case of the /i/ vowel, the locations of the vowels produced by the three young females also cluster in a particular region. Specifically, the /i/ vowels produced by these speakers tend to be located lower in the vowel space than those produced by the other speakers. This seems to suggest that the /i/ vowel of Karitiana is being lowered.

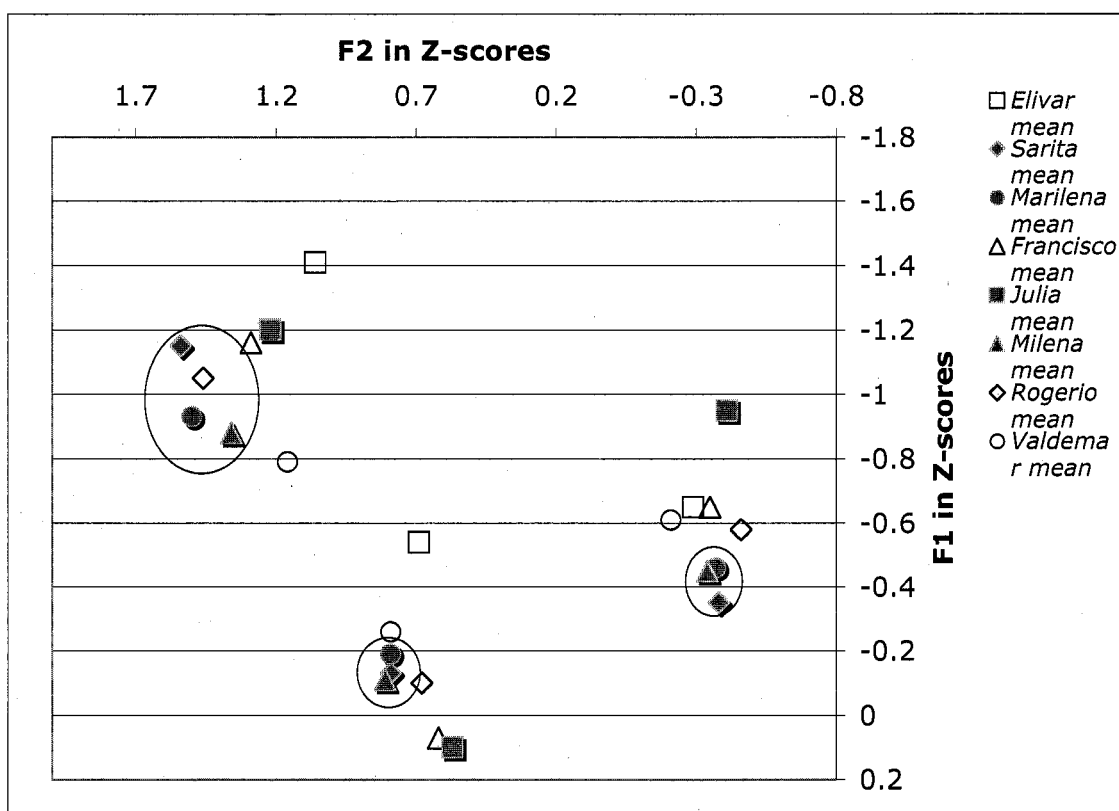


Figure 5.7 Vowel means for /i/, /e/, and /ɨ/. Young female means are circumscribed.

The findings discussed in the previous paragraph with respect to /i/, /e/, and /ɨ/, are more readily apparent if we highlight these vowels, paying particular attention to the

productions of the three young females, whose normalized formant means are remarkably similar. Consider Figure 5.7, in which only a portion of the vowel space from Figure 5.6 is reproduced. This portion contains only the *i*, *e*, and *ɨ* vowel means. It is apparent in this figure that the respective means of Marilena, Milena, and Sarita, the three young females, are very closely clustered.

One of the recurrent findings of sociolinguistic studies is that women tend to be at the forefront of linguistic changes occurring below the level of consciousness. As Labov (2001:367) states:

Women deviate less than men from linguistic norms when the deviations are overtly proscribed, but more than men when the deviations are not proscribed.

In other words, women typically are the leaders of changes involving non-stigmatized variables. This is commonly the case in vowel shifts, such as the Northern Cities Shift (cf. Eckert 1999). It appears that this might also be the case in Karitiana, at least with respect to the apparent movements of *i*, *e*, and *ɨ*. If this were the case, we would expect these vowels to pattern differently in the speech of young adult females than in the speech of other adults. Furthermore, we might expect a monotonic distribution of F1 and F2 z-score values, when contrasted to age. These expectations are borne out in the case of /*ɨ*/, for instance. As we see in Figure 5.7, the three young female participants of my study have lower /*ɨ*/ vowels than the other participants. If we chart the F1 z-score means for this vowel, we find a monotonic distribution along the age axis. This is apparent below:

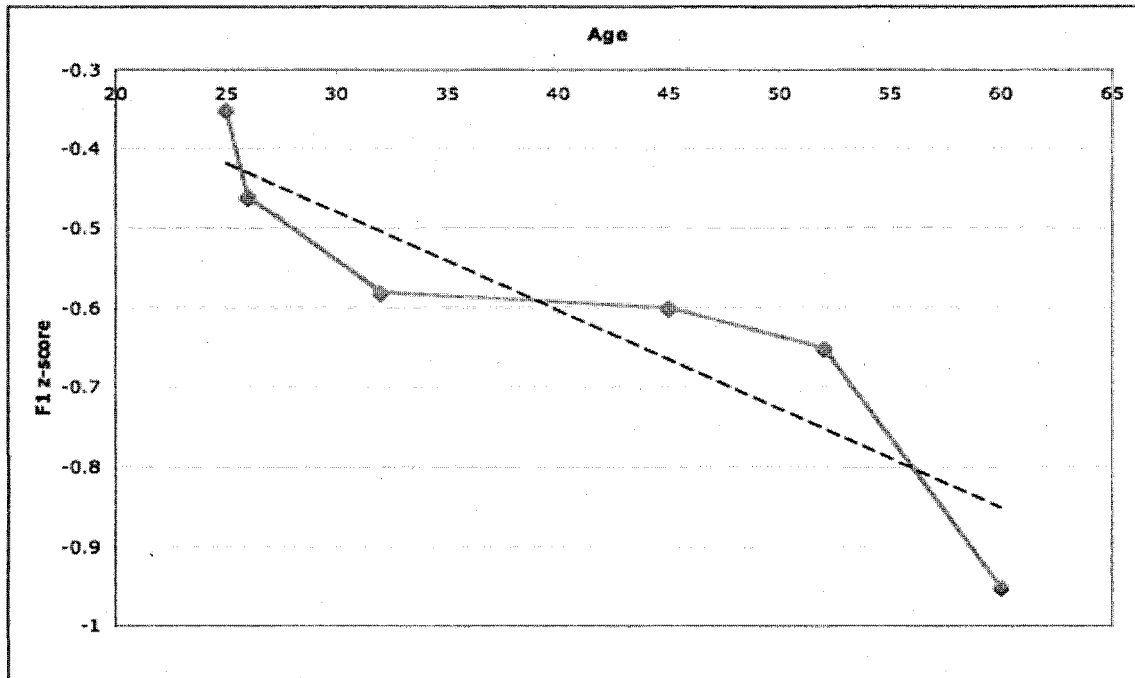


Figure 5.8 F1 z-score values for /i/, contrasted with age of subjects. The dashed line represents the chart's trendline.¹⁹

Figure 5.8 suggests that, as age increases, the F1 values of /i/ vowels tend to be smaller.

In other words, the older respondents tend to produce /i/ vowels that are higher in terms of articulation. The disparity in vowel quality between normalized /i/ means is significant, even with only eight speakers considered. A one-way ANOVA was performed on the data, contrasting the F1 z-scores on an inter-speaker basis. The results of the test were significant at $p < .05$:

Sum of Squares	D.F.	Variance	F-Score	P
0.94	7	0.13	2.62	.03

Chart 5.3 ANOVA test on /i/ z-scores.

The distribution of /i/ vowels also suggests a moderately monotonic patterning.

However, in this case the monotonic patterning surfaces when age is contrasted with $F2$ z-scores. As we saw in Figure 5.7, the young females tend to produce the /i/ vowel at a

¹⁹ The values for the twenty-two-year-old male, which do not pattern with the young females' values, have been omitted in this chart. Those values are consistent with the notion that women may be leading the change of /i/ position, however.

location further forward in the vowel space. This trend, while not as robust as the /i/ lowering, is apparent in the following chart:

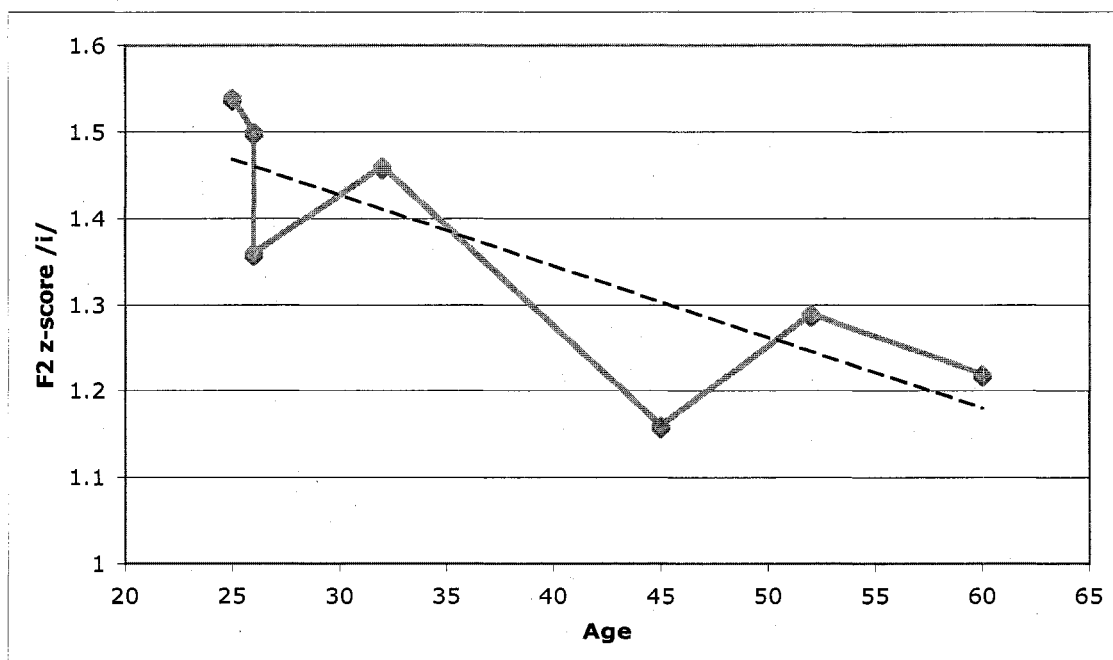


Figure 5.9 F2-z-scores for /i/, plotted against age. (See footnote 19.)

Similar findings obtain for the F2 values of /e/, which is also more fronted in the speech of young females. In the case of /a/, the F2 values of the young speakers tend to be higher as well, though to a lesser extent. This is apparent in Figure 5.6 above. In the case of /o/, there seems to be no discernible pattern across the ages of the respondents, for either F1 or F2 values.

The above findings on age-based vowel space variation are presented in a similar manner to previous studies on vowel spaces. However, one possible danger of doing this is that the Karitiana population, in terms of size and age distribution, differs drastically from the population of studies of language groups such as those found in North American cities. As I note in Appendix B, the most recent estimate of the Karitiana population suggests a figure of 260. However, as I discuss in the Appendix, the population

distribution is remarkable in that approximately 170 of the Karitiana, or 65% of the population, are under the age of 20.

This study, like other similar studies, only considered the vowel spaces of Karitiana adults. Only Karitiana over the age of 20 were considered adults for the purposes of these recordings, to insure that no findings on adolescents affected the results. In other words, the study was restricted to 90 Karitiana, or 35% of the total population. Since 8 Karitiana were recorded, about 9% of the adult population was considered. This figure is quite high, when contrasted to the percentage of adults considered in most studies.

Significantly, only 14 of the Karitiana, or 16% of the adults, are over the age of 50. On the other hand, 40 of the adults, or 44%, are between the ages of 20 and 30. Seventeen adults, or 19%, are between the ages of 30 and 40, while 16, or 18%, are between the ages of 40 and 50. Once these figures are considered, we see that the sample chosen for this study roughly represents the adult Karitiana population distribution. That is, 4/8 speakers recorded are between the ages of 20 and 30, 1/8 speakers is between the ages of 30 and 40, 1/8 speakers is between the ages of 40 and 50, and 2/8 speakers are more than 50 years old. In other words, given the size and distribution of the Karitiana population, the above findings are representative of the adult Karitiana population. Nevertheless, it should be stressed that findings such as Labov's curvilinear hypothesis are based upon remarkably different population distributions. It is not clear what effects, if any, these distributional differences should have on the interpretation of the above results. Nevertheless, it would be imprudent to provide the above results without also

describing the anomalous population distribution of the Karitiana (when contrasted to e.g. the U.S. population distribution). For more on Karitiana demographics, see Appendix B.

§5.5.4 Discussion

This study of Karitiana vowels has yielded several significant findings. The data suggest that the Karitiana vowels may be undergoing a shift, much as there may have been a vowel shift in Proto-Arikém, as described in Storto and Baldi (1994) and Rodrigues (1999). The normalized vowel spaces of the age-stratified subject population are consistent with the suggestion that three of the Karitiana vowels are shifting. This suggestion is buttressed by the normalized vowel data, which show that young Karitiana female adults demonstrated fronted /i/ vowels, fronted /e/ vowels, and lowered /i/ vowels. Given that monotonic distributions of variables along the age dimension often demonstrate changes in progress, distributions such as those in Figures 5.8 and 5.9 are noteworthy. Also, given that females tend to be innovators in the case of changes from below, it is particularly interesting to see that in the case of the *i*, *e*, and *ɨ* movements, the three young females in the study demonstrate nearly identical normalized vowel means, when contrasted to the other speakers.

Future studies, including normalized vowel means from a greater cross-section of the Karitiana population, should help elucidate the vowel movements that appear to be occurring in Karitiana. The motivations for these movements are also yet to be explored. For now, I simply note that there appear to be new migrations afoot among the Karitiana vowels.

6

Phonotactics

§6.1 Evidence for and discussion of syllabic template

Karitiana syllable structure can parsimoniously be described by the following template: (C) V (V) (C) Onset-less syllables are somewhat infrequent, when contrasted to syllables with onsets. This is partly the result of the fact that glottal stops are epenthesized in the onsets of otherwise onsetless stressed nuclei, as was mentioned in Chapter 2. However, onset-less unstressed syllables do occur. Consider the following two examples:

6.1 [ĩn na-**oki**-t ombaki]
 1S NSAP-kill-NFUT jaguar
 ‘I killed the jaguar.’

6.2 [ho:roa] ‘long’

Examples with bimoraic onset-less nuclei also occur. This is not surprising, since there are cases of long vowels in Karitiana, as mentioned in Chapter 2. These long vowels may occur in open or closed syllables. However, word-final bimoraic open syllables are uncommon. The following are two examples of such syllables:

6.3 [pi:] ‘fear’
 6.4 [hi:] ‘thorn’

Most frequently syllables with pronounced long vowels occur word-initially in polysyllabic words. This may be the result of the fact that stress is usually word-final. Therefore, long vowels found earlier in the word must present greater contrasts in terms of length, in order to present a sufficient perceptual contrast with the final syllable,

drawing stress away from that syllable in the process. This is somewhat speculative, but nevertheless would explain, I believe, why phonemically long vowels do not usually occur word-finally in polysyllabic words.

Storto also presents a discussion of Karitiana syllable structure (1999:41-44). In it, she makes the useful observation that “Vowel-initial syllables in Karitiana are often in morpheme initial position.” (43) Of course, as she suggests, this is only a tendency, as we see in example of *ho:roa* (above also), in which the last syllable of the word for ‘long’ is onset-less and open.

Storto also makes the observation that word-internal consonants are syllabified as onsets of the following syllables, rather than as codas of the preceding syllables. She formalizes this rule in the following manner:

Onset-first Rule: $C_1VC_2 \Rightarrow C_1V.C_2 / ___ V$ (Storto 1999:42)

This rule states that “any consonant in C_2 position must syllabify as an onset.” (42)

Storto gives the following clausal example of this rule’s application:

6.5	$[[na+[m+andij]]+\emptyset]$ declarative-causative-laugh-past ‘He made him smile’	⇒	na.ma.ndij (1999:42, original glosses)
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Various examples of this phenomenon could be provided. I will not dwell on this phenomenon, however, since it is fairly unremarkable from a typological standpoint, providing another of many cross-linguistic examples of the so-called “onset-first principle.” This has been defined as “The principle that onset formation takes precedence over coda formation.” (Roca and Johnson 1999:695) This principle appears to result from perceptual factors, since consonants are more easily distinguished when in onset rather than coda positions, given their greater effects on vowel formants. This perceptual motivation was mentioned in the discussion of locus equations in Chapter 3.

Given that the *onset first principle* is at work in Karitiana, it is not surprising to discover that open syllables are much more frequent than closed syllables in this language. However, this principle does not militate against closed syllables in word-final position. The distribution of syllable rhyme types in word-final positions is an empirical matter. If we simply tabulate the number of closed and open syllables in word-final position, we can better understand the structure of Karitiana words. I tabulated 226 common words in Karitiana, in order to test the *type* frequency²⁰ of closed and open syllables in word-final position:

Words ending in C	%	Words ending in V	%
116	51	110	49

Chart 6.1 Distribution of open and closed syllables in word-final position.

As these simple distributional data suggest, word-final syllables in Karitiana are evenly split between closed and open syllables. However, I should stress that these figures are based on words elicited in list form. In actual conversation, the final consonant of a word may be re-syllabified in the onset of a following word, if the following word begins with an onset-less syllable.

Given that syllables with onsets are more frequent than those without onsets, due to the onset-first principle and the epenthesis of glottal stops before stressed onset-less syllables, we can develop an idea of the most frequent syllable types in Karitiana. While CVC syllables are extremely common in word-final position, as reflected in Chart 6.1, they are less common than CV syllables in other environments, due to the onset-first-principle, glottal stop epenthesis, and general restrictions placed on word-medial codas (more on the latter momentarily). Therefore, we can suggest with confidence that CV

²⁰ The token frequency was not considered though, based on impressionistic data, I would say that the two rhyme types in question also have similar token frequencies.

consonants are the most frequent type in Karitiana, followed by CVC syllables. There are also cases of V syllables, however. Such syllables surface in polysyllabic words, when unstressed vowels without preceding phonemic consonants are also not preceded by an epenthesized glottal stop, due to their unstressed status. Along with [ho:.ro.a] (6.2 above), examples include the following:

6.6	[e.re.mbi]	'hammock'
6.7	[o.ke]	'shoulder'
6.8	[o.ʔi]	'sloth'
6.9	[o.pe.tēm]	'brain'

Superficially, it appears that there are complex onsets and codas in Karitiana.

Consider the following examples:

6.10	[mbit]	'pan'
6.11	[kabm]	'now'
6.12	[ŋge]	'blood'
6.13	[iri hodn]	'thank you'

However, all of the examples of seemingly complex onsets and codas involve clusters of the sort depicted in these examples. Specifically, all consist of homorganic nasal-stop or stop-nasal sequences.²¹ As was suggested in Chapter 4, and will be explored further in Chapter 8, such sequences actually consist of one nasal segment, phonemically. The superficial oral stop results when such nasals occur adjacent to stressed oral vowels.

²¹ The one apparent exception to this generalization of the onset sequence is the presence of [mh] sequences at the beginning of words such as *m+hip* (CAUS+fry, 'cook') or *m+hok* (CAUS+play, 'make play'). However, in all cases in my data, even when such words were elicited in isolate, they were preceded by prefixes, with the *m* causative morpheme being resyllabified, occurring in the coda of the preceding syllable. For example, [m] is resyllabified with [ka] in the following example:

ĩn naka-m-hok-i

1S NSAP-CAUS-play-future

'I will play' (An instrument)

I have tried to elicit causative forms without prefixation. However, such attempts have been unsuccessful, though it is unclear whether this is due to the ungrammaticality of such examples or their unusual syllable structure.

There are some restrictions on the syllable template, with respect to the phoneme types allowed in particular slots. Both fricative consonants, /s/ and /h/, are not allowed in coda position, either word-internally or word-finally. Also, the rhotic /r/ does not occur in coda position in my data. These are the only *phonemes* that are prohibited from occurring in coda position. However, certain phonetic segments, such as the epenthetic glottal stop, also do not occur in coda position. Storto (1999:41) suggests that, apart from the glottal stop, these include the alveolo-palatal affricate (which I consider to be an allophone of the alveolo-palatal nasal).²² These restrictions do seem to hold in my Karitiana data. Therefore, the /s/, /h/, and /r/ phonemes might be termed *onset-only* phonemes. (This is alluded to in the discussion of these phonemes in Chapter 4.)

I should note, however, that there are cases in which it appears superficially that /h/ surfaces in coda position. This is occasionally the case in those words ending in open syllables. For instance, consider the following transcriptions, representing two tokens each of three words:

6.14	[pi:]	'fear'
6.15	[pi:h]	'fear'
6.16	[ti:]	'large'
6.17	[ti:h]	'large'
6.18	[oti:]	'moon'
6.19	[oti:h]	'moon'

As we see in these examples, there are cases in which word-final long vowels appear to end in /h/. However, recall from our discussion of the voiceless glottal fricative in Chapter 4 that this sound is essentially a malleable voiceless vowel. That is, it retains the vocal tract articulation of adjacent vowels, and differs in that it is a voiceless segment.

²² Storto also claims there is a non-phonemic bilabial fricative in Karitiana, which does not occur in coda position. This fricative is a lenited allophone of the bilabial stop according to her analysis. However, all of the lenited bilabial stops I have transcribed sound more like approximants than fricatives.

Given this fact, the [h] in the above examples could be interpreted as part of a vowel that has been devoiced for the latter part of its duration. This interpretation, namely that the word-final [h] in such cases does not represent phonemic /h/, is supported by the fact that the overall durations of the word-final syllable rhymes in the tokens transcribed in 6.14 and 6.15 do not vary significantly in terms of length. The word final [i:] represented in 6.14 was found to have a length of approximately 110 ms, while the word-final [i:h] sequence represented in figure 6.15 was found to have a length of approximately 100 ms. In other words, the V: segment and the V:h segment did not vary significantly for length. Also, the [h] segment represented in token 6.15 was found to be only approximately 25 ms long, which is much shorter than most onset varieties of /h/, which are generally around 50 ms long.

When the word-final rhymes in examples 6.16-6.19 are measured, similar figures obtain. All of the rhymes in these cases are roughly 100-110 ms long, and the [h]-final rhymes are not significantly longer than their counterparts. These data suggest that there is no length difference between the word-final V: and V:h rhymes. This supports the claim that such [h] segments are the result of devoicing during the production of the long vowels in question.

According to Storto (1999:41), there are further restrictions on word-internal syllable codas. Specifically, she states that “The only consonants that may occur word-internally as codas are nasal.” This observation is supported by an epenthesis rule that precludes non-nasal consonants from occurring in coda position when a consonant-initial suffix is added to a word. Consider examples 6.20 and 6.21, also found in Storto (1999:41):

6.20	bik+pa sit-NOM	⇒	bi.k<i>.pa	‘seat, bench’
6.21	horōn+pa wash-NOM	⇒	ho.rōn.pa	‘basin, soap (washing thing)’

As we see in the first example, when the *pa* nominalizer is suffixed to the verb ending in /k/, an /i/ is inserted prior to the suffix, forming a new syllable along with /k/. However, when the *pa* suffix is added to a word ending in a nasal consonant, no vowel is epenthesized and the nasal remains in coda position.

These observations, compounded with the fact that there are no examples of non-nasal word-internal codas in Storto’s data, lead her to conclude that only nasal codas occur word-internally. However, based on my data, I would suggest that word-medial non-nasal codas, while rare, do occur in Karitiana. They are typically avoided as Storto suggests, but they nevertheless surface in tokens such as the following:

6.22	[pat.ʔin]	‘sister’
6.23	[pit.ʔi]	‘to eat’

These transcriptions may seem anomalous. After all, we know that the glottal stop is an epenthetic correlate of stress, inserted in onset-less syllables. We also know, based on the onset-first principle, that Karitiana places consonants in the onsets of following syllables, before filling the coda of the preceding syllable. So one wonders why the following forms do not surface instead of those in the previous two examples:

6.24	*[pa.tin]	‘sister’
6.25	*[pi.ti]	‘to eat’

There are two rules at work here, consonant syllabification and glottal epenthesis. It appears, based on examples such as those above, that in these cases glottal epenthesis applies before consonant syllabification. In the terms of traditional formal phonology, it

appears that glottal epenthesis can bleed the rule filling onsets before codas. This is described by the following ordering of rules:

Step 1: $\emptyset \Rightarrow ? / _ \text{'V}$
 Step 2: $C_1VC_2 \Rightarrow .C_1V.C_2 / _ \text{V}$ **Rule ordering 1.**

However, this ordering is not true for all Karitiana words, since usually word-final stressed syllables are preceded by a consonant rather than a glottal stop, as in the following examples.

6.26	[a.ka.'tim]	'all'
6.27	[koj.'pa]	'pineapple'
6.28	[de.wo.'ta]	'side'
6.29	[si:'po]	'eye'

In such cases, we can state confidently that the following ordering of the descriptive formalisms describes the state of affairs:

Step 1: $C_1VC_2 \Rightarrow .C_1V.C_2 / _ \text{V}$
 Step 2: $\emptyset \Rightarrow ? / _ \text{'V}$ **Rule ordering 2.**

In this case, syllabic onset fulfilment bleeds glottal epenthesis. This rule ordering accurately describes the majority of Karitiana words, which begs the question as to why there is an alternate sequencing of rules, namely Rule ordering 1.

To adherents of usage-based models of phonology, a certain number of exceptions are to be expected since the “rules” in question merely generalize a certain set of patterns in the sounds of a language. These patterns should have exceptions, as in the case of the rule orders being considered here. In describing “rules” in usage-based phonology, Bybee (2001:21) states the following:

Rather the notion of rule takes a very different form. Linguistic regularities are not expressed as cognitive entities or operations that are independent of the forms to which they apply, but rather as schemas or organizational patterns that emerge from the way that forms are associated with one another in a vast complex network of phonological, semantic, and sequential relations.

If we recognize that the rules in Rule ordering 1 and Rule ordering 2 are simply “schemas or organization patterns that emerge” over time, it is not surprising that in some cases words would emerge that were not affected by a particular generalization or categorization. This might occur, for instance, if the words reflecting Rule ordering 1, in this case [pit.ʔi] and [pat.ʔin], emerged at a different time or in a different manner than the words reflecting Rule ordering 2.²³

This entire discussion of non-nasal consonants occurring as word-medial codas is based on the acceptance of the transcriptions of [pat.ʔin] and [pit.ʔi]. One could argue that perhaps the words were simply mis-transcribed. However, close inspection of the phonetic data reveals that these transcriptions are correct. Two pieces of related evidence can be brought to bear on the issue. They are observable in spectrograms of the words in question. For example, in the spectrogram of [pit.ʔi] found in Figure 6.1, I highlight two phonetic correlates of the [t.ʔ] sequence. First, we see that the duration of the word-medial voiceless occlusion in [pit.ʔi] is in the neighborhood of 250 ms. This duration is much greater than most consonants in the data, and is a typical length for a sequence of two consonants. Therefore it is unlikely that the occlusion represents /t/ alone. Second, we see that the formant transitions of the onset of the final vowel are not those that are characteristic of /t/. Instead the onset formants of /i/ are flat (as highlighted by the boxes surrounding the relevant formant track portions), and are therefore consistent with a

²³ Perhaps the final syllables in these words were once separate monosyllabic morphemes, with epenthetic glottal stops. These morphemes then formed compounds with the first syllables, also separate morphemes at the time. According to such an account, the elements of the compounds are now semantically bleached, with only an epenthetic glottal stop serving as a vestige of their origin. Of course this account is entirely speculative, but it helps to illustrate how a diachronic pattern might explain the anomalous synchronic phonological patterning in such words.

preceding glottal stop. In this word, then, the transcription of [pit.ʔi], rather than [pit.ti], is correct. The nearly-flat formant transitions characterizing the final vowel's onset are characteristic of a preceding glottal, rather than alveolar, POA.

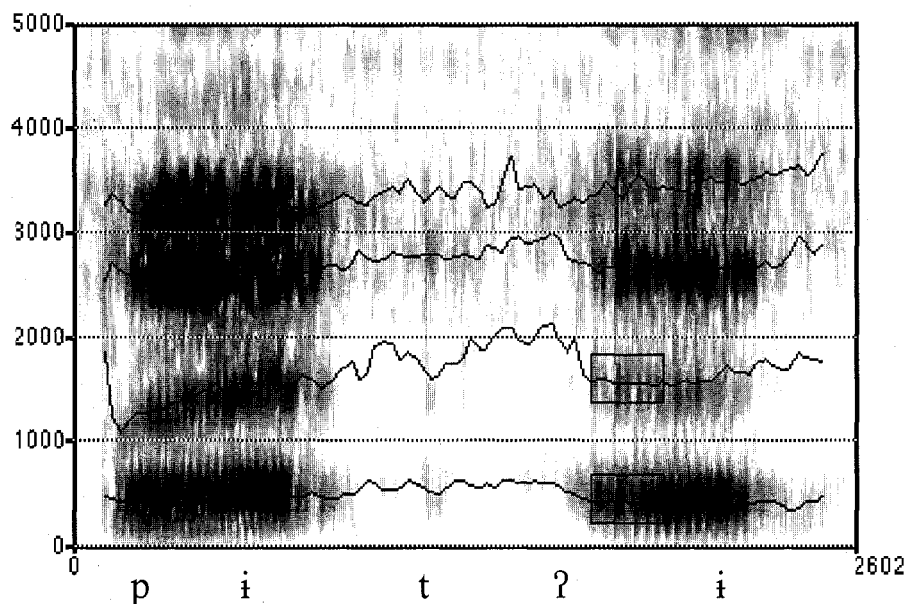


Figure 6.1 Spectrogram for [pit.ʔi]. Note length of occlusion and the flat onset formant transitions of the final syllable. X-axis represents time in seconds. Y-axis represents frequency in Hz. Boxes highlight /i/ onset formants.

Due to the length of the occlusion and the nature of the relevant formant transitions, then, the word-medial period of occlusion in question cannot be attributed entirely to a [t] segment, as transcriptions such as [pit.ti] or [pit.i] imply. The only alternate transcription consistent with Figure 6.1 is [pi.tʔi]. There is no evidence of complex onsets in Karitiana, however, and the decision to include such a typologically unusual onset type in the syllabic inventory, simply for the sake of consistency with the other data related to syllable codas, would be *ad hoc* at best.

The glottal nature of the formant transitions highlighted in Figure 6.1 can be verified by further contrasting the formant transitions in such spectrograms with those

characteristic of /t/. Recall from Chapter 3 that formant transitions of particular stops can be described by locus equations. As we saw in that chapter, the slope of the locus equation for /t/ tends to be flatter than those for /p/ and /k/, due to the great influence it exerts on the formants of following vowels. We can chart the formant transitions associated with the onsets of the final syllables of [pat.ʔĩn] and [pit.ʔi], to test and see if the onsets are consistent with a /t/-V transition. I have done this for productions of each of these words, and the relevant transitions are evident in Figure 6.2. (The tokens charted were produced by the same male speaker utilized in the locus equation study of Chapter 3.)

In Figure 6.2, there are four ellipses. The second ellipse (from the left) highlights a token of /i/, taken from the last syllable of [pit.ʔi]. The F2 onset and F2 midpoint values of this vowel are not consistent with those of an /i/ vowel following a /t/ consonant. If they were, the token in question would occur in the region of the leftmost ellipse (with which it is connected by a dashed line in Figure 6.2). This leftmost ellipse contains the F2 midpoint and F2 onset values of /i/ vowels that occurred following a /t/ rather than a /ʔ/.

The upper-right ellipse (closest to the top-right corner) in the figure contains the formant onset and midpoint values of a token of /i/, taken from a token of [pat.ʔĩn].²⁴ The F2 midpoint and F2 onset values for this vowel are not consistent with those of an /i/ following /t/. If they were, the token would be located in the region of the ellipse located below it, where other /i/ tokens, which followed /t/, are plotted.

²⁴ The vowel in question was not nasalized during the first part of its articulation, so the difference in formant transitions could not be attributed to nasalization.

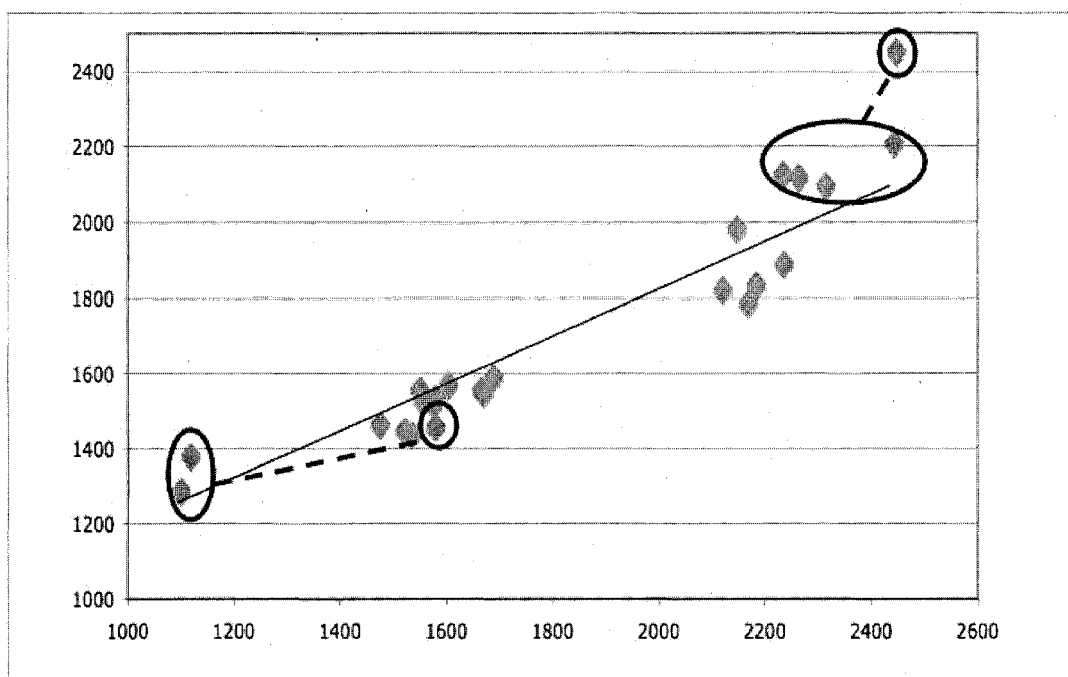


Figure 6.2 Formant transitions of [ʔi] and [ʔi] in [pit.ʔi] and [pat.ʔin], respectively. X-axis represents F2 at vowel midpoint, in Hz. Y-axis represents F2 at vowel onset, in Hz.

Based on such data, we can state conclusively that non-nasal consonants do occur in word-medial codas. However, in my data the only consonant that does so is /t/, and only in a few cases.

In conclusion, I should say that, while it is tempting to suggest that there are rules militating against certain word-internal codas, the data above suggest that these “rules” are simply strong tendencies. Such strong tendencies/generalizations are entirely consistent with the expectations of a usage-based model of phonology, as described by Bybee (2001).

§6.2 Allophones and phonotactics

Based on the account of the distribution of allophones provided in §6.1, as well as in Chapter 2-5, we can generate some useful generalizations about the relationship between allophony, stress, and phonotactics in Karitiana. The distribution rules in Figures 6.3 and 6.4 summarize the behavior of the non-nasal phonemes in the language. The elaborate allophony of nasal phonemes is explained in depth in Chapters 8 and 9, and encapsulated in List 8.1.

The generalizations below encapsulate the effects of stress, as well as syllable position (in the case of the consonants), on the relevant segments. They do not include findings on nasalization.

Vowel allophony and stress	
/i/ /e/ /o/ /ɨ/	Position generally unaffected by stress.
/a/	<p>/a/ → [ə] / elsewhere /a/ → [a] / ' ___'</p>

Figure 6.3 The effects of stress on vowel positions.

As we see in Figure 6.3, based on the data in Chapter 5, only the position of /a/ is significantly affected by stress influences.

In the following figure, the effects of stress and phonotactics on non-nasal (and non-nasalized) consonants are summarized.²⁵

²⁵ See List 8.1 for an overview of nasal allophones that includes the effects of phonotactics and word stress.

Consonantal allophony, stress, and phonotactics	
[ʔ]	/ø/ → [ʔ] / . ___' V
/p/	/p/ → [p] / . ___ V → [p̚] or [b] / V ___ #
/t/	/t/ → [t] / . ___ V → [t̚] or [d] / V ___ .
/k/	/k/ → [k] / . ___ V → [k̚] or [g] / V ___ #
/r/ /s/ /h/ /w/	Allophones of these phonemes must occur in syllable onsets. Generally unaffected by stress.

Figure 6.4 The effects of syllable position and stress on non-nasal consonants.

Note that only one of these distribution rules appeals to stress, and that rule applies to the non-phonemic glottal stop. In other words, non-nasal consonantal allophones in Karitiana generally take the same form regardless of whether they occur in a stressed or unstressed syllable.²⁶ Also, note that the unreleased forms of /p/ and /k/ only occur syllable-finally at word boundaries, while the unreleased form of /t/ can occur syllable-finally, even if the relevant syllable is not necessarily word-final. This generalization is based on the findings in the previous section. As was noted in that section, nasal consonants can also occur in word-internal codas.

²⁶ As we will see in Chapter 10, there are processes of lenition affecting /p/, /t/, and /k/. However, these processes are sensitive to morpheme boundaries rather than stress.

Prosody

§7.1 Word accent

Previous reports on Karitiana suggest that the language accent system is based on pitch modulation. Storto (1999:79) states that “Karitiana has a pitch accent system which assigns tone based on stress.” Rodrigues (1999:114) states that, “In Karitiana and in languages of the Tupari branch there is salient pitch accent, but it is predictable from stress which is itself predictable from other phonological and morphological factors.” I will argue that the term pitch-accent cannot be meaningfully used to describe Karitiana stress. The acoustic data suggest that accent in Karitiana is instantiated by greater loudness, due at least in part to increased positive tilt in the spectra of stressed vowels. Accent also correlates, to a lesser extent, with increased vowel length and higher pitch. However, the correlation between stress and higher pitch is in fact fairly weak when compared to a pitch accent language such as Japanese. Pitch contours in Karitiana are based primarily upon sentence-type intonation patterns. These intonation patterns operate fairly independently of word accent.

§7.1.1 Placement

Word accent in Karitiana is, in the absence of intervening factors, placed on the final syllable in the word. This was the basic conclusion reached by Storto (1999:79) and alluded to in Landin (1984). In Landin (1984), the author notes that the “declarative” prefixes attached to verbs vary in form according to whether the first syllable of the verb

is accented. When stress does not fall on the first syllable of a verb, the form of the suffixes is *ta-* or *na-* (the motivation for this variation is discussed in Part II). However, when preceding a verb with word-initial accent, the relevant markers take the form of *taka-* or *naka-*. In other words, a *ka* syllable is inserted prior to verbs with stress on their first syllable. In most of my examples *ka* is inserted before a monosyllabic verb, when accent is initial and final. Crucially, however, in the case of most of the bisyllabic verbs in Landin (1984) and in my data, *ka* is not inserted. In other words, in these cases accent is typically final. So Landin also refers indirectly to the position of word accent, at least in the case of verbs.

In the absence of intervening factors, discussed next, primary stress occurs on the final syllable and secondary stress occurs on every other preceding syllable. e.g. on the first syllable of a tri-syllabic word. It is not clear, actually, whether secondary stress is an appropriate term, since the stress is often on the same order of magnitude (in loudness) as that of the primary stress. (This has also been found to be the case in at least one other Amazonian language, Jarawara--cf. Dixon 2005)

Two principal intervening factors lead to non-final accent: syllables with heavy nuclei located in non-final position, and non-final vowels that have the same quality as the final vowel of the word they are found in. Before treating the exceptions that result from these two factors, let me exemplify the unmarked stress strategy.²⁷ The following word tokens exhibit primary stress on their final syllable:

7.1	[pẽ.'ndot]	'wide'	7.7	[kĩ.'nda]	'thing'
7.2	[pi.õ.'ndit]	'thick'	7.8	[dʒo.pi.'ʔop]	'nose'
7.3	['mãn]	'husband'	7.9	[pi.so.'kõ]	'fingernail'

²⁷ Most of the Karitiana examples considered so far involve word-final stress. For instance, the words [pat.'ʔĩn] ('sister') and [pit.'ʔi] ('eat'), considered at length in the discussion of phonotactics in the preceding Chapter, exhibit word-final stress.

7.4	[bo.ro.'ja]	'snake'	7.10	[ha.ni.'pa]	'heart'
7.5	[õ.'wã]	'child'	7.11	[e.'ngi]	'to vomit'
7.6	[o.pi.ri.'sap]	'ear'	7.12	[a.pi.'sok]	'to stab'

As we see in these examples, word-final stress is the default word accent pattern. It applies across semantic and grammatical categories--to nouns, verbs, adjectives, and other word classes. (Several of these classes are evident in the above examples.) However, syllables with heavy nuclei attract stress, regardless of their position within the word. This is evident in the following words:

7.13	['ho:.ri]	'there'	7.17	[e.'si:.ma]	'to sneeze'
7.14	['de:.so]	'mountain'	7.18	[a.'si:.ka]	'to shoot (with arrow)'
7.15	[pi.'mi:.nim]	'thin'	7.19	['pa:.si]	'squash'
7.16	['i:.tja]	1PL	7.20	[o.jõ.'mba:.kip]	'lover'

As in the case of the default word-final stress, the stress attraction of heavy nuclei applies across word classes, and in words with varying numbers of syllables.

Usually, accent does not occur on the final syllable of a word consisting of two syllables (the last of which is closed) with nuclei of the same quality. Consider the following examples of words containing initial stress:

7.21	['pi.kip]	'covering'
7.22	['ʔi.rip]	'tapir'
7.23	['te.rep]	'straight/honest'

I refer the reader to Storto (1999:46) for a list containing other examples. The next two examples suggest that similar vowel quality is not enough for a non-final syllable to draw stress away from a final one. Such syllables do not draw stress away from the final syllable if they occur in words that contain more than two syllables:

7.24	[ki.ri.'rit]	'frog'
7.25	[ko.ro.'ʔop]	'inside'

Stress does occur on the final syllable of a bisyllabic word with two similar nuclei, if the final nucleus is heavy:

- 7.26 [o.'go:t] 'nephew/niece'
 7.27 [pi.'pi:d] 'know'

These accent patterns are generally consistent, though exceptions exist. For instance, consider the following two transcribed tokens in which accent does not occur on the final syllable of the word, though none of the intervening factors so far discussed are present:

- 7.28 [pa.'ʔi.ra] 'wild/angry' 7.29 ['o.jĩm] 'bus'

§7.1.2 The Tupí context of word accent

In Suruí, a Tupí-Mondé language that is geographically proximate to Karitiana, accent has been found to occur at variable positions in the word. Van der Meer (1982:28) makes the following observations:

Quanto a posição da sílaba accentuada na palavra, esta parece ser livre, com talvez uma única condição para acentuação nas sílabas finais de tom baixo na presença de outras (não proclíticas) de tom alto. Estas parecem só poder ser acentuadas se forem sílabas fortes, isto é, se forem longas ou fechadas.

Translation:

With respect to position, the stressed syllable within the word appears to be free, with perhaps the only restriction occurring on final syllables of low tone occurring adjacent to others (non proclitics) of high tone. These apparently can only be stressed if they are strong syllables, that is, either long or closed.

Suruí, according to Van der Meer, has fairly unpredictable word-level stress then. This is not the case in the other Tupí languages I have surveyed, however. For instance, in Parintintin, another geographically proximate language, but of the Kawahib cluster of Tupí-Guaraní, primary stress of a word depends on its position in the phonological phrase. Pease and Betts (1971:10) make the following remarks:

A phonological phrase is postulated to account for certain features of stress, pitch, and length, which are commonly associated with groups of syllables. The phonological phrase is comprised of one or more syllables, generally more than one.... Phrase stress generally occurs on the first syllable of the phrase except in initial phrases in a sentence, in which case one or two unstressed syllables may precede the stressed syllable.

In Asurini, a Tupí-Mawé language, word accent is said to occur on the penultimate syllable. This is noted in Harrison (1984:51), who also states that, "Once the primary accent has been established one can place secondary accent regressively on every other

syllable.” This latter observation appears to hold in Karitiana and various other Tupí languages as well.

In the languages surveyed so far, then, we see word accent occurring either unpredictably, on the first syllable of the phonological word, or on the penult. Judging from these examples, there is significant heterogeneity in Tupí stress systems. Nevertheless, there are examples of word stress patterns similar to that found in Karitiana. For example, Cunha (1987:24) notes that in Awa-Guajá, another Tupí-Guaraní language, there is “accento fixo, que incide sempre na última sílaba da raiz.” (There is “fixed stress, which always occurs on the final syllable of the root.”) Juma, a member of the Kawahib cluster of Tupí-Guaraní, also exhibits word-final stress. Abrahamson and Abrahamson (1984:172) note that “O acento numa palavra geralmente recai em sílabas alternadas, recuando a partir da última sílaba.” (The stress of a word generally falls on alternating syllables, beginning with the final syllable.) This pattern is remarkably similar to the pattern uncovered in Karitiana.

In three of the six Tupí languages considered (including Karitiana), accent is typically placed on the final syllable of a word. Therefore, we can conclude that the word stress pattern suggested for Karitiana is not anomalous, given the findings from other members of its language family.

§7.1.3 Bysyllabic words with two identical vowels

It is unclear what motivations underlie the exceptional stress pattern of bisyllabic words with two identical nuclei. Storto (1999:46) accounts for cases of this phenomenon, such as those provided above, in the following manner:

One straightforward way of accounting for the data is to posit an epenthetic nucleus in the last syllable of such words, and to define the stress rules at this level as to somehow ignore epenthetic vowels. If

epenthetic vowels are not accessible to the computation of stress, than the words in (98b) [like those in the examples above] are not exceptional because stress is predictably assigned to the rightmost syllabic nucleus, that is, the only nucleus in the word before the application of epenthesis.

She notes further that it is not the “CV_i.CV_iC shape that determines the exceptional word-initial stress pattern. Words such as [ka.'rak] ('sleep', noun) and [do.'kon] ('skunk') have the same shape...but their stress falls predictably on the final syllable.” According to Storto's account, words such as ['pi.kip], 'covering/bark,' only have one vowel underlyingly. In this case, the underlying form would be /pikp/. Word stress is based on this form and therefore occurs on the first, final, and only syllable. Epenthesis then occurs, inserting a vowel of the same quality as the first, between the /k/ and the /p/.

I refer the reader to Storto (1999:46-49) for a more detailed discussion of her account of such words. The account is consistent with the data. However, there are at least two troublesome aspects to the account. First, there are no other instances in the language in which underspecified vowels are inserted and assimilate the features of vowels in adjacent syllables. Second, it is unclear why a language that does not allow complex onsets or codas in any other environment would allow complex codas in these underlying forms. Not only are the codas in question complex, but in many cases, e.g. [pikp], they are of a typologically exotic sort, consisting of adjacent voiceless stops with different POA's. At this point I do not offer a sound alternative to Storto's account. I can offer this speculative, yet plausible, suggestion: Sound changes frequently travel via analogical extension. Based on examples and data that I do not recapitulate here for the sake of brevity, Bybee (2001:124) concludes that “it is perhaps possible that high phonological similarity to a unique form can condition an analogical reformation.” I would suggest, then, that the marked stress pattern under consideration applies only to

words of a certain phonotactic template because the stress pattern has been extended from other similar exceptional words, perhaps beginning with one “unique form” that had the stress pattern. For example, a word with two vowels of the same type could have originally received this stress pattern due to its phonological²⁸ similarity to another stress-initial word with two vowels of the same type. (How this pattern would have arisen in the first place is another question altogether.) This is one admittedly speculative alternative to Storto’s account, which, as I have said, is also consistent with the data.

§7.1.4 Affix participation in accent

Since primary word-level accent in Karitiana typically occurs on the final syllable, suffixation would be expected to affect the placement of such stress. However, what we find in Karitiana is that suffixes fall into two classes, those that are stressed and those that are unstressed. For instance, consider the following three words:

- 7.30 se.ʔa-dnã
good-ADJ.PL
‘good (referring to many things)’
- 7.31 a.ʎndi-j
smile-FUT
‘will smile’
- 7.32 kata-ʎpa
sleep-NOM
‘bed’

We see that in the case of the first and second words, affixation does not affect primary word accent and stress falls on the same syllable that it would fall on in the word without

²⁸ This pattern appears to be due to phonological factors alone, since the words in question do not fall into any discernible morphological or semantic category, but clearly fall into a phonological category. Also, the words in question do not appear to have been historically polymorphemic. In the last chapter, I suggested that some words, which violate the nasal-only restriction on word-internal codas, *may* have been polymorphemic at one point. This would help explain their violation of the syllabic template. There is no evidence that the word-final stress violations are due to the relevant words being polymorphemic at some point in the past. Anyways, it would be surprising if their stress pattern could be attributed to morphological factors, given the clear phonological pattern uniting the stress exceptions.

a suffix.²⁹ In the case of the third example, however, stress falls on the final syllable, a nominalizing suffix. Storto (1999:83) also recognizes the existence of two sorts of suffixes, one sort that receives word stress, (though she claims it only receives secondary stress) and another that does not. For an analysis of Karitiana affix stress based on phonological cycles, see Storto (1999:83-89).

§7.1.5 Investigation of phonetic correlates of accent

Karitiana accent is instantiated by stressed syllables of greater loudness, when contrasted to non-accented syllables of the same word. Acoustically, *loudness* is correlated with *amplitude*, which measures fluctuations in air pressure. However, this correlation is not linear, since the human ear is more sensitive to softer sounds. Furthermore, the human ear perceives amplitude variation more acutely within a particular range of frequencies. As Johnson (2003:50) notes, human hearing is most sensitive to sounds that have frequencies between 2 and 5 kHz. Therefore, a sound with greater amplitude in this range, but lower overall amplitude than another sound with less energy in this frequency range, may still be perceived as louder. As Crosswhite (2004) suggests, “increased energy in frequency bands to which the human auditory system is particularly sensitive leads to increased perceived loudness.” She also notes that

the spectral balance of speech sounds can be manipulated by changing the spectral tilt of the glottal source: a more asymmetric glottal pulse leads to a glottal spectrum with a less negative tilt and therefore concentrates more energy in the mid-frequency harmonics. (2004:1)

In other words, a more positive spectral tilt, with more energy in the mid-frequency harmonics, leads to greater perceived loudness. (Of course, greater amplitude typically leads to greater energy throughout the spectrum, and therefore correlates strongly with

²⁹ The [j] tense suffix is a reduced form of the /i/ vowel. As such, it could in principle bear stress but does not. (I discuss /i/ approximantization in Chapter 10.)

loudness as well.) A more positive spectral tilt has been found to characterize stressed syllables in stressed-timed languages such as Dutch and English, as well as syllable-timed languages such as Polish and Macedonian. (Crosswhite 2004:1)

The only phonetic correlate of accent mentioned in Storto's (1999) discussion of Karitiana is pitch. She makes the following observations:

Informally, the rules accounting for tone assignment are as follows. First a H tone is assigned to the stress head of a morpheme, that is, to the nucleus that bears stress. Since stress is often final in the language, the majority of the words will end in a H tone. One common situation in which this fails to happen, is when a L tone is added to the end of a sentence to mark certain sentential types. The L melody is obligatorily inserted in declarative sentences, negated imperatives, and questions. (1999:89-90)

So, according to this account, accented syllables tend to have higher pitch unless they occur clause-finally in a declarative clause, for instance. My data suggest, however, that the one consistent correlate of accented vowels, regardless of their position within a given clause, is loudness. Accented syllables in Karitiana are almost always louder than their adjacent unstressed counterparts. They are also frequently longer, though there are exceptions to this pattern. They are also typically higher in terms of pitch, as Storto suggests, but there are exceptions to this pattern as well, as she notes in the above excerpt. Increased loudness is the most consistent correlate of stressed vowels in the language. This increase is achieved by increasing the amplitude of the stressed vowel, and in many cases it is also achieved via a more positive spectral tilt.

In order to test the phonetic correlates of accented nuclei in Karitiana, I created a database, into which I inputted values for specific parameters of accented and unaccented vowels. For each of the five oral vowels in the language, I created a table containing the values of these parameters for various accented and unaccented tokens of the vowel in question. In this way I was able to contrast the acoustic characteristics of a particular vowel in accented and unaccented environments. In the database, I also entered data for

other vowels occurring in the same words as the accented vowel, in order to contrast the findings of the accented vowels with those of non-accented vowels occurring in the same word. This seemed an important step since accent is by nature relative, and its prominence in terms of fundamental frequency, loudness, and length can only be understood when contrasted to the fundamental frequency, loudness, and length of other adjacent syllables.

The following parameters were examined for each of the word tokens considered for the database on word accent:

1. Length of the vowel under examination.
2. Length of the next-longest vowel in the word token.
3. Pitch (F_0) average for the vowel.
4. Pitch (F_0) average of the highest remaining vowel in the same word.
5. Pitch variation (F_0 change) during vowel's production.
6. Amplitude in terms of decibels.
7. Amplitude of another vowel in the word, in terms of decibels.
8. Difference between 6 and 7.
9. Loudness in terms of sones. This was found by considering the loudness of the steady state portion of the vowel, over at least 50 ms.
10. Loudness of next-loudest syllable in the word, in terms of sones.
11. Difference between 9 and 10.
12. Spectral tilt of the vowel.

By assessing these parameters for accented³⁰ and unaccented varieties of each of the five oral vowels, I was able to ascertain which of the parameters most strongly correlated with word stress in Karitiana.

As an example of this methodology, consider the following data, based upon one token of the word [e.'se] 'water' and another of the word [se.'ʔi:] 'drink.'

³⁰ One might wonder how the vowels were initially judged to be accented or unaccented, before the parameters in question were examined. After all, if the syllables were classified as accented initially due to perceptual loudness, than it would not be surprising to find that loudness correlates with accent all of the time, and the reasoning would be circular. However, syllables were initially classified as accented only if they had any combination of two factors involving greater loudness, length, or pitch. So if a syllable nucleus was both longer and had a higher pitch compared to others in the same word, the syllable in question was considered accented, even if the syllable's vowel was lower in terms of loudness. By establishing these criteria for the initial consideration of an accented syllable, I was then able to observe which of the three possible factors was most consistently tied to the implementation of accent in Karitiana.

Vowel	Length in ms	Other vowel length in ms	F ₀ Average	F ₀ Average for other vowel	F ₀ variation	Amplitude in dB	Amplitude of other vowel in dB
e.'se	129	58	104	124	-28	68.3	57.9
se.'i:	218	65	123	94	-4	68.5	68.9

Vowel	Amplitude dif.	Loudness in sones	Loudness of other vowel in sones	Difference in loudness	Spectral tilt, measured in Phons-dB
e.'se	11.4	37.9	14.6	23.3	24.2
se.'i:	-0.4	30.8	30.7	0.1	21

Data such as these also allowed me to contrast the accent-related variables of accented and unaccented varieties of the vowel types.

Values such as those in the above data were tabulated for ten tokens (5 stressed, 5 unstressed) of each of the five oral vowels. The tokens were produced by a 22-year-old male, and were excised from elicited clauses. They were produced in identical recording conditions, so that amplitude and loudness findings could be prudently contrasted.

After examining the data such as that found above for each of the five oral vowels, several tendencies began to surface. Not surprisingly, it was found that accented vowels tend to have longer duration than their unstressed counterparts. This is to be expected since we have established previously that long vowels tend to draw stress. However, it should be noted that accented vowels tend to be longer even when they are not phonemically long. For instance, consider the example of /e.'se/ found above. In this example, the stressed *e* vowel does not appear to be phonemically long. (In such cases, the language resource person often was able to intuit that such was the case, and would say something to that effect.) However, we see that the token considered was 129 ms long, in contrast to the 58 ms production of the unstressed *e* in the same token.

In my data, it was frequently the case that accented vowels were longer. However, there were exceptions in which accented vowels were of the same length or even shorter than their unstressed counterparts in the same word. Nevertheless, in some rare cases length appears to be the primary correlate of accent. As an example of this, consider the token of /se.'ʔi:/ described by the data above. We see that, in the case of this token, the long stressed /i/ vowel has a duration of 218 ms, in contrast to the unstressed *e* vowel, which is less than one third that long. Interestingly enough, however, the loudness and pitch of the vowels in question is nearly identical, suggesting that in this case the only acoustic correlate of accent is length. This is the only such example found in the 50 tokens presently under consideration however, and in general it appears that length is an ancillary, rather than primary, correlate of accent. This is consistent with other more extensive transcription-based data as well.

As Storto suggests, accented vowels are frequently higher in terms of pitch. However, as she notes, this is not the case in many common environments such as at the end of declarative clauses, which are signalled in part via a lower pitch on the last syllable of the clause. Also, when individual words are elicited, their final syllable is often lower in terms of pitch, even when it is stressed. Since such isolated tokens do not occur in clauses, this suggests that the lower pitch of utterance-final accented vowels is not due exclusively to clausal environment.

These findings are not consistent with Storto's claims that the default instantiation of word accent is an increase in pitch. In fact, it seems clear that higher pitch is not the primary correlate of accent in Karitiana. Like length, it appears to be an ancillary correlate. In many languages, higher pitch is one of the correlates of accented vowels.

Such a correlation, especially if weak, does not necessarily imply that the language in question is a pitch-accent language, as Storto suggests of Karitiana (1999:79). For instance, Germanic languages are not considered pitch-accent languages, even though pitch is one of the primary correlates of accent in these languages. Fry (1995) notes that, in English, duration and pitch increase correlate more strongly with accent than loudness does. In Karitiana, pitch does not correlate with stress to the extent that duration and especially loudness do. In a prototypical pitch accent language such as Japanese, however, accent is realized primarily “by a change in pitch, not by a change in loudness or duration” (Hazegawa and Hata 1995:1).³¹ The pitch increase in stressed Japanese vowels is often in the range of 70-100 Hz. In the case of the fifty vowel tokens being considered here from Karitiana, pitch increases, when present, typically range from 5-25 Hz.³² In many cases, as I have mentioned, stressed vowels were lower in terms of pitch. All of this leads us to conclude straightforwardly that Karitiana is not a pitch-accent language.

Having suggested that length and pitch increase are not the *primary* correlates of accent in Karitiana, we now turn to loudness, which I claim is the primary correlate of word accent in the language. As we see in the above sample data, one of the cells in the database I created for accented and unaccented vowels was designated for *some* measurement. Sones are based upon a pre-determined scale of subjective loudness, and can be queried rather easily via a function in Praat (Boersma & Weenink 2005). For each vowel in my data, I entered a sone value based on a measurement of the loudness of a

³¹ As Hazegawa and Hata note, however, higher pitch in Tokyo-Japanese often occurs on the vowel following a stressed syllable, due to a phenomenon termed “F0-peak delay.” Still, the primary correlate of stress in this dialect is prominent pitch marking.

³² The speaker on whom these data are based, unlike that of Hazegawa and Hata, was a male. However, this fact alone would not account for such a disparity in pitch increases.

central portion of the vowel. It soon became clear that the stressed vowels in my data were consistently louder than the other vowels of the same word. (This is generally clear perceptually as well.)

Accented vowels in my data were an average of 10.2 sones louder than the next loudest vowel in the word token considered. Conversely, the unaccented vowels considered in my data were an average of 9.7 sones softer than the loudest vowel in the same word. It is worth stressing that the greater loudness of an accented vowel can only be understood in the context of adjacent vowels. In other words, it is not beneficial to consider figures such as the average sones of accented vowels. Loudness varies significantly according to the conditions under which a word token is perceived. However, the loudness of a syllable *relative to another syllable in the same word* would seem to be fairly constant across disparate listening environments.

One interesting finding that surfaced in my data is that certain vowel types present greater loudness disparities in accented and unaccented syllables. For instance, accented *i* vowels were an average of 6.5 sones louder than the next loudest vowel in the word. Unaccented *i* vowels were an average of 6.9 sones softer than the loudest vowel in the word. On the other hand, accented *o* vowels were an average of 13.3 sones louder than the next loudest vowel in the word. Unaccented *o* vowels were an average of 10.7 sones softer than the loudest vowel in the same word. The loudness disparity between accented and unaccented *o* vowels, then, is greater than that of *i* vowels. The loudness disparities of the five oral vowels, for both accented and unaccented varieties, are summarized in the following figure:

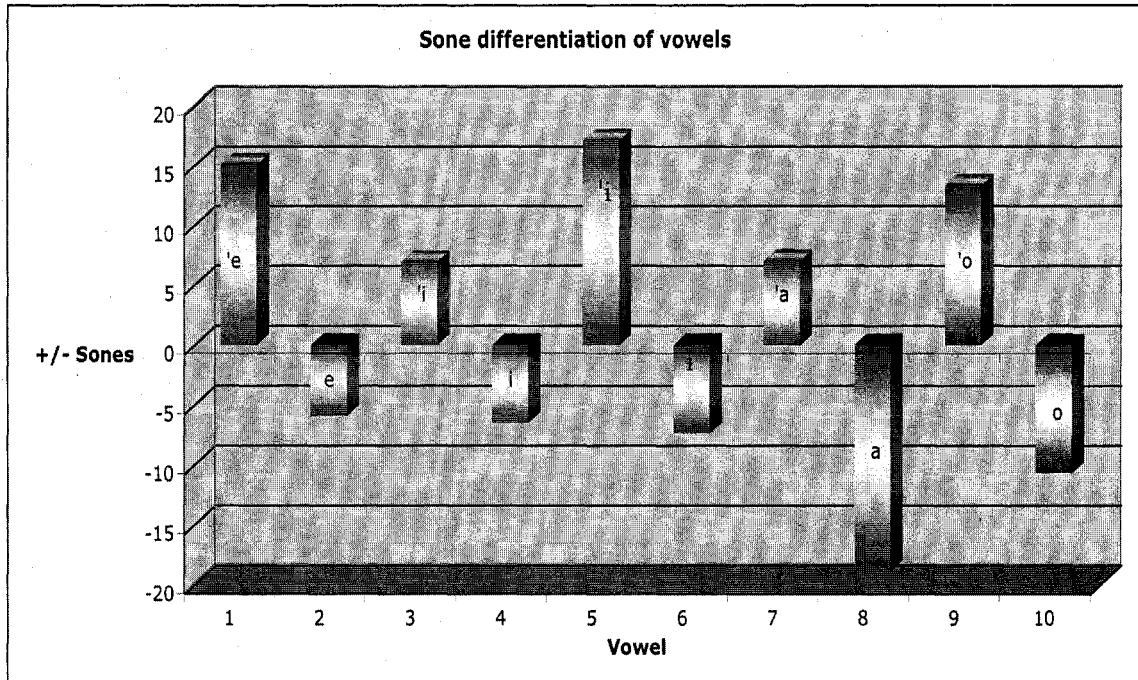


Figure 7.1 Average sone differentiation of individual vowels, when contrasted to other vowels in same word token.

The findings represented in Figure 7.1 are based on the current set of data, ten tokens of each of the vowels.

It is interesting to note that the vowel that presents the greatest decrease in loudness in unstressed environments is the vowel *a*. Recall from the discussion of vowel formants in Chapter 5 that this vowel is reduced in unstressed environments. That is, in unstressed environments *a* takes a schwa-like form, occurring in a more central region of the vowel space. It is interesting to note, then, that the only vowel that is reduced in terms of position in the vowel space is also reduced in terms of loudness. Unstressed *a* appears to play a unique role in Karitiana phonology, by being reduced in terms of position and loudness.³³ Of course, as Figure 7.1 suggests, all unstressed oral vowel types are softer than their stressed counterparts. However, the reduction of loudness is clearly the greatest

³³ Position and loudness do naturally correlate to some extent, since /a/ is an inherently louder vowel due to its formant make-up.

in the case of *a*. For this vowel, under the recording conditions for this study, the unstressed varieties were an average of 18.9 sones softer than the loudest vowel in the word token considered. The other four vowels were not as soft in unstressed environments. In fact, on average, the remaining four vowels, when unstressed, were only 7.6 sones softer than the loudest vowel of a word.

§7.1.6 Spectral tilt

As has already been mentioned, greater vocalic loudness can be achieved by an overall increase in amplitude and/or an increase in amplitude within the range of 2-5KHz, which the human ear is most sensitive to. As the above quote from Crosswhite suggests, an increase within this range is often associated with a more “asymmetric glottal pulse.” One of ways in which a glottal pulse can be made more asymmetric is by the tightening of the vocal chords, i.e. increased laryngealization. It appears that stressed vowels in Karitiana can be characterized in this manner, that is, they are more laryngealized than their unstressed counterparts. Perhaps it is not surprising to find that the glottal folds are tighter during the production of stressed vowels, since we know that stressed vowels with no preceding tautosyllabic phonemic consonant are preceded instead by an epenthetic glottal stop. (See Chapter 4.) Therefore, we might intuit that the onsets of many stressed vowels are characterized by a tightened glottis. It appears that some laryngealization remains during the following stressed vowel, leading to an increase in glottal pulse asymmetry, and an increase in spectral tilt. *In fact, it seems plausible that the epenthesis of glottal stops is perceptually motivated, since it leads to greater vocalic laryngealization, more positive spectral tilt, and increased loudness.*

All of the stressed and unstressed vowels in the present study were tested for spectral tilt. This was done by first assessing the *phon* level for a steady state portion of approximately 50 ms, taken from the center of the vowels in question. This was achieved by querying some levels in Praat, and then converting the results to phons via the formula: $phons = 10(\log_{10}sones / \log_{10}2) + 40$. (Cf. Crosswhite 2004:1) The level of decibels for the same portion of the vowel was also queried. The result of this operation was subtracted from the number of phons, i.e. phons-dB. This process was undertaken for each of the fifty tokens of stressed and unstressed vowels taken from word tokens excised from elicited clauses. The result of this operation was an assessment of spectral tilt, with larger values for the phons-dB operation suggestive of more positive spectral tilt.³⁴

In general, stressed vowels in Karitiana were found to have a more positive spectral tilt than unstressed vowels, as reflected by greater disparities between their phon and decibel levels. This is apparent in the following figure:

³⁴ The phon scale, like the sone scale, describes loudness rather than amplitude. However, the phon scale can be more readily contrasted with decibels. By subtracting dB's from phons, we essentially discover a difference between loudness and amplitude. The expectation is that sounds with high spectral tilt will have greater differences between loudness and amplitude. That is, more positive spectral tilt leads to greater loudness without increasing overall amplitude, and can therefore be generally assessed by the Phons-dB operation.

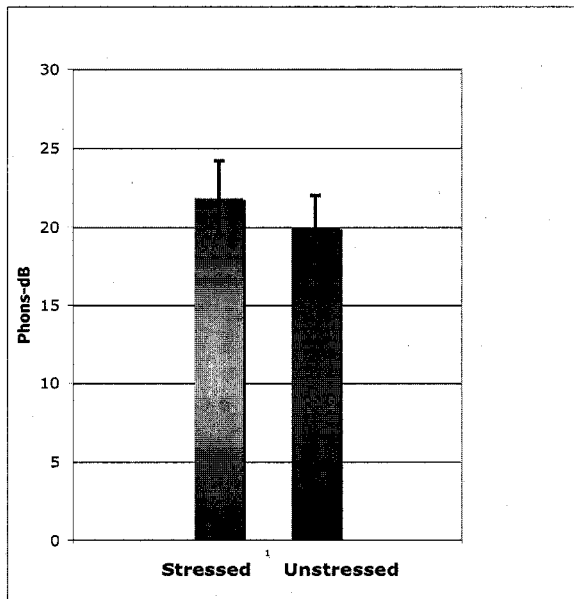


Figure 7.2 Average spectral tilt of Karitiana stressed and unstressed vowels. $P < .006$

In this study, the average phon-dB difference for stressed vowels was 21.86, with a standard deviation of 2.33. The average phon-dB disparity for unstressed vowels was 19.96, with a standard deviation of 2.06. The difference between these two groups was significant at $p < 0.006$, according to a two-tailed T-test with unequal variance assumed.

As in the case of the findings related to loudness, it was found that the spectral tilt of certain vowel types was, on average, greater than that of others. For example, stressed *a* vowels had an average phon-dB disparity of 24.8, while stressed *i* vowels had a much smaller average phon-dB disparity of 19.7. The spectral tilt of each of the vowels, both stressed and unstressed, is apparent in the following figure.

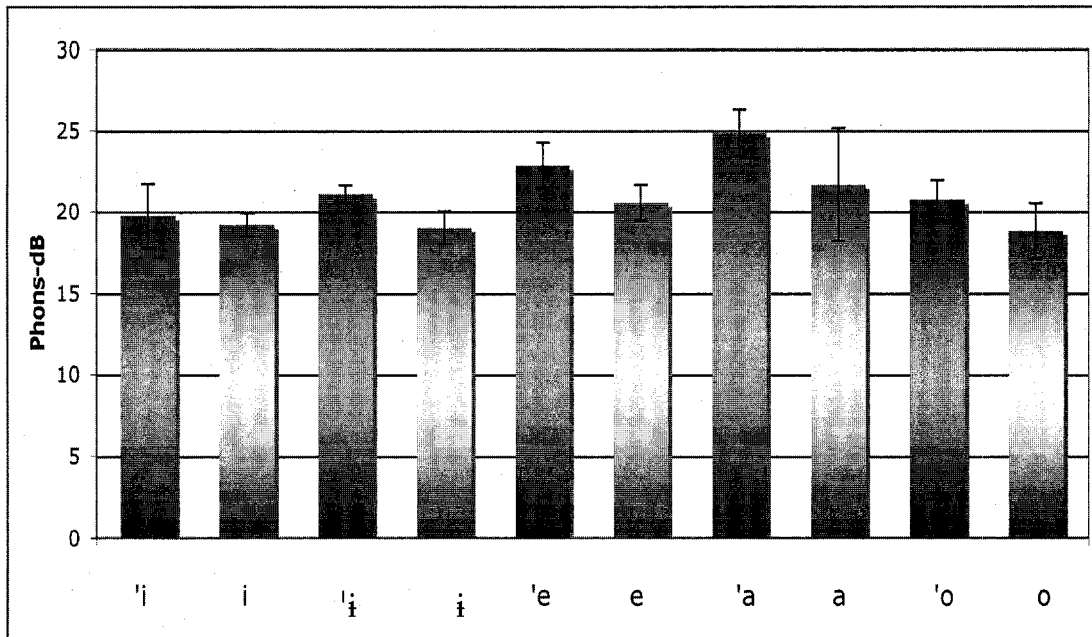


Figure 7.3 Spectral tilt of all oral vowels, stressed and unstressed. Bars represent one s.d.

The data in Figure 7.3 suggest that there is an inherent discrepancy in the spectral tilt of the different vowels. This is not a particularly significant finding, since we know that vowels have different prominences in different frequency ranges (formants), which could affect their spectral tilt. What is significant here is the finding that in the case of each of the five oral vowels in Karitiana, the stressed vowel presents a more positive spectral tilt than its unstressed counterpart. Therefore, we can add Karitiana to the list of languages in which more positive spectral tilt has been shown to be associated with stress. This list includes Polish, Macedonian, Bulgarian, Dutch, and English (Crosswhite 2004:1). The addition of Karitiana to this list is noteworthy since it clearly is genetically and geographically unaffiliated with any of the other languages on the list.

§7.2 OT description of stress constraints

We have mentioned several factors that constrain the placement of word-level stress in Karitiana. Setting aside for the moment exceptional words, we can claim that word-level stress in Karitiana is typically word-final, unless a non-final syllable in the

word contains a bimoraic nucleus. If the final syllable has a bimoraic nucleus, then stress falls on that syllable even if a preceding syllable also has a bimoraic nucleus. Secondary stress falls on alternating preceding syllables, and is unaffected by syllable weight.

The above factors can be parsimoniously described within the framework of Optimality Theory. In fact, the following simple ranking of OT constraints appears to account for the majority of Karitiana words:

DEP-IO,*CLASH>> **WSP_{(C)VVC}** >> **PARSE-SYL**>> **RIGHTMOST**>> **FT-BIN, RH-TYPE=I**

All of the above constraints are found in popular works on Optimality Theory, e.g. Kager (1999) and Prince and Smolensky (1993). The first of these constraints, **DEP-IO**, militates against the epenthesis of vowels for the purposes of stress placement. It is ranked high since it does not appear to be violated in Karitiana, though vowel epenthesis occurs for other reasons in the language. The second constraint, also not violated in my data, is ***CLASH**. This constraint prohibits the occurrence of two adjacent stressed syllables, and is also not violated in my data. (As we saw in §7.1, clash is avoided in verbs by the addition of *ka* to **na-/ta-** prefixes attached to words with initial stress.) The third constraint, **WSP_{(C)VVC}**, is violated when syllables with bimoraic nuclei are unstressed. As we have seen, this constraint should be ranked highly in Karitiana. The **PARSE-SYL** constraint prevents syllables from being unparsed and therefore not affecting word stress one way or another. **RIGHTMOST** is a constraint that stipulates that primary stress should fall on the rightmost stressed syllable in a word. **FT-BIN** dictates that stressed feet must have two syllables, while **RH-TYPE=I** dictates that feet

should be iambic, i.e. have foot-final stress.³⁵ The collusion of these latter two constraints results in alternating iambic stress in the absence of other constraint violations.

The ranking of the given constraints presented above is consistent with the data so far presented in this chapter. Since Karitiana stress can be principally described by such a small number of constraints, the OT method of stress description seems appropriate here. I am not suggesting that Karitiana speakers' *cognition* related to production is mirrored by the OT description. That is, I am not postulating that GEN produces a set of inputs that are then constrained, producing one correct output. I simply provide the ranking in order to succinctly describe word-level stress patterns in Karitiana. The above ranking can be better grasped if we consider a few examples of word-level stress. Consider the following tableau, containing the winning candidate from several options for the word for 'heavy,' [pitit].

pitit	DEP-IO	*CLASH	WSP _{(C)VVC}	PARSE-SYL	RIGHT-MOST	FT-BIN	RH-TYPE=I
a. ^σ (pi.'tiit)				*!			
b. pi.(.'tiit)				*!		**	
c. ('pi.tiit)			*!				*
d. ('pi).(.'tiit)		*!				**	
e. ('pi.i).(.'tiit)	*!				*	*	*

Figure 7.4 Tableau for /pitit/, 'heavy.'

Or consider the following tableau, for the word [boroja], meaning 'snake':

³⁵ This constraint is not violated by monosyllabic feet, since such feet are necessarily stress-final. RH-TYPE=I would only be violated by polysyllabic feet without foot-final stress. This is evident throughout the OT literature, e.g. in Kager 1999.


boroja	DEP-IO	*CLASH	WSP _{(C)VVC}	PARSE-SYL	RIGHT-MOST	FT-BIN	RH-TYPE=I
a.  ('bo).(ro.'ja)						*	
b. ('bo.ro).(.'ja)					*!	*	*
c. ('bo).(ro).(.'ja)						**!*	
d. ('bo).ro.(.'ja)				*!		**	
e. ('bo.ro).ja				*!			*
f. (bo.'ro).(.'ja)		*!				*	

Figure 7.5 Tableau for /boroja/, 'snake.'

As one final example of the constraint ranking presented above, consider the following tableau for the polysyllabic word, [hirɪpɪ:mpa], meaning 'fishing hook.'


hirɪpɪ:mpa	DEP-IO	*CLASH	WSP _{(C)VVC}	PARSE-SYL	RIGHT-MOST	FT-BIN	RH-TYPE=I
a.  ('hi.ri).(pɪ:m.pa)							**
b. hi.ri.(pɪ:m.pa)				*!*			*
c. (hi.'ri).(pɪ:m.'pa)			*!		*		
d. (hi.'ri).(pɪ:m.pa)		*!					*

Figure 7.6 Tableau for /hirɪpɪ:mpa/, 'fishing hook.'

As in the other two cases, this tableau only contains a few possible outputs, sufficient for the purposes of illustration.

§7.3 Comments on vowel length

I suggested in §7.1.4 above that vowel length is an ancillary correlate of word stress, despite the fact that there are also cases of phonemic contrast based upon length. I noted that in some cases, e.g. one recorded token of [e.'se], the stressed vowel is relatively long—129 ms in this case—despite the fact that the speaker did not consider this word to have a long vowel. (Not all tokens of this word present such length, either.) Since length correlates with stress, it is difficult to say whether a given vowel is underlyingly long, based simply upon surface length. Since there are relatively few minimal pairs based upon vowel length alone, the task of investigating the specifics of

contrastive length is that much more difficult. The clearest cases of underlyingly long vowels seem to be those that occur in non-final position, since stress is typically word-final. If we investigate such vowels, we can better understand the correlates of phonemic length in Karitiana.

The following chart contrasts the lengths of long vowels in non-final position with unstressed short vowels of the same quality.

Vowel	Length in ms	Vowel	Length in ms
[gi:jo]	142	[ki:ri]	106
[bi:wo]	123	[ekip]	86
[go:kip]	121	[korombo]	61
[de:so]	165	[epesap]	64
Mean value	138	Mean value	79

Chart 7.1 Vowel duration.

The tokens on which this chart is based were excised from elicited carrier frames, and did not consist of words provided in isolate. While this chart only represents a sampling of vowel lengths, it is elucidating. Based on this data it appears that vowels that are long underlyingly tend to be in the neighborhood of 60 ms longer than unstressed vowels.

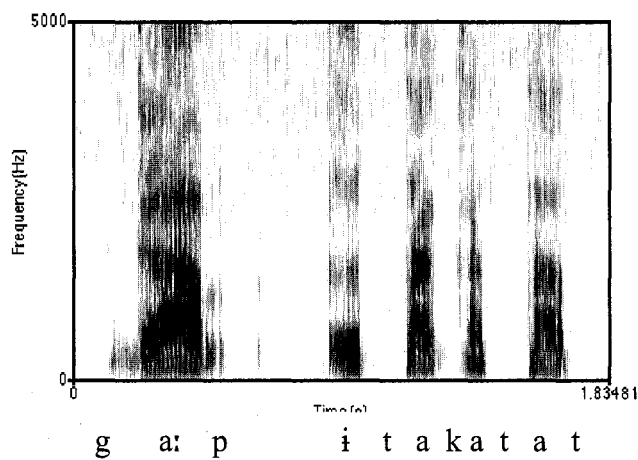
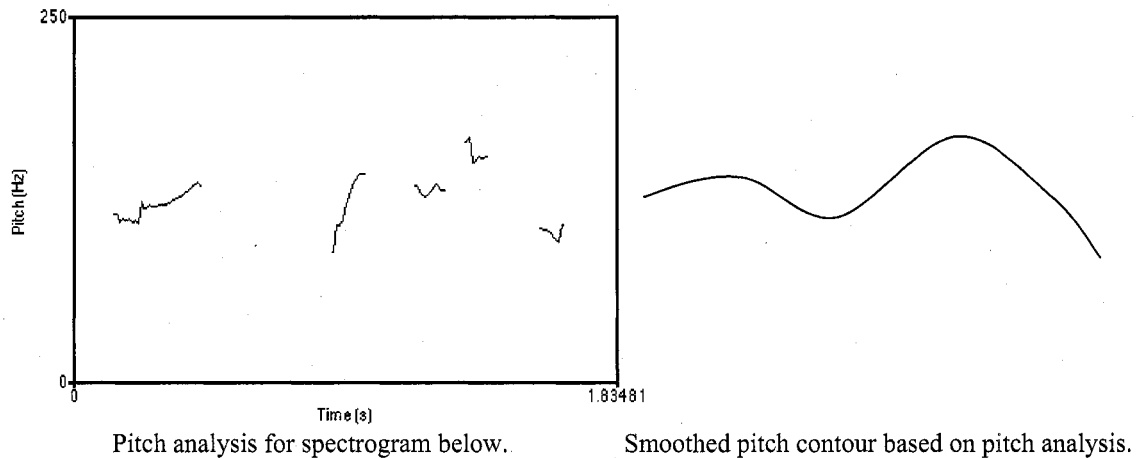
§7.4 Clausal intonation patterns

Landin (1984:239,247-248) makes a few claims regarding the intonation contours associated with different clause types. Judging from the contours sketched above particular clauses in his study, his claims can best be encapsulated by the suggestion that both negative and declarative clauses are characterized by an intonation contour that rises on the penultimate and antepenultimate syllables in the clause. The final syllable of these clause types, as we have already alluded to, is low in terms of pitch. This intonation contour is independent of word stress.

Judging from my data, Landin's generalizations are largely correct, though the greatest correlate of this intonation contour appears to be a falling pitch associated with

the end of the clause. In other words, there is not always a rise in the pitch of the near-final syllables. It appears that interrogative clauses are also characterized by this falling intonation contour. Storto (1999:98) also notes a distinction in the pitch contours of the three clause types so far mentioned. She posits an “intonational rule inserting a L tone sentence finally” in the case of “declaratives, negated imperatives, and questions”. As Landin (1984:247) notes, imperative clauses are characterized by a different intonation pattern, namely “rising intonation on the final stressed syllable of the verb root”.

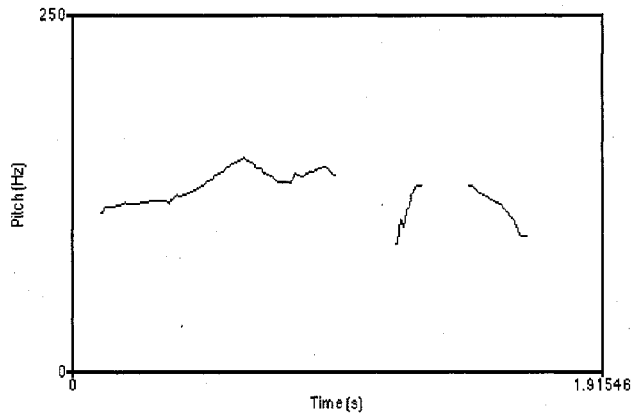
In the following three figures I present clauses from my data, representing one declarative clause, one interrogative clause, and one imperative clause. The clauses are represented by spectrograms, as well as by pitch analyses of the given spectrograms. I have also drawn smooth pitch contours based on the given pitch analyses. By examining the figures we can get a clearer sense of the clausal contours of Karitiana. Since I only provide one example of each clause type, I should note that the contours represented in these clauses seem to generally represent those contours of the other clauses I have performed pitch analyses on.



ga:p i-taka-tat-ø
 field 1S.ABS-SAP-go-NFUT
 "I went to the field."

Figure 7.7 Pitch contour and spectrogram for a declarative clause. Note falling intonation.

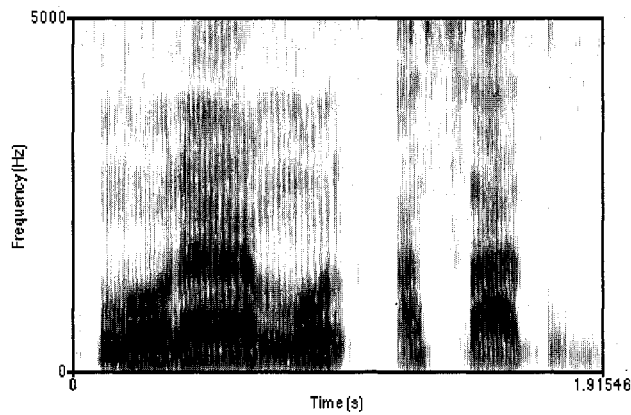
The high-low pattern of the end of this clause is characteristic of interrogatives as well. It is worth stressing that the penultimate syllable in this clause is higher than the preceding syllables, though overall the pitch is relatively flat during the utterance, hovering around 125Hz. Nevertheless, it is insufficient to say that the clause contour is characterized only by a low pitch on the final syllable. Rather, it appears that this basic intonation pattern is described as falling clause-finally, and in some cases rising then falling. Consider the following example of an interrogative:



Pitch analysis for spectrogram below.



Smoothed pitch contour based on pitch analysis.



m õ ã m õ n a s a: t

moramon

a-sa:t

what

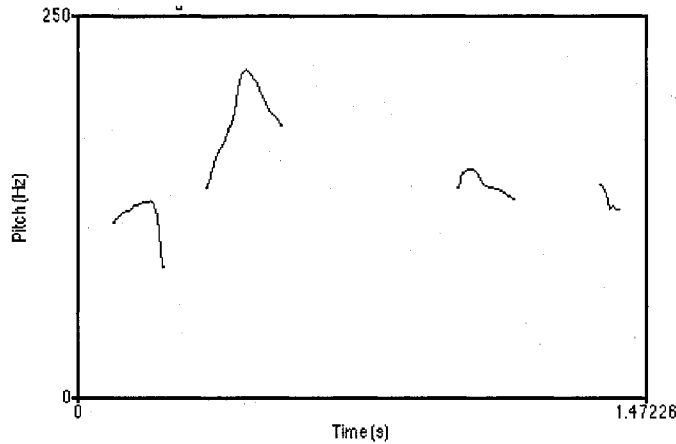
2S.ABS/GEN-name

“What’s your name?”

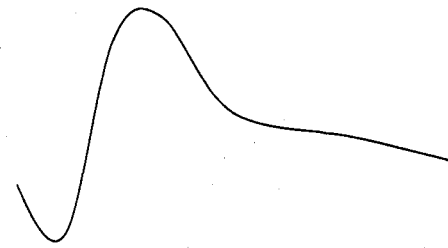
Figure 7.8 Pitch contour and spectrogram for an interrogative clause. Note falling intonation of clause-final word.

There does not seem to be significant variation in the contours of content interrogatives and polar interrogatives.

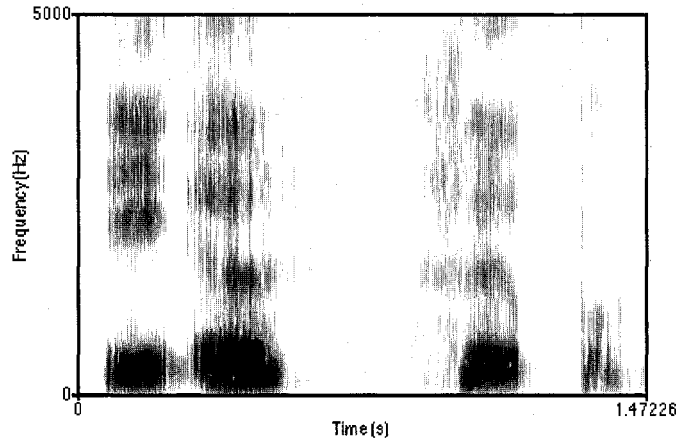
Imperative clauses are the only basic clause type whose *primary* correlate is not the falling pitch pattern associated with the other types. As we see in the following example, there is a definite rise in the pitch associated with the stressed syllable of the verb. This is concordant with Landin’s claims.



Pitch analysis for spectrogram below.



Smoothed pitch contour based on pitch analysis.



i i h i p o

i-i hipo
 IMP.TRANS-eat(trans) this
 "Eat this one."

Figure 7.9 Pitch contour and spectrogram for an imperative clause. Note high pitch of stressed vowel.

It is not the case that imperative clauses do not have falling pitch clause-finally in some cases. However, when the clause-final syllable is the stressed syllable of the verb, its pitch remains high. In other words, in imperative clauses the high pitch associated with the stressed syllable of the verb is instantiated regardless of clause position.

Based on the data considered in this chapter, it seems that word-stress and intonation are largely independent. The latter phenomenon correlates more generally with

clause-type. In imperative clauses word-stress and clausal intonation interact, so that in this case alone there is a very marked pitch increase on the stressed syllable of one word in the clause, specifically the matrix verb.

8

Nasality in Karitiana: Variable velar timing

§8.1 The distribution of bilabial, alveolar, and velar nasals

One of the commonalities of Tupí languages is the pervasive influence of nasality on the surface forms of the language. Karitiana presents no exception and in this language the most pervasive factor conditioning phonetic variation is oscillating velar movement.

Before considering the previous account of nasal consonant distribution in Karitiana, it is worth outlining the basic patterning of nasal segments in the language. This was done in a different manner in section 4.4³⁶. Here my focus is restricted to the surfacing of oral segments adjacent to nasal consonants. In Karitiana, there are many cases in which, superficially anyhow, nasal consonants are followed by homorganic voiced oral consonants. For example, consider the following transcribed tokens of common Karitiana words:

8.1	[pẽ.'ndot]	'wide'	8.2	[ã.'mbi]	'house'
8.3	[sẽ.'mbok]	'wet'	8.4	[ẽ.'ngi]	'to vomit'
8.5	[kĩ.'nda]	'thing'	8.6	[ã.'mbo]	'to climb'

In cases such as these, I have found that the nasal segment averages approximately 50-80 ms in length, while the following oral segment is usually somewhere around 40 ms in

³⁶ In that section I outlined in some detail the surface form of the palatal nasal, which is not discussed here since it does not participate in the phenomena described in this chapter. The motivations for this are not altogether clear, but it seems important not to group the sound with its alveolar, bilabial, and velar counterparts, given its different patterning.

length, in words excised from elicited clauses.³⁷ In the case of each of these words, the first vowel of the word is nasalized. (However, as I will suggest later, these nasal-stop sequences are not underlyingly *nasal* vowels, and the nasalization in question spreads regressively from the following nasal consonant.)

Interestingly, these and other words containing word-medial nasal consonants are often produced with no nasal consonant at all. In fact, in many cases I have elicited the words in question only to have tokens such as the following produced:

8.7	[pe.'dot]	'wide'	8.8	[a.'bi]	'house'
8.9	[se.'bok]	'wet'	8.10	[e.'gi]	'to vomit'
8.11	[ki.'da]	'thing'	8.12	[a.'bo]	'to climb'

In cases such as these, the words are clearly produced with no velar lowering at all. The first vowels are not nasalized, and the nasal consonant is clearly absent. Such productions, while not rare, are not as common as those with pre-nasal consonant type sequences, as in the previous examples.

The variation of such words stretches even further, however, and occasionally includes forms such as the following, in which the nasal consonants are preceded and followed by homorganic oral segments:

8.13	[pe.'dndot]	'wide'	8.14	[a.'bmbi]	'house'
8.15	[se.'bmbok]	'wet'	8.16	[e.'nggi]	'to vomit'
8.17	[ki.'dnda]	'thing'	8.18	[a.'bmbo]	'to climb'

I should note that, in such cases, the oral segment preceding the nasal consonant is typically shorter than the oral segment following the nasal consonant. As an example of this, consider the production of one 52-year-old male's production of [kidnda]. In the example in question, the first *d* lasted approximately 30 ms, according to a spectrogram

³⁷ These durations are fairly similar to crosslinguistic findings on pre-nasal type sequences. For instance Ladefoged and Maddieson (1996:12) suggest that nasal-stop sequences in Sinhala last a total of 100 ms.

for the word. The *n* segment, on the other hand, lasted approximately 130 ms, while the second *d* segment lasted approximately 60 ms. (This was a relatively slow production of the word.) This shorter duration of the first oral segment is not trivial, but is instead suggestive of the true nature of the segments that are surfacing in such words. I will return to this point below.

Many nasal consonants do not surface with preceding or following “oralization” of the sort apparent in the previous examples. In such cases, the nasal consonant typically falls between two nasal vowels, or is adjacent to only one vowel, which is nasal:

8.19	[^l nām]	‘rotten’	8.20	[^l nā-]	NSAP
8.21	[^l ē:m]	‘dirty’	8.22	[^l tōm.tōmā]	‘guitar’
8.23	[^l kī.ma]	‘dry’	8.24	[mō.mē. ^l mēm]	‘entrance’

The above examples suggest that, when occurring word-initially prior to a nasal vowel, a nasal consonant is usually produced as a nasal segment with no portion of “oralization.”

When a nasal segment occurs word-finally, it is usually preceded by an “oralized” segment if the final vowel is oral, as in these two examples:

8.25	[^l dʒiŋŋ]	‘to stop’	8.26	[iri ^l hodn]	‘thank you’
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Finally, when a nasal segment occurs word-initially when preceding an oral vowel, it is usually produced as a pre-nasal segment in the case of the velar nasal, and simply as an oral stop in the case of the alveolar and bilabial nasals. (There are a few exceptions to this latter generalization, e.g. [^lmbit], ‘pan’, cited previously in Chapter 2.)

Consider the following examples:

8.27	[^l ŋga]	‘field’	8.28	[^l ŋge]	‘blood’
8.29	[^l ŋgok]	‘manioc’	8.30	[^l bik]	‘to sit’
8.31	[bi.ki. ^l pa]	‘cockroach’	8.32	[de.wo. ^l ta]	‘side’
8.33	[de. ^l so]	‘mountain/hill’	8.34	[di.ki. ^l si]	‘spider’

There are variations in the productions of these words, however the forms I have listed are the most common varieties of the words in question, according to my transcriptions.

As further evidence of the pre-nasalization that surfaces word-initially in many Karitiana words, consider the following spectrogram of the word [ŋge], ‘blood.’

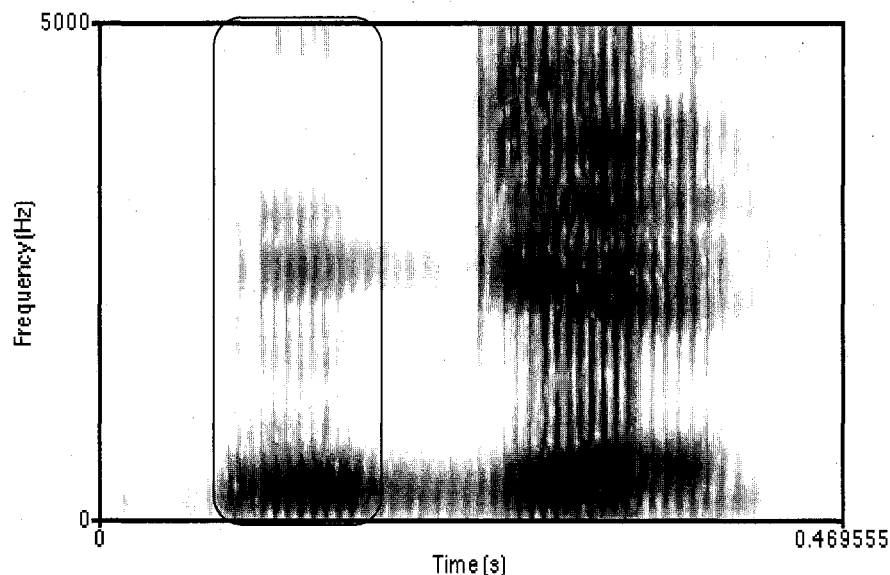
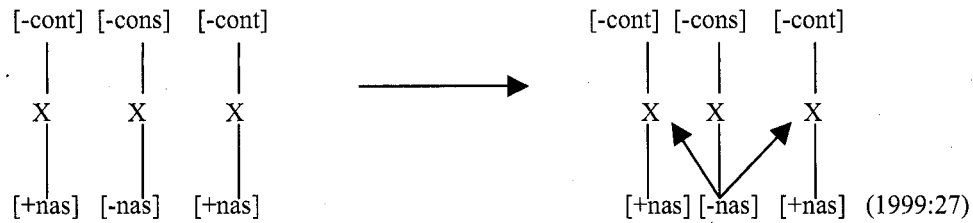


Figure 8.1 Spectrogram for token of [ŋge], ‘blood,’ as produced by a 32-year-old male. Nasal segment preceding stop is highlighted. Note greater sonorance of highlighted segment, when contrasted with following stop.

As we see in this example, there are two segments preceding the vowel. The first of these is characterized by anti-formants and sonorance, while the second segment is clearly not a sonorant, but does exhibit voicing as evidenced by the gray band along the bottom of the relevant portion of the spectrogram.

Storto (1999:25-32) provides a feature-based account of the seemingly capricious surfacing of oral segments, adjacent to nasal consonants, in Karitiana. Her account is summarized by the following spreading rule:



In other words, pre and post-oralization of nasal consonants is always due to the presence of adjacent non-nasal vowels. The putative [-nasal] spreading results in various surface forms of nasal consonants. These can be summarized according to environment. Below I provide the surface nasals suggested in Storto’s data (1999:25-26), based on environment in which they occur:

	Environment of nasal:	Surface form of nasal:
a.	V__V	[bmb], [dnd], [gŋg]
b.	##_V	[b], [d], [g]
c.	V__##	[bm], [dn], [gŋ]
d.	∇__∇	[m], [n], [ŋ]
e.	##_∇	[m], [n], [ŋ]
f.	∇__##	[m], [n], [ŋ]
g.	V__∇	[bm], [dn], [gŋ]
h.	∇__V	[mb], [nd], [ŋg]

Storto’s approach entails a binary feature for nasals, the negative nasal feature spreading from oral vowels to adjacent nasal consonants in predictable ways.

There are three primary problematic issues with this account of the data. The first is that frequently the surface forms of nasal consonants are not consistent with the notion that adjacent oral vowels affect them in predictable ways. This is the case with words that are expected to present pre- and post-oralized segments but also surface as pre-nasal type segments, e.g. [kinda]. Storto (1999:30) acknowledges such variation of nasal segment forms occurring between two oral vowels. She recognizes that,

“strictly speaking, the variation implies variation in the underlying forms of each word since oral vowels occur contiguous to nasal consonants without causing oralization, and nasal vowels never occur contiguous to oralized portions of nasal consonants.”

In other words, given the surface variation of the relevant forms in Karitiana, the only way to accept the account she presents, in which the [-nasal] feature spreads from oral vowels to nasal consonants in an exceptionless manner, is to posit variation in the underlying forms of the words in question. This is not a desirable option, and it is one that need not be appealed to since, as I will suggest, a different account of the oralization phenomenon is available.

The variation of surface forms of nasals is not only found in those nasals contiguous to two oral vowels. It is also found in the case of the word-initial, pre-oral-vowel environment. In such cases the nasal may in fact surface as [b], [d], or [g], as predicted by Storto's account, but may also surface as [mb], [nd], or [ŋg]. In fact, as examples such as 8.27-8.29 suggest, [ŋg] appears to be the default form of the velar nasal in this environment. (This variation will be explored in section §8.3.)

One of the interesting aspects of the relevant variation is that it suggests that pre-nasal type segments are generally more frequent than has been suggested in the literature, since putatively pre- and post-oralized forms ([bmb], [dnd], [gŋg]) are often only pre-nasal like ([mb], [nd], [ŋg]), while supposedly oral word-initial underlying nasals are pre-nasal like also, in the case of [ŋg].

The second difficulty with Storto's account of nasal consonants is that it implies that nasal features, positive or negative, only spread from vowels to adjacent consonants in Karitiana. In other words, there are no cases in which vowels are nasalized by the presence of an adjacent nasal consonant. However, there are clear cases in my data in which vowels appear to be nasalized in this manner. To cite one of various examples in my data, the already-discussed word /kina/, which according to Storto's data contains an

underlyingly oral /i/ vowel (surfacing as [kidnda]), sometimes occurs with a nasalized /i/. As I noted, in many cases such words are produced with pre-nasal type segments, rather than the pre and post-oralized segments predicted by Storto's account. For instance, rather than [kidnda], the majority of tokens of this word in my data are accurately transcribed as [kĩnda]. In such words, the first vowel is weakly nasalized. The presence of nasalization can be tested with acoustic measurements, since nasalized /i/ vowels tend to have much wider formant bandwidths than their non-nasal counterparts (the acoustic correlates of vowel nasalization are explored further in §8.4 below). I have found many instances of [kĩnda] in which the formant bandwidths of the first vowel are wider than those of other, clearly-oral, [i] tokens. In such cases, the vowel also has a different perceptual quality, characteristic of weak nasalization. Significantly, however, when I elicit slow productions of words such as [kinda], the first vowel is inevitably not nasalized. Instead, if the word is produced syllable-by-syllable, as [ki] *pause* [nda], the first vowel is non-nasalized, suggesting that the cognitive representation of the sound in question is that of an oral vowel. However, in the presence of a following [nd] sequence, the oral vowel may be nasalized.

The third difficulty with Storto's account of nasal spreading in Karitiana is that it does not account for the phonetically-relevant fact that the oral and nasal segments of sequences such as [dnd], [nd], [dn], [bmb], and [mb] vary significantly in length. This fact was discussed briefly above, when I noted that in one token of [kidnda], the first alveolar oral segment was only one-fourth the length of the nasal portion of the consonant, and half that of the final oral segment of the consonant. In general, I have found that, when a first oral segment is present in such nasal consonants, it is much

shorter than the following nasal and oral segments of the consonant. It is frequently four times shorter (or more) than the nasal segment, and often half the length of the second oral segment. In other words, *in those relatively few cases where pre and post-oralization do surface in the same nasal consonant, the pre-oralization tends to be very abbreviated.* Given that this pre-oralization often does not surface and only surfaces for extremely abbreviated durations, an account which groups all oralization segments together, despite this variation in the occurrence and length of “pre-oralization” segments, seems to overlook some important phonetic generalizations.

Storto points out some interesting patterns related to nasals in Karitiana. However, her account, which is accurate for many of the relevant surface tokens in Karitiana, suffers from the three major problems delineated above. The goal of the remaining portions of this chapter is to provide a more consistent account of the relevant phenomena in Karitiana. In order to do so, however, it is worth first considering pertinent findings from other studies on Tupí languages, to see what patterns surface in the language family more generally, patterns that might influence our construal of the Karitiana data.

§8.2 The Tupí context

In this section I will consider briefly relevant findings related to nasalization in several languages: Suruí, a Tupí-Mondé language, as well as Awa-Guajá, Parintintin (geographically proximate to Karitiana), Kaiwá, and Mbyá, all members of various subgroups of the large Tupí-Guaraní branch. These languages were chosen since the literature contains fairly detailed studies of their nasalization processes. I will also consider very briefly the findings from Jensens' (1999) treatment of Proto-Tupí-Guaraní.

The following discussion is not meant to serve as a comprehensive treatment of Tupí nasality. I simply wish to illustrate three commonalities shared by other Tupí languages, commonalities that serve as a useful relief to the description of the relevant nasalization processes in Karitiana. The commonalities will present themselves in the course of the discussion.

Van der Meer (1982:12) notes that in Suruí, a Tupí language geographically and genetically proximate to Karitiana, there are similar phenomena to those observed in Karitiana. For instance, there is optional word-initial pre-nasalization of voiced stops, for instance in words such as [ndag], ‘pocket knife’ and [mbaga], ‘finished.’ There are also instances of pre-nasal surface segments occurring when a voiced stop follows a nasalized vowel sequence, e.g. /mēbe/-> [mēmbe].

In Suruí, there are nasal vowels, as well as *nasalized* vowels. The nasalized vowels generally result from anticipatory assimilation from nasal consonants. Van der Meer makes the following observation:

A nasalização antecipatória, quando é iniciada por consoante, normalmente não afeta mais do que um vogal, afetando também um aproximante não silábico que esteja entre a consoante iniciadora e a vogal afetada; além disso, ela é mais fraca do que a iniciada por vogal.

Translation:

Anticipatory nasalization, when it is initiated by a consonant, normally does not affect more than one vowel, also affecting a non-syllabic approximant that occurs between the initiating consonant and the affected vowel: also, this sort of nasalization is weaker than that initiated by a vowel.

So there is nasalization, initiated by vowels *and* consonants, in Suruí. However, there is a difference in the degree of nasalization, with nasalization due to consonants seeming perceptually weaker according to Van der Meer.

In Parintintin, the effect of velar lowering on surface forms in the language is remarkably similar to that of Karitiana. Pease and Betts (1971:6) note that surface nasal consonants occur “utterance initially preceding a nasal vowel and utterance medially

between nasal vowels, e.g. *tupahãmã*. Prenasalized stops occur “following a nasal vowel and preceding an oral vowel, e.g. *õmboapi*. Voiced stops ([ʃ] [g] or [gw]) “occur between oral vowels and in utterance initial position preceding an oral vowel.” This distribution is almost identical to the distribution of relevant segments in Karitiana. However, in Karitiana, voiced stops only sometimes occur between oral vowels. As I have noted, the surface forms in that environment are typically pre-nasal-like, though occasionally they exhibit pre and post-oralization as Storto suggests, and do sometimes surface as simple voiced stops (see §8.4 below).

Pease and Betts consider Parintintin to have no phonemic voiced stops, coming to a similar conclusion as that of Storto, vis-à-vis Karitiana, namely that surface voiced stops are underlyingly nasal consonants. They also make the important observation that in Parintintin there are *inherently oral*, *potentially nasal*, and *inherently nasal* segments. The first category might be considered *oral* sounds, the last category *nasal* sounds. The second category represents sounds that are occasionally *nasalized* by adjacent *nasal* segments. Pease and Betts (1976:9) note that Parintintin has regressive nasalization, when a nasal suffix is attached to a root with potentially nasal segments, and progressive nasalization, when a suffix with oral vowels is attached to a word with nasal segments. This implies, of course, that some vowels in suffixes are underlyingly oral but nevertheless exhibit nasalization. Therefore we know that Parintintin has inherently *nasal* vowels, nasal vowels, as well as *nasalized* vowels. In this sense it is similar to Suruí.

In their discussion of Kaiwá, Harrsion and Taylor (1984:17) recognize that a nucleus in that language may be “completely nasal, completely oral, or partly oral and nasal.” In other words, they recognize degrees of nasalization in vowels. This is due, in

part, to their recognition of the fact that some vowels are *nasalized* (rather than nasal underlyingly) by following nasal consonants. For example, the authors suggest (1984:18) that pre-nasal consonants such as *mb* regressively nasalize preceding vowels in a word, e.g. *õmõnẽmboaso* (where every vowel before *mb* is nasalized).

It has also been suggested that in Awa-Guajá, as in the languages so far discussed, vowels can be *nasalized* when occurring next to a nasal consonant. Cunha (1987:40) also notes that the degree of nasalization of vowels in Awa-Guajá is greater when the relevant vowel occurs between nasal consonants, especially in stressed syllables. In other words, for Cunha there are differences in the level of nasality of a given segment in Awa-Guajá.

Similarly, in Mbya-Guaraní there are nasalized vowels, not merely nasal vowels. Regressive nasalization of vowels in that language is initiated in the nasal consonants: *m*, *n*, or *ŋ*. To Dooley (1984:20), there are several levels of phonetic nasalization in Mbya. There is strong phonetic nasalization of vowels, which occurs in lexically assigned or stressed nasal vowels. There is medium-to-strong phonetic nasalization, which occurs in regressively nasalized vowels, resulting from following *m*, *n*, or *ŋ*. There is also weak-to-medium nasalization, which occurs in those vowels nasalized via progressive nasalization, from a preceding *m* or *n*. As in the other works considered here, then, Dooley (1984) recognizes the need for distinguishing between levels of phonetic nasalization in the language described.

I would suggest, that, given these findings in other Tupí languages, it would be somewhat remarkable if there were not different degrees of nasality associated with vowels in Karitiana. In all of the other languages surveyed, the authors make it clear that

there are underlyingly *nasal* vowels, but that *nasalized* vowels also surface due to progressive or regressive nasalization originating in a nasal consonant. This is the first commonality in the literature on Tupí phonetics and phonology that helps us better understand the patterns of velar lowering in Karitiana. We must consider the possibility that many vowels adjacent to nasal consonants are *nasalized*, either regressively or progressively, by such consonants. Vowels may not always be the source of nasalization. This possibility can be further explored if we consider the acoustic correlates of nasalization and discover whether certain vowels in Karitiana, as in the other Tupí languages considered here, have weaker phonetic nasalization than other vowels. Such an exploration will be undertaken in §8.3, and it will be seen that, in fact, there are different degrees of phonetic nasalization of vowels in Karitiana and that nasalization appears to spread to some vowels from following consonants. This is not surprising given the literature surveyed above.

Aside from the existence of *nasalized* vowels due to nasalization initiated in consonants, there is a second relevant commonality in the phonetics/phonology literature related to the languages in the above survey. That commonality is the presence of pre-nasal segments in the languages in question. These segments appear to most-frequently occur word-medially between a *nasal* (or *nasalized*) vowel and a following oral vowel. Some authors consider such pre-nasal segments to be voiced stops underlyingly (Harrison and Taylor, Van der Meer), while other authors suggest that the relevant segments are nasal consonants underlyingly (Pease and Betts, Dooley, Storto). What is most pertinent here, though, is that pre-nasal segments are fairly commonly produced word-medially in

a wide-variety of Tupí languages.³⁸ Cases of word-medial pre- and post-oralization, on the other hand, appear to be rare. At least in Karitiana, such segments are also marked in that they are less frequent than pre-nasal segments, as I suggest in §8.4. My suggestion of the unmarkedness of pre-nasal segments in Karitiana appears to be buttressed by the fact that such segments are widespread in Tupí languages.

The third commonality, and the last to be discussed here, between the patterns of nasalization in the above languages, relates to the velar nasal consonant. One of the recurring themes of descriptions of Tupí nasal patterns is the special status of this consonant, when contrasted to the bilabial and alveolar nasal consonants. For instance, in Karitiana, when a velar nasal consonant occurs word-initially before an oral vowel, a pre-nasal segment, [ŋg], usually surfaces. The segment also surfaces (rarely) as a voiced stop, as predicted by Storto's account, and the variation between [ŋg] and [g] in this environment is unpredictable in the case of some words. However, in some words, e.g. *ŋge*, 'blood', the [ŋg] variant is required, in contradistinction to Storto's account. On the other hand, the word-initial allophones of /m/ and /n/ are almost always consistent with Storto's account. That is, before oral vowels, [b] and [d] surface word-initially.

In word-initial environments, there is a definite difference between the pattern evinced by the velar nasal, when contrasted to the bilabial and alveolar nasals. Similar patterns are observed in other languages such as those discussed above. For the sake of brevity, I will not describe the relevant patterns here. I will simply note that velar nasals often have a special status in Tupí languages, and that this typically relates to word-initial distribution. For example, Jensen (1999:134) notes, in speaking of Tupí-Guaraní

³⁸ Rodrigues (1974:13) considers ancient Guarani to have had nasal vowels, nasal consonants, and pre-nasalized consonants underlyingly.

languages, that “Most languages do not permit η word-initially, and this was a possible restriction in proto-TG as well.”

In summary, we have seen that there are three relevant commonalities evident in the various Tupí nasal patterns found in the literature: First, in each language there appear to be degrees of nasalization, and distinctions between *nasal* and *nasalized* vowels. Vowels are often nasalized by adjacent nasal consonants, both progressively and regressively. Second, prenasal segments are the most common default productions associated with word-medial nasals preceding oral vowels. Third, velar consonants tend to have a special status when contrasted to their alveolar and bilabial counterparts. All of these three commonalities can, I submit, be fruitfully brought to bear upon the discussion of patterns of velar lowering in Karitiana. Hopefully by this point nasal patterns in Karitiana have been delineated to the extent that the presence of the above Tupí commonalities (*vis-à-vis* nasality) in Karitiana is self-apparent.

Before concluding this section, it worth noting that that there are somewhat similar distributions of velar lowering evident in the literature on some unrelated languages. Of course, other languages have phonetically prenasalized stops, e.g. Sinhala (Jones 1950), Fula (Arnott 1970), and Fijian, (Ladefoged and Maddieson 1996:122). Several Australian languages also exhibit pre-stopped nasals, e.g. Diyari (Austin 1981) and Western Arrernte (Anderson 2000), along with separate stop phonemes. Fijian exhibits both prenasal stop segments and voiceless stop phonemes, much as Karitiana does.

Nevertheless, the distribution of Karitiana nasal consonants differs significantly from these other languages in important respects. For example, it seems that only in

Karitiana do underlying nasal consonants surface as voiced stops, with no nasality, in word-initial position. Also, the prenasal or prestopped nasal consonants in these other languages tend to be separate phonemes altogether. Western Arrernte,³⁹ for example, exhibits a series of six nasal consonants and six prestopped nasals. However, the prestopped nasals and nasal consonants are separate phonemically. In other words, the prestopped nasals are not allophones of the nasal consonants (cf. Anderson 2000:35), as they are in Karitiana. I have found no case in the literature on unrelated languages in which such a variety of phonetic segments (voiced stops, nasals, prenasal stops, and prestopped nasals) are unified phonemically.

§8.3 Acoustic evidence for nasal *and* nasalized vowels

Johnson (2003:163) suggests that nasalized vowels present “the most complicated configuration of the vocal tract found in speech.” The acoustic correlates of this configuration are complex and cannot be treated in depth here. Nasalization affects the formants of vowels by changing the levels of formants and, in a more significant manner, by affecting the bandwidths of those formants. The effects on formant levels are due in part to the presence of anti-formants (the motivations of these are similar to those of nasal consonants, discussed in chapter 4 above), which may cancel out certain formants associated with a particular vowel. The formants of a nasalized vowel are also affected by the presence of formants associated with the nasal chamber, in addition to those formants associated with the oral chamber. Due to the conflation of variables associated with the articulation configuration of nasalized vowels, the effects of nasalization on particular

³⁹ Eastern Arrernte is mentioned in Chapter 4, where it is noted that the “palatal” nasal of Karitiana exhibits nasal zeroes that are quite similar to the zeroes of the alveolo-palatal nasal of Eastern Arrernte. (Cf. Chart 4.1.) Ladefoged and Maddieson (1996:129) note that Eastern Arrernte also exhibits prestopped nasals. However, they suggest that these prestopped nasals are variants of the nasals in the language, not phonemes.

vowel formants may appear capricious and unpredictable. For example, in some cases the F1 associated with a particular vowel is lower when the vowel is nasalized, while in other cases the F1 may be higher. (Cf. Johnson 2003:164-165)

The formant bandwidths of nasalized vowels tend to be wider than those of their oral counterparts. Johnson (2003:151) suggests the following:

The formant bandwidths during nasal sounds are wider than those in nonnasal sounds, because the vocal tract with the nose open has greater surface area and greater volume. The greater surface area of the vocal tract means that the walls of the vocal tract absorb more sound than in nonnasal sounds, and the greater volume of air means that the inertia of air within the vocal tract absorbs more sound as well.

Also, since there are both nasal and oral formants present in nasalized vowels, some of these formants may occur in the same region of the spectrum, creating seemingly larger formants of greater bandwidths. It seems clear, then, that nasalized vowels will tend to have formants with greater bandwidths than their oral counterparts.

In order to test the acoustic correlates of the five Karitiana nasal vowels, in contrast to the five oral vowels, mid-sections of three tokens for each of the ten vowels were sampled. The vowels with nasalization tested represented clear cases of inherently *nasal* vowels, in which the velum was lowered throughout the production of the vowel. In each case, the vowel in question was tested for the level and bandwidth of F1, F2, and F3. It was discovered that, as we might have expected, the formant level differences between oral vowels and their nasal counterparts were fairly minimal, while the bandwidth differences between the sets of vowels were pronounced. The purpose of performing this investigation was two-fold: to accurately determine the acoustic correlates of vowel nasalization in Karitiana and, in doing this, to allow for the examination of vowels in which nasalization was more ambiguous, that is when it was unclear perceptually to what extent a given vowel was nasalized. With the knowledge of the relevant acoustic

correlates in hand, I could examine certain vowels adjacent to nasal consonants, to test whether they exhibited velar lowering to an extent that was more consistent with a *nasalized*, rather than inherently *nasal*, status.

In the following figure I have charted the values of F1, F2, and F3 for ten of the nasal and oral tokens sampled. These tokens were representative of the tokens examined, which did not present major variation in the vowel-midpoint formant values.⁴⁰ In each case, an oral vowel is presented along the x-axis, followed by its nasal counterpart. The formants of each vowel are represented separately along the z-axis, and the formant levels are represented in Hz along the y-axis.

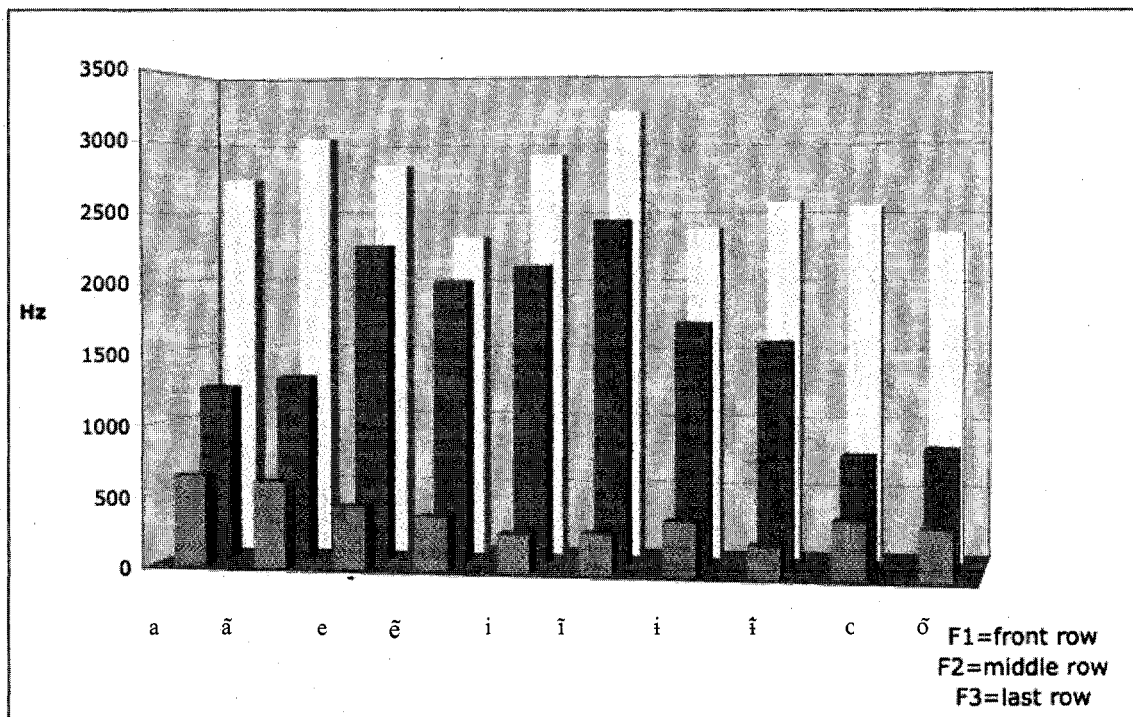


Figure 8.2 Affects of velar lowering on Karitiana formants.

What this chart demonstrates is that formant levels are fairly unaffected by velar lowering in the Karitiana vowels. There are differences associated with nasality, but these

⁴⁰ The variation in formant values was not significantly greater than the normal variation associated with vowel formants. See Chapter 5 for sample variations of formant values taken from different tokens of the same vowel type.

differences are not very pronounced. (For instance, nasal *i* appears to have a lower F1 than oral *i*, while nasal *i* seems to have a higher F2 than its oral counterpart.)

The effects of velar lowering on formant bandwidths are much more pronounced. In the following figure I have charted the F1, F2, and F3 bandwidths of the same vowel tokens sampled in Figure 8.2. In this chart, the vowels are represented in the same manner, along the x-axis, with each oral vowel followed by its nasal counterpart. The formants are still represented along the z-axis, though the y-axis now represents formant bandwidths (in Hz), rather than formant levels as in Figure 8.2:

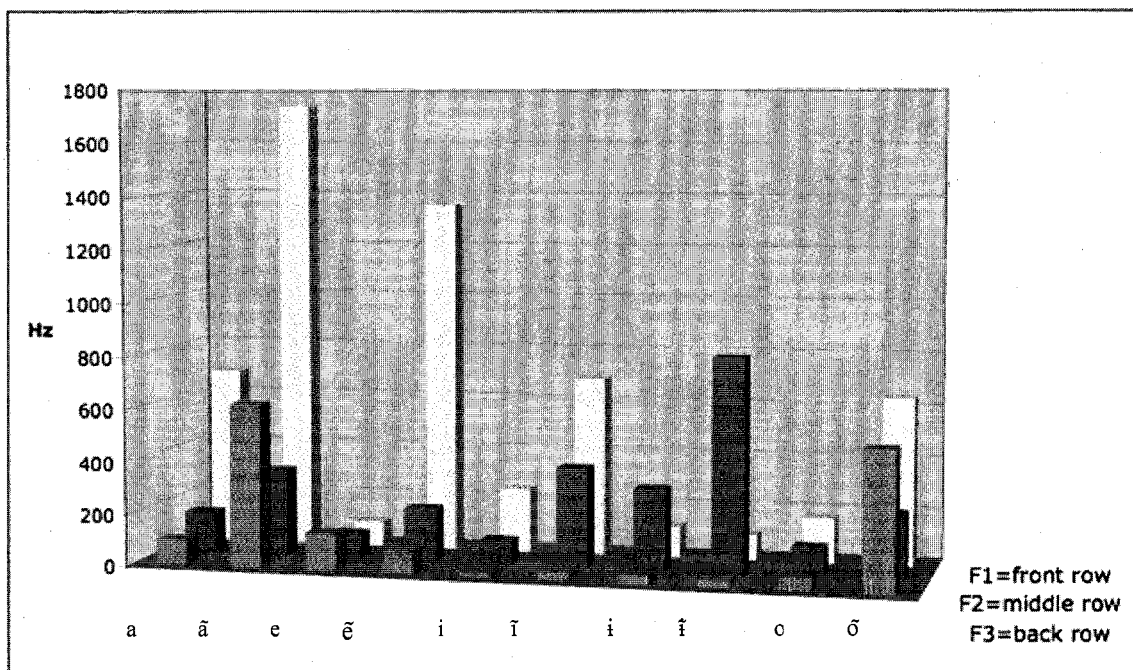


Figure 8.3 Effects of velar lowering on formant bandwidths.

As this figure clearly demonstrates, nasality clearly influences vowel formant bandwidths in Karitiana. However, the extent of the effects varies according to vowel and formant type. For instance, the [ã] vowel sampled had much wider F1 and F3 bandwidths, when contrasted to its non-nasal counterpart. The [ẽ] vowel, on the other hand, only had a wider F3 bandwidth when contrasted to its oral counterpart. Generally, the effect of velar

lowering tends to produce the greatest effect on F3 bandwidth in these data. However, in the case of [ĩ], the F2 formant has a wider bandwidth, when contrasted to the F2 bandwidth of oral [i], while the F3 bandwidth remains relatively unchanged.

With these data in hand, we are better equipped to tackle the issue of degrees of nasalization. We have already suggested that some Karitiana vowels appear to be *nasalized*, rather than inherently *nasal*. In the former vowels, we might expect nasalization to be present only through part of the duration of the vowel in question⁴¹. So, for instance, in the case of the surface form [kĩnda], ‘thing’, which we have suggested contains a *nasalized* rather than *nasal* first vowel, we might predict that the formant bandwidth changes associated with velar lowering only surface during a portion of the vowel’s production.

In order to test the hypothesis that many Karitiana vowels are nasalized, rather than nasal, various tokens of vowels produced with some velar lowering were examined. For instance, in one token of the word [korõmbo], ‘mouth,’ I considered the formant bandwidths of the *o* vowel preceding the *m* segment. Based on the information in Figure 8.2, I expected that, if the vowel in question were nasalized throughout its production, it would contain a wide F3 bandwidth throughout. However, as I tested the vowel in question, the bandwidth findings suggested a narrow F3 bandwidth (<100 Hz) for the first half of the token in question, which ballooned to a wider F3 bandwidth (>300 Hz) for the second half of the vowel’s production. This suggests that, in the case of this

⁴¹ Degree of velar lowering can also affect levels of nasalization, of course. Velar lowering is best measured by examining airflow through the naris during a vowel’s production. For the purposes of this discussion, I am considering the extent of nasalization according to a temporal scale only. That is, highly nasalized vowels, typically inherently nasal vowels, are categorized as such due to the presence of the relevant wider bandwidths *throughout* their production. Vowels with weaker nasalization are categorized as such due to the absence of wider bandwidths through a significant portion of their production.

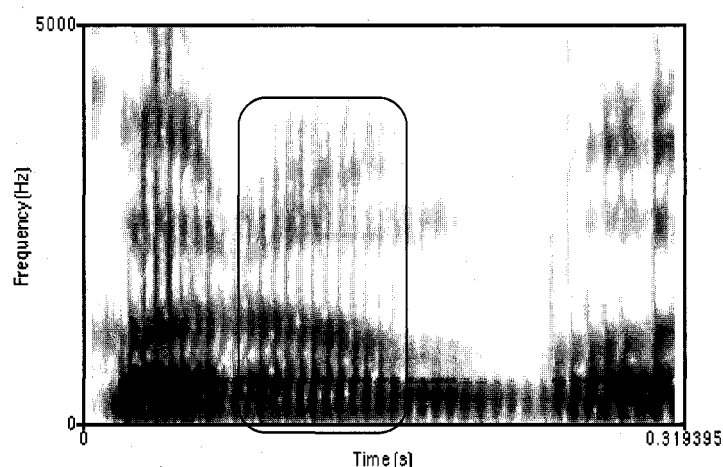
vowel, it was only nasalized throughout the second half of its production. By examining the vowel in detail, I was able to determine that F3 bandwidth changes began after approximately 40 ms of the vowel's duration. The velum was apparently lowered at this point, and remained lowered through the approximately 45 ms remaining in the vowel's production, as evident in the continued presence of a wider F3 bandwidth.

I have examined many other Karitiana vowels in a similar fashion. Some of the results of my examination are apparent in the following table, containing tokens of each of the five Karitiana vowels, exhibiting nasalization through only part of their duration:

Vowel	Approximate duration with lowered velum (ms)	Approximate duration with raised velum (ms)
[ko.rõ.'mbo] 'mouth'	40	45
[kĩ.'nda] 'thing'	50	45
[a.kĩ.'ndop] 'open'	30	25
[ã.'ŋgat] 'stand up'	35	55
[pẽ.'ndot] 'wide'	65	25

Chart 8.1. Sample durations of velar lowering.

As we see in these sample data, many of the supposedly nasal vowels of Karitiana are weakly nasalized, that is nasalized for only part of their production.



k o r o õ m b o

Figure 8.4 Nasalized [õ] vowel preceding nasal consonant.

Formant bandwidth changes are not always obvious in a given spectrogram, and must be found by querying the bandwidth in a program such as Praat. Nevertheless, nasalization is usually visually apparent in a spectrogram, via formant bandwidth changes and/or formant level changes. Consider the spectrogram in Figure 8.4, exemplifying velar lowering through part of an /o/ vowel's production. It represents a token of the word [ko.rõ.'mbo]. As nasalization of the second /o/ vowel begins, the 2nd formant is visibly lowered, apparently due to increased labialization associated with [m]. Nasalization was also confirmed by listening to the vowel token. When the first portion of the vowel is played it sounds non-nasalized. The second portion of the vowel sounds nasalized, however. The second portion also presents greater F1 and F3 bandwidths (as we might expect based on Figure 8.3), however these differences are only barely visible in Figure 8.4.

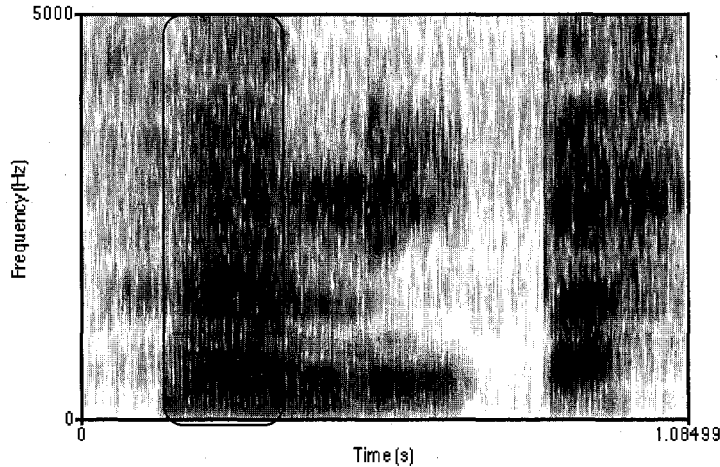
As we have seen, the timing of this velar lowering varies extensively from token to token, so that in a word such as [kĩnda], the velum may drop during the production of the first vowel, as in the token represented in Chart 8.1, or only after the vowel has ended, for instance in [kidnda].

Other vowels in Karitiana, however, regularly demonstrate velar lowering *throughout* their production. Some examples of each of the five vowels are evinced in the following chart of nasal vowel tokens:

Vowel	Duration with lowered velum (ms)	Duration with raised velum (ms)
[hã.nĩ.'pa] 'heart'	180	0
[hã.nĩ.'pa] 'heart'	97	0
[sẽ.'nda] 'waist'	143	0
[pi.õ.ndit] 'thick'	74	0
[ĩn] 1S	108	0

Chart 8.2 Sample durations of velar lowering.

The data in Chart 8.2 are based on data such as that represented in Figure 8.5, a reproduced spectrogram for the word /hãĩpa/, ‘heart.’



h ã n ã p a

Figure 8.5 An /ã/ vowel, with velar lowering throughout.

In this spectrogram the nasalization of the /ã/ is present throughout the production of the relevant vowel. The evidence for velar lowering in this case involves both a difference in formant levels and bandwidths, between the /ã/ in question and a non-nasalized /a/. These differences are apparent visually in Figure 8.5, since the word represented also contains a non-nasalized /a/. Note that the /ã/ exhibits more diffuse bandwidths (especially in the case of F3), as well as a lower F1, when contrasted with the word-final /a/. Both of these differences are consistent with the findings of Figures 8.2 and 8.3.

Unlike the /o/ vowel highlighted in Figure 8.4, there is no significant change in the state of the formants in the first vowel of Figure 8.5. Therefore, the contrast between nasalized vowels and nasal vowels is apparent when the two spectrograms are contrasted.

What such data point to, then, is the existence of both *nasalized* and *nasal* vowels in Karitiana.⁴² Some vowels, such as those in Chart 8.2, are *nasal*, with regular patterns of velar lowering that occur throughout the vowel in disparate tokens. Other vowels, such as those of Chart 8.1, appear to be *nasalized*. In such cases, nasalization appears to spread regressively from a following nasal consonant. However, this nasal spreading does not *always* occur--its variability will be further addressed in section 8.5.

The existence of *nasal* and *nasalized* vowels in the same language is not altogether rare, and should not be unexpected. Not only does it occur in the Tupí languages surveyed above, it occurs in Romance languages such as French and Portuguese, for instance.

§8.4 Evidence for markedness of pre- and post-oralized nasals

As has already been mentioned, words such as those presented in Chart 8.1 are occasionally produced with a pre and post-oralized segment, e.g. [dnd]. This results in surface forms such as [kidnda], [pedndot], and [agn̩gat]. As I have noted, Storto (1999) considers such segments to be the default productions of such words. However, as I have demonstrated, the first vowels in these words may be nasalized, due to regressive nasalization spreading from the nasal consonant. If productions with such nasalization are the default production, it would appear that Storto's account would become untenable, since it would be contradicted by the regressive nasalization originating in consonants. It

⁴² According to Paradis and Prunet (2000), evidence from lexical borrowings suggests that contrastive nasal vowels are in fact biphonemic. This claim is based primarily on the fact that nasal vowels in French words tend to be "unpacked" as V-N sequences when borrowed by languages without nasal vowels, e.g. Fula. The researchers argue that nasal vowels can best be represented, underlyingly, as "an oral vowel root node followed by an adjacent nasal consonant root node," (2000:341) both of which occupy the same unit of the timing tier. If one accepts their analysis, then, strictly speaking, Karitiana exhibits V-N sequences that occupy one timing unit (nasal vowels), as well as V-N sequences that occupy two timing units and exhibit regressive vocalic nasalization (nasalized vowels).

would also be contradicted by the lack of oralization, which is expected to originate in the first underlyingly oral vowel and spread to the following nasal consonant.

In order to test the relative frequencies of the pre- and post-oralized segments in question, I conducted interviews with eight Karitiana of various ages. These interviews lasted approximately one hour. During the interviews, I elicited various clauses containing target words that had the relevant sequences of sounds. These target words included words such as /penot/, /kina/ and /aŋat/, words that would be expected to surface with pre- and post-oralized segments according to Storto's account. A total of 261 tokens of such words were considered. In each case I noted whether the relevant nasal consonant of a word such as /kina/ surfaced as [nd], [dnd], [n], or [d]. The following distribution of segments was observed (where C-N-C represents pre- and post-oralized segments, N-C represents prenasal type segments, C represents voiced-stop-only segments, and N represents nasal-only segments).

Sequence type	Tokens	Percentage
N-C	210	80.4
C	41	15.7
C-N-C	7	2.7
N	3	1.2

Chart 8.3. Distribution of segments where pre- and post-oralized nasals should putatively occur.

Clearly prenasal type sequences were the most frequent to surface in the data. The difference between the number of prenasal type tokens (210) and all other tokens combined (51) was significant. ($\chi^2=6.65$, 1 d.f., $p<.01$) The tendency toward the production of prenasal type sequences in words such as /kina/ and /penot/ was apparent in the speech of all respondents, though the rates of such prenasals did vary somewhat on an interspeaker basis. This is apparent in the following figure:

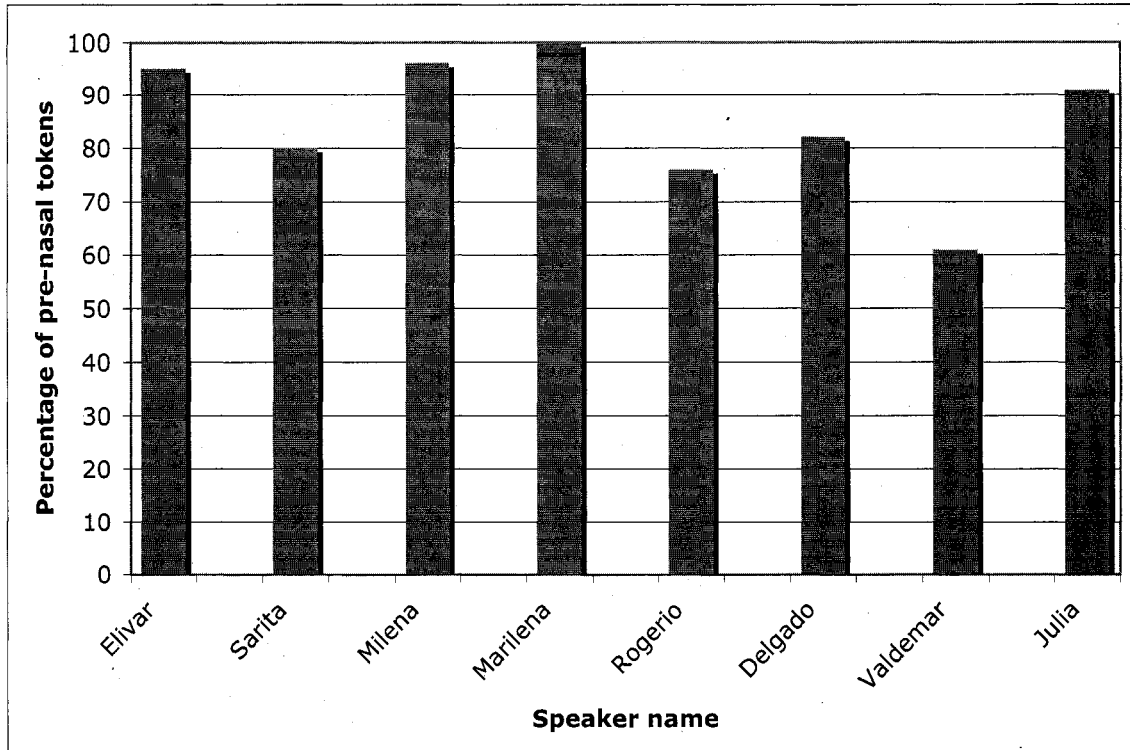


Figure 8.6 Rate of pre-nasal type segments, according to speaker. Y-axis represents the percentage of N-C (nasal-consonant/voiced-stop) sequences produced by a speaker. In other words, the number of pre-nasal type sequences uttered, divided by the number of possible pre-nasal type sequences uttered. The possible number of such sequences was found by counting the V-N-V (oral vowel/nasal consonant/oral vowel) sequences in the underlying forms of the speakers' utterances.

Even the speaker with the lowest rate of pre-nasal type segments produced them in over 60% of the relevant tokens.

Since pre- and post-oralized segments only surfaced in less than 3% of the tokens, it seems inappropriate to base our account of the patterning of nasal consonants on such tokens. It seems that, word-medially between two oral vowels, the default production of nasal consonants is N-C. However, we must still attempt to account for the fact that these segments sometimes surface as C-N-C and, even more frequently (over 15% of the time), surface as voiced stops with no nasalization. In the following section I outline my account of the patterning of velar lowering relevant to the bilabial, alveolar, and velar consonants in Karitiana.

§8.5 The account of consonantal nasality

The patterns of velar movement in Karitiana are not random, though a consideration of data such as those in the previous section may give the impression of a lack of systematicity. It is true that there is extreme variation in the production of nasal consonants, however this variation seems to be restricted in its phonological environment. I would like to suggest that the key to understanding the patterning in question is the consideration of word stress. To illustrate this point, below I provide a list of Karitiana words with nasal consonants (some of which are taken from Chart 8.1 above). On the left of the list, I have placed the putative underlying forms of each word. On the right, I present the possible variations of the word in question.

	Underlying form:	Possible surface forms:
8.35	/koromo/ 'mouth'	[ko.rõ.m'bo], [ko.ro.'bo], [ko.ro.'bmbo]
8.36	/kina/ 'thing'	[kĩ.'nda], [ki.'da], [ki.'dnda]
8.37	/akinop/ 'open'	[a.kĩ.'ndop], [aki.'dop], [aki.'dndop]
8.38	/aɲat/ 'stand up'	[ã.'ɲgat], [a.'gat], [a.'gɲgat]
8.39	/penot/ 'wide'	[pẽ.'ndot], [pe.'dot], [pe.'dndot]
8.40	/anij/ 'smile/laugh'	[ã.'ndij], [a.'dij], [a.'dndij]
8.41	/hana/ 'talk'	[ˈha.dna]
8.42	/ɲi:ɲa/ 'stop/stand'	[ˈdʒi.gɲa]
8.43	/homa/ 'drown'	[ˈho.bma]
8.44	/otamamin/ 'four'	[o.'ta:dna.min]
8.45	/esi:ɲa/ 'waterfall'	[e.'si:gɲa]

Other examples of this patterning could be adduced, but this list will suffice for our purposes. A clear trend begins to surface when we consider surface forms such as these, with word stress transcribed. We see that stressed vowels that are underlyingly oral (i.e. are not represented as nasal vowels in the underlying forms on the left in the above examples) do not occur adjacent to a nasal segment in the surface forms on the right. In other words a stressed oral vowel must be separated from a nasal consonant by an intervening oral stop. For instance, since the stressed vowel in /koromo/ is underlyingly

oral, a surface form such as [koro¹mõ] is not permitted. Instead, only forms such as [korõm¹bo], [koro¹bo], and [koro¹bmbo] are permitted.

We also see in data such as those in the above list that unstressed oral vowels do *not* require a segment of oralization to occur between them and adjacent nasal consonants. (Contravening Storto's account.) In such cases, the underlyingly oral vowel may be nasalized due to regressive nasalization, as Chart 8.1 above demonstrated. In section 8.1 above I recapitulated Storto's account of nasal consonant surface forms, providing the relevant environments and surface forms of nasal consonants, based on her account. In the light of the data so far considered, below I provide an updated list of relevant environments and surface forms. In the list below I have highlighted the surface forms that differ from the list found in Storto (1999).

Environment of nasal:	Surface forms of nasal:
a. V__'V	[mb], [nd], [ŋg], [b], [d], [g], [bmb], [dnd], [gŋg]
b. 'V__Ṽ/V	[bm], [dn], [gŋ]
c. Ṽ__'V	[mb], [nd], [ŋg]
d. ##__V	[b], [d], [g], [ŋg]
e. V__##	[bm], [dn], [gŋ]
f. Ṽ__Ṽ	[m], [n], [ŋ]
g. ##__Ṽ	[m], [n], [ŋ]
h. Ṽ__##	[m], [n], [ŋ]

List 8.1 Effects of phonotactics and word stress on the distribution of nasal consonants. (See Figures 6.3 and 6.4 for the effects of stress and phonotactics on the distribution of the remaining Karitiana phonemes.)

This list differs crucially from that based on Storto's account, since it implies that in environments *a.* and *b.*, the presence of an adjacent *stressed* oral vowel is the primary factor determining the surface form of the adjacent nasal consonant. I am suggesting, then, that the surface forms of nasal consonants in environments *a.* and *b.* are *not* due to spreading of [-nasal] features from all adjacent oral vowels. Instead, it appears that only *stressed* oral vowels regularly affect the surface forms of word-medial nasal consonants,

since the nasal resonant of the adjacent nasal consonant must be separated from the stressed oral vowel by a segment of non-nasal occlusion.

The portion of nasal consonants adjacent to unstressed oral vowels is most-frequently nasal, rather than oral, in nature. However, there are occasionally oral stops separating the nasal consonant and the unstressed oral vowel (when the unstressed vowel precedes the nasal consonant) as the variegated surface forms for environment *a*. above demonstrate. In fact, it appears that there is a general imprecision of the velar timing associated with nasal consonants, when they occur following an unstressed oral vowel and prior to a stressed oral vowel. Interestingly, the only similarity between the surface forms in this environment is the presence of a voice-stop segment prior to the stressed oral vowel. That is, since a nasal consonant such as /n/ surfaces as [nd], [d], and [dnd] in such environments, the only commonality between the forms is the presence of [d]. The behavior of the velum in such productions seems capricious, since it may lower early, during the production of the preceding vowel (e.g. as [nd] with a preceding *nasalized* vowel), or at the onset of the nasal consonant (e.g. as [nd] with no nasalization of the preceding vowel), or at a later time during the consonant's production (e.g. [dnd]), or not at all (e.g. [d]).

This patterning can be elucidated if we employ the framework of Browman and Goldstein (1986). Within their framework, phonetic productions are described by "gestural scores," which describe the movements and timings associated with the individual vocal articulators. Gestural scores consist of timing and movement information for the velum, tongue tip, tongue body, lips, and glottis. They help to clarify the movements involved in different productions of the same Karitiana word. For example,

consider the Karitiana word /penot/, which surfaces most frequently with a [nd] sequence word-medially, i.e. [pe^hndot]. In some cases the first vowel of the word is nasalized, in others not. In the following spectrogram, there is no evidence of nasalization of the first vowel, and the velum lowering occurs almost simultaneously with the end of the vowel:

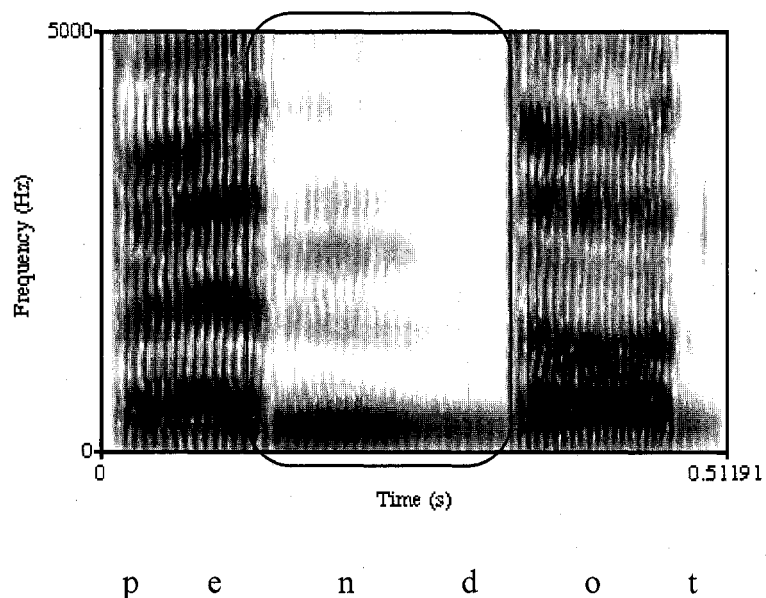


Figure 8.7 Spectrogram for token of [pendot]. Formant levels and bandwidths of first vowel are consistent with oral production. Pre-nasal segment is highlighted.

The same token described by the above spectrogram can also be described by a gestural score elucidating the movements of the individual articulators:

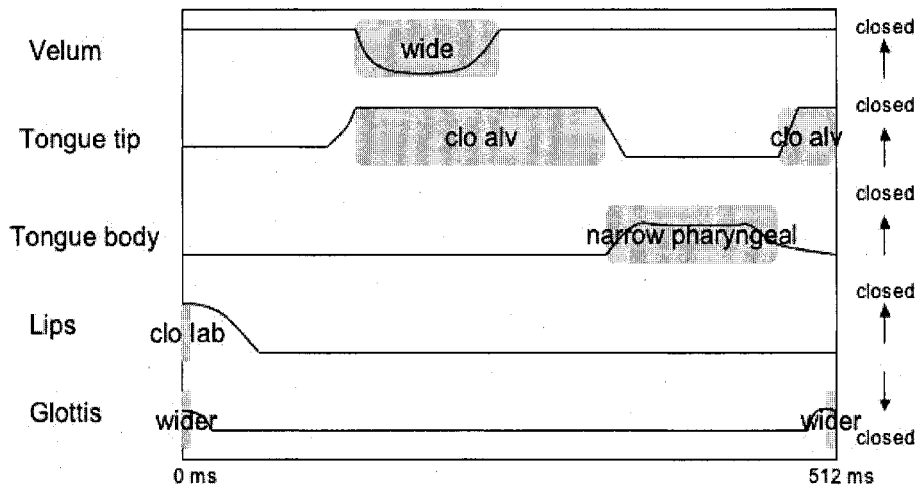


Figure 8.8 Gestural score for token represented in Figure 8.7.

As this gestural score evinces, the velar aperture is maintained through just over half of the duration of the alveolar tongue tip constriction, while the glottis is also constricted.

Therefore, the resultant sound can be described as [nd]. However, in other cases the same word is accurately transcribed as [pedot], described by the following gestural score:

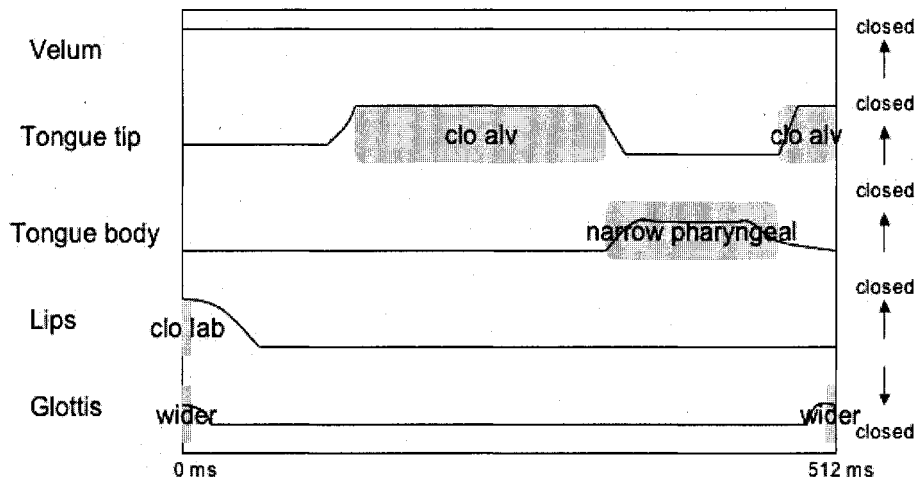


Figure 8.9 Gestural score for [pedot].

In fewer cases the same word can be represented by [pedndot] and the following gestural score:

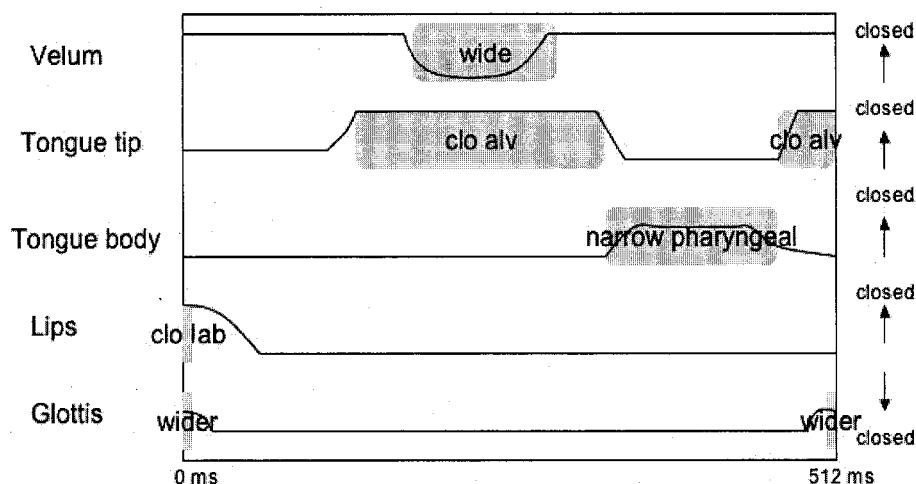


Figure 8.10 Gestural score for [pedndot].

Such gestural scores highlight the *variable velar timing* associated with nasal consonants in Karitiana, when they follow an unstressed oral vowel and precede a stressed oral vowel. *In the case of such nasal consonants, the most salient aspect of their production, which is evident in all three of the above gestural scores, is the presence of a voiced oral occlusion prior to the stressed oral vowel.* All of the following aspects are less crucial and surface more sporadically: nasalization of the preceding unstressed oral vowel, pre-oralization of the nasal consonant, and even the presence of velar lowering. These data suggest that, in this environment as well as in the word-initial, pre-oral-vowel environment, voiced occlusion is the only common element to all of the nasal consonant variants in question.

The distribution of nasal allophones seems amenable to a plausible perceptual motivation, since the motivating factor of the distribution appears to be the clear production of a non-nasal segment adjacent to *stressed* oral vowels. In other words, one of the correlates of stress in Karitiana appears to be the increased salience of the oral/nasal status of the stressed vowel. The oral status of stressed oral vowels is highlighted in two ways: First, by raising the velum prior to the production of a stressed

oral vowel, even when the preceding segment is a nasal consonant. Second, by delaying velar lowering following a stressed oral vowel, even when the following phoneme is a nasal consonant. In some tokens, the prohibition against velar lowering immediately adjacent to a stressed oral vowel results in the absence of velar lowering altogether, as in Figure 8.9.

Recall that at the conclusion to §8.2, I noted three commonalities of nasal patterning in the Tupí languages surveyed. One of these was the predominance of pre-nasal type segments in word-medial environments. This, we have seen, is also apparent in Karitiana. The second commonality was the presence of varying degrees of nasality. We have seen that there are at least two degrees of nasality in Karitiana. In underlyingly nasal vowels, the velum is lowered throughout the entire duration of the vowel. Unstressed oral vowels, on the other hand, often undergo regressive *nasalization* for part of their duration, when followed by a nasal consonant. The third commonality noted was the frequently disparate treatment (phonologically) of the velar nasal consonant, when contrasted to its alveolar and bilabial counterparts. I observed that word-initially in Karitiana, velar nasals almost always surface as a pre-nasal stop ([ŋg]), while alveolar and bilabial nasals almost always surface as voiced stops ([d] and [b]) in this environment.

All three commonalities discussed vis-à-vis the Tupí literature have been found to surface in Karitiana as well, then. The above discussion addressed the first two of these commonalities in a straightforward manner. The third commonality, related to the distribution of the velar nasal, will be treated in the following section.

Before concluding this portion of our analysis of nasality, it should be noted that nasal spreading, originating in nasal vowels, has been said to exist in the language. Storto (1999:36) suggests the following:

Long distance spreading of a [+nasal] is possible in Karitiana. This feature spreads word-internally from a nasal vowel in rightward direction [sic], passing through sonorants... and being blocked by the presence of a [-sonorant].

This claim is supported by tokens such as the following:

- | | | |
|------|---------------|-------------------|
| 8.46 | [ʔo.hõ.řõ.řo] | ‘type of chicken’ |
| 8.47 | [ã.'mēm] | ‘enter’ |
| 8.48 | [sõ.ŋõ] | ‘firewood’ |

Given the prevalence of nasal vowels in Karitiana, it is actually difficult to establish in such cases that nasality is spreading to following vowels, since the vowels in question could very well be underlyingly nasal. In other words, it may simply be the case that in such examples the velum is simply maintained in a lowered position when a sonorant occurring between two nasal vowels is produced. The only two non-nasal phonemic sonorant consonants in Karitiana are /w/ and /r/, so we might simply state that, when these two phonemes occur between two nasal vowels,⁴³ velar position does not change. This might seem to be a fastidious maneuver, but I believe that the account of nasal spreading recapitulated above overlooks an important fact, which is that stressed underlyingly oral vowels are never nasalized in Karitiana. Even when preceded by a clearly nasal vowel and an intervening sonorant, an environment that should lead to their nasalization according to Storto’s above formulation of nasal spread, such vowels are not nasalized. As an example, consider the word /sēna/, ‘waist/middle section.’ The first vowel in this word is nasal, since in all of the tokens I have examined it demonstrates the acoustic correlates of velar lowering throughout its production. Based on the above rule

⁴³ Recall that /w/ and /r/ do not occur word or syllable-finally.

of nasal spreading, we would expect the surface form of such a word to be [sēnā]. However, the most common surface form is [sēn.¹da], produced with no velar lowering during the final vowel. This is consistent with our suggestion above that the velum is always raised prior to the production of a stressed oral vowel in Karitiana.⁴⁴

§8.6 Diachronic considerations

The patterns of nasality in Karitiana are interesting from a typological perspective, and it is difficult to account for them in a straightforward fashion. A parsimonious feature-based approach (e.g. Storto's) assists in the description of such patterning but, in the end, is found wanting since it is unable to account for variable velar timing that leads to disparate productions of what is apparently the same phoneme, in the same environment, often spoken by the same speaker at a nearly identical time. To account for such variability it is crucial, I believe, to consider possible diachronic motivations for the variation in question. As Bybee (2001:212-213) notes, "A diachronic approach explains both the general formal or structural tendencies and the fact that most such tendencies are only tendencies—they cannot be formulated as absolute because they have exceptions."

It appears that there are diachronic trends influencing the distribution of nasal consonant allophones in Karitiana. One clue to understanding these trends is the behavior of the velar nasal. Recall that this nasal has been shown to demonstrate marked distribution patterns in many Tupí languages. We have seen that in Karitiana the behavior of this nasal differs from that of the alveolar and bilabial nasals, specifically in word-initial

⁴⁴ It is also worth mentioning that all of the examples Storto (1999:37) presents of the blocking of nasal spread involve the cessation of nasality in the onset of a syllable with a stressed oral vowel. Examples include [nōn'so], 'woman,' [hānī'pa], 'heart,' and [mōrō'tʃa], 'close.'

position. In word-initial environments prior to oral vowels, the velar nasal consonant surfaces as either [ŋg] or [g], though usually as the former. In contrast, the alveolar and bilabial nasals almost always surface as [d] and [b], respectively, in this environment.

Consider the following examples:

8.49	[de.'so]	'mountain'
8.50	[bi.'wo]	'become light'
8.51	['ŋge]/['ge]	'blood'
8.52	[go.'kip]	'sun'

It is interesting that, in examples such as 8.49 and 8.50, [d] and [b] cannot be replaced by [nd] and [mb]. There are much fewer cases of pre-nasal type alveolar and bilabial segments, word-initially, in my data. (One of these [mbit], 'pan', was provided in §2.1.)

Furthermore, when speakers are presented with tokens such as the following, they deem them unacceptable, suggesting they sound odd:

8.53	*[nde.'so]	'mountain'
8.54	*[mbi.'wo]	'become light'
8.55	*[mbo.ro.'ti]	'paca' (large rodent)
8.56	*[ndi.ki.'si]	'spider'

Unlike those occasional word-medial cases in which /m/ and /n/ surface as [b] and [d], in these word-initial environments they are *required* to occur as [b] and [d]. One plausible account for this fact is that these two surface segments, which are so perceptually distinct when contrasted to their homorganic nasal counterparts, are the result of an ongoing split, in which [b] and [d] are diverging from [m] and [n]. It seems possible at least that word-initial /m/ and /n/ were once produced as [mb] and [nd] when occurring prior to a word-initial oral vowel, much as /ŋ/ is often pronounced as [ŋg] in this environment today. Such productions of /m/ and /n/ would have been consistent with their current production in word-medial environments. However, we see in the above examples that,

synchronously at least, any presence of nasality in these word-initial consonants strikes Karitiana listeners as unacceptable in most cases.

The behavior of the velar nasal in word-initial contexts before oral vowels is noteworthy in another respect. In some words the velar nasal can be produced in this environment as [ŋg] *or* [g], for instance in tokens such as [ŋgok] and [gok], both meaning ‘manioc’. However, in a few words, it can only be acceptably produced as [g], for instance in [gokip], ‘sun.’ Karitiana speakers find the following production unacceptable:

8.57 *[ŋgo.kip]

Such a fact cannot be explained by the reliance on a [-nasal] feature (spreading from the following vowel), since in both [ŋgok] and [gokip] the first vowel is oral. It can, however, be explained if we except the possibility that word-initial [ŋg] is becoming unacceptable in some words, much as [mb] and [nd] are now unacceptable word-initially in nearly all cases. The following observations are relevant to these data:

Since alternations of all types are created by sound change, they are initially conditioned phonetically and...only gradually take on lexical, morphological, or syntactic associations. This is one major universal path of change: a movement from phonetic conditioning to nonphonetic conditioning. (Bybee 2001:214)

The sound changes I suggest are occurring in Karitiana are consistent with the universals mentioned here by Bybee. We see that word-initial [g], which may have been initially the result of phonetic conditioning related to a following oral vowel, is beginning to take on lexical associations, since it is now required in some words where [ŋg] is unacceptable, despite the fact that this pre-nasal segment sometimes occurs in the same word-initial phonetic environment as [g].

As I suggested above, it seems plausible that [mb] and [nd] were at one point more frequent word-initially before oral vowels, due to the phonetic conditioning in that environment, which is similar to the conditioning resulting in word-medial [mb] and [nd] in Karitiana today. Recall that in word-medial contexts before a stressed oral vowel, the only constant in productions of /m/, /n/, and /ŋ/ is the presence of a voiced occlusion. It seems likely that this may have also been true of alternations in word-initial environments, in which case [mb] and [nd] may have begun to vary with [b] and [d] word-initially as they do now word-medially. Such variation would also be entirely consistent with the current variation of word-initial velars. It is plausible that, gradually, [b] and [d] became the unmarked variants (in most words at least) and began to form lexical associations. This would be entirely consistent with the current behavior of [g], which has formed lexical associations with words such as [gokip] and is now no longer one of two possible variants, but is instead the only acceptable variant of the segment in question in this word. The formation of lexical associations is after all (as Bybee suggests) a crucial step taken in the process towards phonemic independence.

The account being suggested is admittedly somewhat speculative at this point, though it is consistent with the data so far presented, as well as perceptual data to be presented in the following chapter. In fact, the perceptual data is perhaps the strongest evidence for the diachronic account being suggested here.

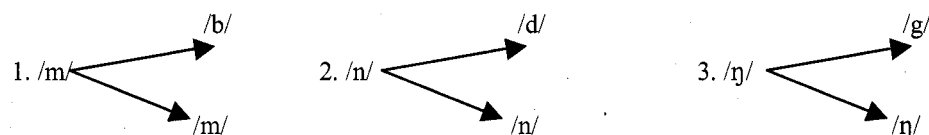
One could object to the account put forth here on the basis that the variants of /m/, /n/, and /ŋ/ are still largely in complementary distribution, as described in §4.4 above. That is, there may be no reason to suggest that forms such as [b] and [d] are splitting from [m] and [n]. However, a perspective that relies on the *near-complementary*

distribution of these forms would ignore the fact that [ŋg] and [g] generally distribute differently in identical word-initial environments, according to lexeme, and would also be forced to ignore the unpredictable variation of word-medial nasal allophones. Here, another comment provided by Bybee (2001:213) proves insightful:

Thus, for any given synchronic slice in any language, we find that the phonemic principle works quite well for the majority of contrasts and for predictable phonetic variants, but that in addition, there are certain lexical and morphological environments where the principle breaks down.

A diachronically-focused account of the variation of forms in question *predicts* that there will be certain inconsistencies in the complementary distribution of certain segments. In fact, those inconsistencies, such as the [ŋg]/[g] word-initial alternation in Karitiana, provide clues to the diachrony that may account for the distributional patterns as a whole.

Let me formulate my claims of the plausible divergence of phonemes being discussed here, symbolically:



I am not suggesting that the splits in question have been completed, simply that the evidence is consistent with ongoing splits in the case of the three nasals. The evidence is also consistent with the notion that split 3 above is less far along the course of divergence than splits 1 and 2. (This is the case since [ŋg] occurs word-medially *and* word-initially.)

If my claims are accurate, we should expect that there would be comparative evidence in favor of them. For example, we might expect to find related languages that have been described as having phonemic /b/, /d/, or /g/ in addition to their homorganic nasal counterparts. Perhaps we might even find related languages that are said to have phonemic /b/ and /d/, but not a phonemic /g/. An examination of the literature on Tupí

languages suggests that both of these expectations are borne out. Rodrigues (1999:113) presents a survey of phonemic inventories in Tupí. Of the nine languages surveyed, five have some combination of phonemic /b/, /d/, or /g/. Two of these languages, Suruí and Gavião (both Tupí-Mondé languages), have phonemic /b/, /d/, and /g/. One language, Káro (Tupí-Ramaráma) has phonemic /b/ only. *Significantly, two languages, Juruna and Mundurukú (of the eponymous branches), have phonemic /b/ and /d/, but not phonemic /g/. All of these languages, with the exception of Juruna, appear to have a phonemic velar nasal.*

These comparative findings are consistent with the expectations based on our diachronic account, and provide further evidence for the plausibility of the splits I suggest are currently taking place in Karitiana. It appears that the voiced stops in Karitiana may be at an intermediary stage in which [b] and [d] are beginning to approach phonemic status but have yet to do so. [g], on the other hand, seems to be lagging even further behind in this process. The suggestions I am making are remarkably consistent with the patterns in Káro and Juruna, and the distributions of homorganic nasal and stop phonemes in these Tupí languages generally support the claims made here. They also imply that similar diachronic trajectories to those suggested here for Karitiana *may* have occurred in related Tupí languages.

One of the keys to predicting a sound change is the existence of allophones that are significantly distinct phonetically. Such phonetic disparity leads to a natural cognitive re-association of the phones in question. Consider the following comments:

Another major generalization over specific phonetic paths of change is an increase in the phonetic distance between the unchanged variant and the variant affected by change. (Hooper 1976a, Janda 1999) Thus a velar might first palatalize to [kʲ], but then later move to [c] and, as in the history of Spanish, continue to [ts], which changes to [θ] or [s], eventually creating an alternation between /k/ and /s/ (eletrico, electricidad). *In this process either new phones are created that are sufficiently different phonetically from*

their sources to be regarded as separate phonemes, or the altered phones merge with already existing phonemes. (Bybee 2001:214, Italics added)

The relevant Karitiana phones indeed demonstrate a gradual increase in phonetic distance. In word-initial environment, it appears that nasals were produced as pre-nasal type segments and are now produced with no nasality in most cases. In word-medial environments, there are also many cases in which putatively nasal segments are produced with no nasality (15% of the cases preceding oral vowels in the data of section 8.4).

In chapter 4 I discussed in some detail the acoustic correlates associated with nasal consonants. These include the presence of antiformants and nasal formants, significant percepts that allow for ease of distinguishability between nasal and non-nasal consonants. Such sounds are very “different phonetically,” (see quote above) both perceptually and articulatorily, when contrasted to voiced stops. They are clearly distinct enough to differ phonemically from voiced stops, since homorganic nasal consonants and voiced stops present meaningful contrasts in many languages, including five of the nine Tupí languages considered in Rodrigues’ (1999) survey.

I am suggesting that the phonetic disparity between the oral and nasal segments in question points to a likely ongoing sound change, in a manner that is consistent with Bybee’s claims on diachrony. The diachronic account I am suggesting is also consistent with comparative data, as well as the distributional/production evidence in Karitiana. One piece of production evidence in favor of the split hypothesis I am suggesting is found in Storto (1994:4). She suggests that the /m/, /n/, and /ŋ/, surface as [b], [d], and [g] word-initially. However she notes parenthetically that “in a more conservative dialect still spoken by elders we find the forms [mborotɨ], [ndopɨ], and [ŋgop].” I have no other strong evidence for systematic age-variegation in the production of such forms. This may

be due to the fact that my field work took place over a decade after Storto transcribed such forms. Regardless, this piece of evidence she presents is entirely consistent with the account I am suggesting. I should also note that on one occasion a young Karitiana adult also suggested that there was a meaningful contrast between /d/ and /nd/. He produced the following tokens and suggested that they were separate words in which /d/ and /nd/ could not occur in free variation:

- | | | |
|------|---------------|---------------|
| 8.57 | [kinda pitit] | 'boulder' |
| 8.58 | [kida pitit] | 'heavy thing' |

According to the speaker who produced 8.57 and 8.58, the words in question represent a minimal pair. Such a minimal pair is consistent with the account being suggested here. One natural expectation is that more such minimal pairs will begin to crop up in the language, as /n/ and /d/ diverge.

If the account I am suggesting is accurate, and not merely plausible speculation, it should be consistent with perceptual data as well. That is, the manner in which a Karitiana speaker *perceives* the sounds in question should be consistent with the account I have adduced, which is based on the manner in which Karitiana speakers *produce* the given sounds. In the following chapter I present an investigation of a Karitiana speaker's perception of the relevant sounds. The results of this investigation are in fact the greatest support available for the account suggested here. Nevertheless, it is fair to say that the present account is tentative, since it suggests an incipient sound change that naturally is hard to verify, since we would not expect many pieces of evidence such as minimal pairs. Nevertheless, the combined pieces of evidence, from the age-stratified variation of nasals suggested by Storto, to the interesting distribution of word-initial [b] and [d], to the emergence of minimal pairs such as that cited above, along with comparative Tupí data,

are all *consistent* with the diachronic account laid out in this section. Combined with the relevant perceptual evidence, laid out in Chapter 9, the diachronic approach to variation suggested here seems the most plausible account available, which can neatly account for the interesting variation of nasal allophones in Karitiana.

Nasality in Karitiana: Perception evidence

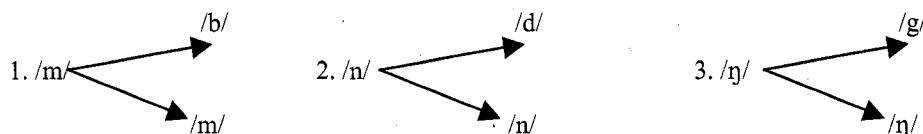
§9.1 Purpose of perception experiment

With the findings of the previous chapter in mind, I set out to better understand the cognitive grouping of nasal phonemes and their putative allophones, by the Karitiana. To do so, it seemed most appropriate to examine perceptual data, since such data are useful for understanding the groupings of particular sound types. In order to examine such data, I performed a speech-perception experiment in order to identify the perceptual similarity between the relevant sounds in Karitiana. The goals of the experiment were two-fold: first, to better understand the manner in which the sounds are perceived and, second, to buttress (or vitiate) the claims arrived at in the previous chapter.

The immediate goal of the experiment described in this chapter was to ascertain the perceptual distances between nasal consonants, homorganic voiced-stop consonants, and homorganic pre-nasal segments, for a given Karitiana speaker. For instance, I sought to test whether [nd] seemed to be perceptually grouped with [n], and whether [mb] was grouped with [b]. In order to carry out the experiment, it was of course necessary to have a control subject as well. This allowed me to test the perceptual groupings demonstrated by the Karitiana subject against those demonstrated by a non-Karitiana speaker, demonstrating that the results of the experiment did not stem from general human perception factors.

Before delving into the experiment's methodology, it is worth considering in greater detail why such an experiment is relevant for our purposes. By way of background, consider the following analogy. Suppose in a given language "Y" there are two relevant phonemes, /t/ and /s/. /t/ has only one allophone, [t], but there are three allophones of /s/. These are [s], [θ], and [ʃ]. Now suppose that [ʃ] is no longer in strict complementary distribution with [s] and [θ], and that it seems plausible that it is on the path towards achieving phonemic status. Since separate phonemes are generally more dissimilar perceptually than allophones (see §9.5), we might expect that the speakers of language Y would perceive [t] to be quite different from [s]. However, [θ], which is an allophone of /s/, might be perceived to be quite similar to [s]. So, the evidence would likely suggest that [s] and [θ] are perceived by "Y" speakers to be quite similar, while [s] and [t] are perceived to be quite dissimilar. Now, if it is in fact true that [ʃ] is no longer simply an allophone of /s/, but also does not have phonemic status like /t/, then two expectations result. Since [ʃ] is in *near* complementary distribution with [s], we would expect that speakers of language Y would perceive [ʃ] to be more similar to [s] than to [t]. However, they should also perceive [ʃ] to be less similar to [s] than [θ] is similar to [s], since [θ] is in strict complementary distribution with [s]. In such a case, a speech perception experiment could be run to see if the perceptual data supports the claim that [ʃ] is diverging from /s/. If the results of the experiment were consistent with the two relevant expectations, then we would have more evidence suggesting that [ʃ] is in fact diverging from [s].

With the simple language Y example in mind, let us turn back to the relevant Karitiana data. Recall the tentative diachronic account I presented in §8.6, which attempts to account for the synchronic variation of nasal consonants in Karitiana. That account included the following representations of ongoing splits:



According to the account presented in §8.6, splits 1 and 2 appear to be in a more advanced state than split 3. If these suggestions are accurate, we would expect them to be supported by perceptual data, much as the suggestions for language Y would be. For example, if in fact [d] is closer to achieving phonemic status than [g] is, we would expect [d] to be more perceptually dissimilar to [n], than [g] is to [ŋ]. (Much as, in the case of language Y, we expected [ʃ] to be more dissimilar to [s], than [θ] was to [s]).

Intuitively, we might expect perceptual distance⁴⁵ to be relatively large between a strictly nasal allophone (e.g. [n]) and a homorganic voiced-stop allophone⁴⁶ (e.g. [d]), since such sounds are quite different phonetically (see Chapter 4). Therefore, it seemed reasonable to focus the speech perception experiment on the Karitianas' perception of nasal allophones that share some voiced occlusion (e.g. [nd] and [d]). With that intuition in mind, I designed and carried out an experiment that aimed to explore the predictions of the diachronic account in §8.6, as they relate to voiced stops and prenasal segments. More specifically, the experiment was designed to explore the following predictions, which follow from the diachronic account:

⁴⁵ Perceptual distance refers to the amount of perceptual dissimilarity between two sounds. Greater perceptual distance equals greater perceived dissimilarity.

⁴⁶ Since presently the sounds in question are not completely distinct from each other phonemically, it seems that this term is still appropriate.

The [g] segment and the [ŋg] segment should demonstrate greater perceptual similarity for a Karitiana speaker, when contrasted to the perceptual similarity of [d] with [nd], or the similarity of [b] with [mb]. Furthermore, we can predict that [b], [d], and [g] will exhibit greater perceptual similarity with their prenasal counterparts for a Karitiana subject than for a control subject whose native language contains phonemic /b/, /d/, and /g/.

These predictions are based in part on relevant previous findings in speech perception, as will be discussed in §9.5. Generally speaking, though, the expected greater perceptual similarity of [g] and [ŋg] follows from the suggestion that [b] and [d] are further along than [g] in their progression towards phonemic independence. Recall the hypothetical example of language Y. In that case, [ʃ] was expected to be less similar perceptually to [s] than [θ] was similar to [s], since [ʃ] was more phoneme-like than [θ]. In a similar vein, if [b] and [d] are no longer straightforward allophones of /m/ and /n/ in Karitiana, we would expect them to seem less similar to [mb] and [nd], respectively, than [g] is to [ŋg], since [g] is less phoneme-like (more allophone-like). Another expectation for language Y was that [ʃ] would be perceptually more similar to [s] than to [t], since /t/ was a completely separate phoneme that exhibited no complementary distribution with [ʃ], unlike [s]. In an analogous manner, we would expect that [b], [d], and [g] (which have not yet attained phonemic status in Karitiana according to the diachronic account of §8.6), should be perceptually more similar to [mb], [nd], and [ŋg], respectively, for a Karitiana speaker than for a speaker of a language in which [b], [d], and [g] are definitely entrenched phonemes.

As we see, then, there are clear predictions, related to speech perception, which follow from the diachronic account suggested in section §8.6. In the following section I describe the experiment I designed and carried out in order to test whether or not these predictions are met by the speech perception of the Karitiana.

§9.2 Methodology

The methodology employed in the experiment described below follows the basic methodological suggestions presented in Johnson (2003:59-77) for speech perception experiments. These suggestions are based on studies such as Miller and Nicely (1955) and Shepard (1972). For those unfamiliar with such experiments, let me outline their basic form. Typically, a subject listens to the recording of a sound, which is embedded in noise so that there is some confusion involved. Then, after hearing this stimulus sound, the subject listens to several other sounds, which are not embedded in noise. The subject is then asked to decide which of these sounds the stimulus sound (the one embedded in noise) most closely resembles. The subject is asked to make many such judgments for the sounds in question. After the task is repeated many times, various patterns may begin to surface in the responses of the subject(s), on both an intra-subject and inter-subject basis. For instance, suppose a subject listens to the word “mama”, which is embedded in white noise. The subject then listens to three other words, “dada”, “mama”, and “baba,” which are not embedded in noise. She is then asked to judge which of the three choice words sounds most like the word embedded in noise. If, over the course of the experiment, she frequently chooses “baba”, when the word embedded in noise was in fact “mama,” then this would suggest that there is a high degree of perceptual similarity between “mama”

and “baba.” Of course this example is over-simplified, but it illustrates the basic form of these sorts of experiments.

I will first outline the basic steps of the experiment, and then return to each step in greater detail. The basic steps were as follows: First, recordings were made of various stimulus syllables. Second, noise was added to the stimulus syllables, though the versions without noise were also stored. Third, the order of the syllables with noise was randomized. Fourth, the subject was presented the syllables with noise, followed by three similar tokens, without noise. The subject was asked to select which of these three was most similar to the token presented with background noise. Fifth, the responses of the subject were noted. Finally, these responses were tabulated into confusion matrices (more on these below) that could then be converted into maps of perceptual distances. (Maps of perceptual distances are simple drawings representing perceptual similarity, where shorter distances between points represent greater similarity between sounds.) Steps four through six were performed twice, once for the Karitiana subject and once for the control subject.

I will now describe each of the steps mentioned in the preceding paragraph in greater detail, beginning with the first point from the above methodological outline.

1. Stimuli recorded. The stimuli recordings consisted of consonant-[a] syllables in which the consonant was either a prenasal, a nasal, or a voiced stop. Specifically, the consonants selected were [nd], [d], [n], [mb], [b], [m], [ŋg], [g], and [ŋ]. Each permutation of these consonants, followed by [a]⁴⁷, was recorded twenty one times. (I was the speaker.) This yielded 189 sample syllables containing 21 tokens each of [nda], [da], [na], [mba], [ba],

⁴⁷ The stimuli were monosyllabic, with no preceding vowel. Such stimuli were chosen since the difference I was most interested in, [g]/[ŋg], relates to word-initial variation in the language.

[ma], [ŋga], [ga], and [ŋa]. The syllables were examined to ensure that there were not marked pitch differences between them. Also, the duration of the segments in question was held fairly constant, so that, for instance, certain tokens of prenasals did not have particularly long nasal portions.

2. *Noise-adding.* The 189 sample syllables were recorded directly onto a Mac G4 via *Audacity*, at a sampling rate of 44.1 KHz. White noise was then added to the syllables individually through a noise-adding function in *Audacity*. This yielded syllables with a signal-to-noise ratio of 1 dB.⁴⁸ The noise lasted throughout the duration of each audio file, beginning approximately 500 ms prior to the syllable and lasting around 500 ms after the conclusion of the syllable.

3. *Randomization.* The order of the 189 noise-embedded syllables was randomized. However, it should be noted that both subjects were presented with the syllables in the same randomized order. In other words, the syllables were not re-ordered after the first subject completed the task.

4. *Presentation.* The 189 randomized noise-embedded syllables were presented to each subject. Each noise-embedded stimulus recording was followed by a short pause (just under two seconds). After this pause the subject heard an audio file containing three syllables without white noise. These syllables were separated from each other by approximately one second of silence. These syllables were the “choice” syllables. The participants were expected to choose from these which syllable was most similar to the noise-embedded stimulus syllable. The “choice” syllables consisted of one prenasal-[a] sequence, one nasal-[a] sequence, and one voiced-stop-[a] sequence. These syllables

⁴⁸ Signal-to-noise ratios of 0 dB's are common in such experiments. However, in this case, such high amounts of noise masked the nasal resonants completely, making the stimuli completely indistinguishable.

were recorded separately in Audacity, but, again, noise was not added in these cases. In all cases the three syllables were homorganic with each other and with the relevant noise-embedded stimulus syllable. The sequencing of the three syllables was varied in a consistent manner. For example, for the twenty-one cases in which the noise-embedded syllable consisted of [da], there were seven cases in which the three following syllables were presented in this order: [da], [nda], [na]. Similarly, there were seven cases in which the syllables were presented in this order: [nda], [na], [da]. Also, there were seven cases in which the following syllables were presented in this order: [na], [da], [nda]. In other words, the syllables following the noise-embedded stimuli were ordered so that each “choice” syllable occurred seven times sequence-initially, seven times sequence-medially, and seven times sequence-finally. This was done to ensure that response patterns did not vary due to primacy or recency effects.

As was noted above, the “stimuli” recordings consisted of the following syllables, embedded in noise: 21 tokens each of [nda], [da], [na], [mba], [ba], [ma], [ŋga], [ga], and [ŋa]. The “choice” recordings consisted of three of these syllable types. So, by way of further illustration, the syllable [ŋa] was presented 21 times, embedded in noise, at various points in the experiment. Each time it was presented, it was followed by the “choice” syllables [ŋga], [ga], and [ŋa], which were presented without background noise and occurred in three different orders (seven times for each order), with either [ŋga], [ŋa], or [ga] occurring sequence-initially (as demonstrated in the previous paragraph with respect to [na], [da], and [nda]).

5. *Responses noted.* After the speakers were presented with a given noise-embedded stimulus and the following three “choice” syllables, they notified me which of the choice syllables most sounded like the noise-embedded syllable. They did this by simply stating whether they thought the most similar choice syllable was the first, middle, or last choice syllable heard. In each case, the response was noted and entered into a spreadsheet.

6. *Confusion matrices and perceptual maps created.* The responses entered in the spreadsheet were tabulated. This allowed for the creation of confusion matrices, which are simply tabulations of the number of times that different test sounds are confused with each other. Confusion matrices contain tabulations of the responses generated for each of the stimuli sounds. In the case of this study, three separate confusion matrices were created for each subject, one for each place of articulation. For example, since the three alveolar sound types ([nd], [n], [d]) were contrasted with each other, a confusion matrix was generated for this place of articulation. This matrix listed the number of times [nd] was confused with [n] or [d] (and vice-versa), as well as the number of times [n] was confused with [d] (and vice-versa). Similarly, confusion matrices were generated for the bilabial and velar POA's, respectively. From these confusion matrices, perceptual maps were created. Perceptual maps allow for the abstraction into a two-dimensional plane of the perceptual similarity between disparate sounds. These maps are based entirely on the tabulations found in confusion matrices, according to a formula discussed below. The nature of the confusion matrices and resultant perceptual maps will crystallize in the discussion of the results in 9.4.

§9.3 Participants and setting

There were only two subjects in this experiment—a 22-year-old Karitiana male and a 26-year-old American female. The motivation for selecting only one Karitiana was pragmatic, based on restrictions that were necessary for finding a Karitiana subject. For instance, the methodologies employed here required some familiarity with the researcher. The experiment was undertaken in a small rented office outside the city of Porto Velho, so that background city noises would not affect the results. The task required any subjects to wear headphones and sit in the office with the researcher for a period of two hours. For reasons of cultural sensitivity, it was important that the subject be a male. However, this person also had to be familiar with concepts such as multiple-choice responses. Several of the Karitiana I worked with during elicitation sessions did not seem comfortable with this task, as it seemed quite foreign to them. Sample multiple-choice questions resulted in seemingly random responses.

The Karitiana subject eventually selected was a young adult male who seemed at ease with the task. Before selecting him, however, I presented him with 15 multiple-choice questions, based on auditory stimuli, in order to test whether or not he was adept at responding to questions of the format required. He answered all 15 questions correctly with little hesitation. While I am not suggesting that the subject in question is the only Karitiana who could participate in such a task, at the time of the experiment he seemed the most logical choice. The subject is a fluent speaker of Karitiana, who speaks it with his wife and other family members despite a high-degree of familiarity with Portuguese.

The control subject was selected simply because she spoke natively a language (English) that has phonemic nasals and phonemic voiced stops, but does not have nasal consonants with pre-nasal or voiced-stop allophones.

The subjects were informed that they would be presented with stimuli embedded in noise and that they would then be presented with three similar stimuli, occurring without noise. They were asked to state which of the three response stimuli most-closely resembled the original noise-embedded stimulus. The subjects were allowed to make the similarity judgments without a time constraint, though impressionistically it seemed both subjects usually responded in two to three seconds. Since the task took over two hours, the subjects were given a break halfway through the experiment.

§9.4 Results

In the following charts I present confusion matrices for each of the speakers. The charts can be read in the following manner: For a given noise-embedded stimuli, listed in the left-most column, the number of times it was perceived as one of the three possible response types is listed in the right-hand columns, under the respective sound (column heading). So, for example, examining Chart 9.1 we see from the second row that the control English-speaking subject categorized [nd]⁴⁹ as [nd] 16 times. That is, when she heard the [nda] syllable embedded in noise, she correctly identified it as [nda], from the three “choice” audio files, 16 out of 21 times. Meanwhile, she categorized the sound as a [d], incorrectly, only 3 times, and as [n], again incorrectly, only 2 times. In contrast, we see based on the third row of Chart 9.1 that, when she was presented with a [na] stimulus syllable embedded in white noise, she correctly identified it as [na] only 11 times out of

⁴⁹ Since all of the stimuli ended in [a], this sound has been omitted from the confusion matrices. It was used to create neutral syllables, since many of the perceptual qualities of the sounds being investigated surface in vowel onsets.

21. That is, after hearing [na] followed by three “choice” syllables, she only chose [na], the correct response, in just over 50% of the cases.

In the confusion matrices, table cells containing correct responses are shaded.

Stimuli	Tabulation of choices		
	d	nd	n
d	12	9	0
nd	3	16	2
n	1	9	11

Chart 9.1. Confusion matrix for alveolars, English speaker.

Stimuli	Tabulation of choices made		
	d	nd	n
d	12	8	1
nd	3	5	13
n	3	1	17

Chart 9.2. Confusion matrix for alveolars, Karitiana speaker.

Stimuli	Tabulation of choices		
	g	ŋg	ŋ
g	8	8	5
ŋg	1	10	10
ŋ	0	3	18

Chart 9.3. Confusion matrix for velars, English speaker.

Stimuli	Tabulation of choices		
	g	ŋg	ŋ
g	5	12	4
ŋg	4	8	9
ŋ	0	0	21

Chart 9.4. Confusion matrix for velars, Karitiana speaker.

Stimuli	Tabulation of choices		
	b	mb	m
b	7	14	0
mb	0	19	2
m	0	13	8

Chart 9.5. Confusion matrix for bilabials, English speaker.

Stimuli	Tabulation of choices		
	b	mb	m
b	12	6	3
mb	7	5	9
m	2	2	17

Chart 9.6. Confusion matrix for bilabials, Karitiana speaker.

The raw data found in the above confusion matrices can be more easily understood once we reinterpret the data in order to find the perceptual distances between relevant sounds. For the sake of clarity I will illustrate the manner in which perceptual distances are arrived at by utilizing the data from Chart 9.2. I will only illustrate this process for the data in that chart. However, all of the other perceptual distances were calculated in an identical fashion, based on the methods described in Shepard (1972) and recapitulated in Johnson (2003:67).

In order to find the perceptual distances between the sounds in Chart 9.2, we must first discover the perceptual similarity between the relevant sounds. Generally speaking, perceptual similarity is quantified by finding a ratio involving the number of times that two sounds are confused with each other. That is, given two sounds [x] and [y], the perceptual similarity between the two sounds is uncovered by dividing the amount [x] and [y] are confused with each other, by the amount they are correctly identified. More specifically, perceptual similarity is calculated via the following formula:

$$S_{ij}=(P_{ij}+P_{ji})/(P_{ii}+P_{jj})$$

In this formula, S_{ij} represents the similarity between two sounds. P_{ij} represents the proportion of times a stimulus with sound i is categorized incorrectly as sound j . Conversely, P_{ji} represents the proportion of times a stimulus with sound j is categorized incorrectly as sound i . P_{ii} represents the proportion of times a stimulus with sound i is categorized correctly as sound i . Similarly, P_{jj} represents the proportion of times a stimulus with sound j is categorized correctly as sound j .

Consider now the data from Chart 9.2 above. Based on these data and the above formula, we can calculate the perceptual similarity between [d] and [nd] for the Karitiana

speaker. We see in Chart 9.2 that [d] was categorized incorrectly as [nd] in 8 out of 21 cases, a proportion of .38 (P_{ij}). We also see that [nd] was categorized incorrectly as [d] in 3/21 cases, a proportion of .14 (P_{ji}). Adding these proportions together ($P_{ij}+P_{ji}$) gives us a figure of .52 (=11/21). Next, we can see in the chart that [d] was correctly categorized as [d] in 12/21 cases, a proportion of .57 (P_{ii}), while [nd] was correctly categorized as [nd] in 5/21 cases, a proportion of .24 (P_{jj}). Summing these proportions ($P_{ii}+P_{jj}$) gives us a figure of .81 (=17/21). According to the above formula, we then take the sum of proportions of incorrect responses and divide them by the sum of proportions of correct responses, leaving (.52/.81), i.e. ($P_{ij}+P_{ji})/(P_{ii}+P_{jj})$. This fraction can be restated as 0.64, and this new figure represents the perceptual similarity, in arbitrary units, between [d] and [nd]. In other words, $S_{ij}=0.64$.

We now have a figure, 0.64, that represents the perceptual similarity between the two sounds. However, we must not stop there since figures of perceptual similarity can be converted into figures of perceptual distance, with greater perceptual dissimilarity correlating with greater perceptual distance between sounds. According to Shepard's Law, "the relationship between perceptual distance and similarity is exponential." (Johnson 2003:68) As a result of this, figures for perceptual similarity can be translated to figures for perceptual distance via the following simple formula: $d_{ij} = -\ln(S_{ij})$ That is, the perceptual distance between two sounds is calculated as the inverse of the natural log of the perceptual similarity between the two sounds. In the case at hand, the perceptual similarity (S_{ij}) between [d] and [nd] for the Karitiana subject, was found to be 0.64. Therefore the perceptual distance (d_{ij}) between [d] and [nd] is $-\ln(0.64)$, or 0.45.

We have seen, then, that the confusion matrix data in Chart 9.2 can provide us with figures representing the perceptual distance between two different sound types. Once the perceptual distances between three sounds (e.g. [nd], [d], and [n]) are found in this manner, the distances can be represented in two-dimensional space by triangulating different points in perceptual space. For instance, consider that the perceptual distance between [nd] and [d] was found to be 0.45 for the Karitiana speaker, based on the data in Chart 9.2. Based on the data in that chart we can also find that the perceptual distance between [d] and [n] is 1.97, while the perceptual distance between [n] and [nd] is 0.45 for this speaker. With these figures, we are able to describe graphically the perceptual distances among all three of these sound types. Consider the following perceptual map based on the triangulation⁵⁰, of the perceptual distances between the three sounds in question:

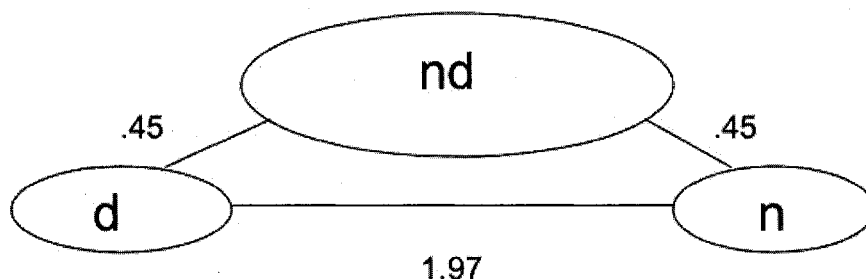


Figure 9.1 Perceptual map of relevant alveolar sounds, Karitiana subject. Based on Chart 9.2 above. In this and the following perceptual maps, sounds with large ovals circumscribed about them have a large degree of confusability, when contrasted to both other sounds in their respective maps. (See footnote 50.) The ovals are designed to allow for the distances to remain to scale, while allowing the distance lines to connect all of the sounds in each perceptual map.

The perceptual map in Figure 9.1 suggests that there is a high degree of confusability between the alveolar prenasal segment and *both* of the other two alveolar segments for

⁵⁰ I refer to the figures as triangulations, though strictly speaking they are not since in each case one sound (typically the prenasal) exhibits relatively short perceptual distances between itself and *both* other sounds. For this reason the sounds are circumscribed by ovals, which represent the general confusability of the sounds. A sound with a large oval circumscribed about it has a large degree of confusability with both other sounds.

the Karitiana speaker. (For this reason the distances cannot form a proper triangle.) However, [d] and [n] demonstrated greater perceptual distance between each other, as we might have expected. (Recall from our discussion earlier that we are primarily interested in the perceptual distances between the voiced stops and the homorganic prenasal segments, though these can be better understood when the perceptual distances relating them to nasal-only consonants are also considered.)

Perceptual maps such as those in Figure 9.1 were generated for each of the relevant confusion matrices presented above. In the following figures, I present all of the remaining 5 perceptual maps created from the matrices, representing the relevant perceptual distances of the Karitiana and control subjects. The maps are drawn approximately to scale. However, the most crucial aspect of the maps are the figures for perceptual distance represented on them. The pictorial representations are meant only as elucidative tools, capturing in picture form the quantitative findings of the experiment. After presenting all of the perceptual maps, I present a discussion of them in the following section.

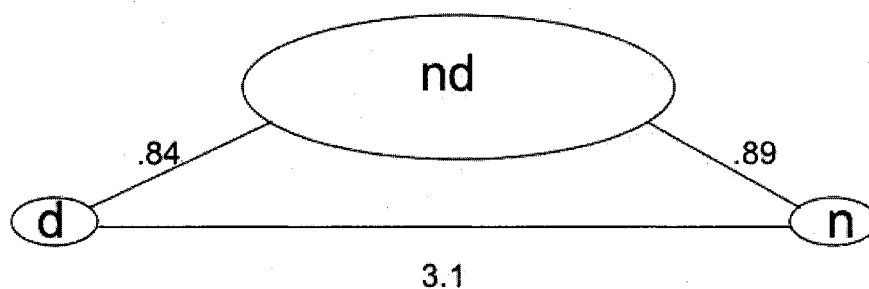


Figure 9.2 Perceptual map of relevant alveolar sounds, English speaker. Based on Chart 9.1.

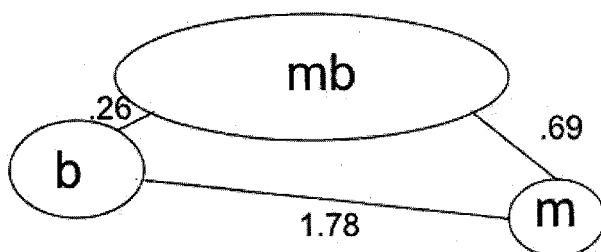


Figure 9.3 Perceptual map of relevant bilabial sounds, Karitiana speaker. Based on Chart 9.6.

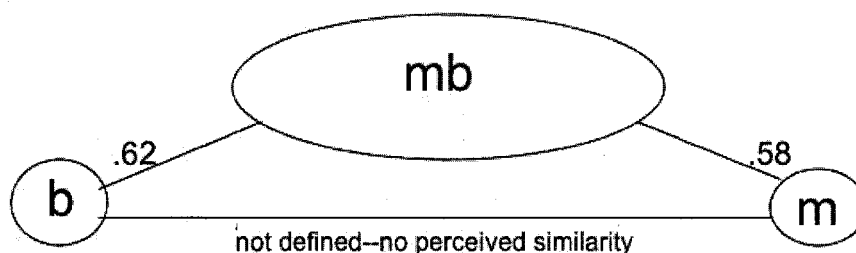


Figure 9.4 Perceptual map of relevant bilabial sounds, English speaker. Based on Chart 9.5.

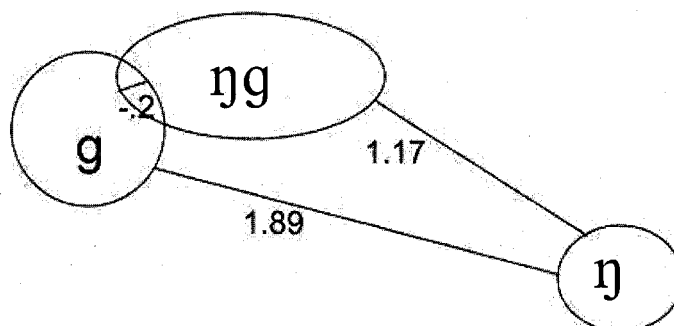


Figure 9.5 Perceptual map of relevant velar sounds, Karitiana speaker. Based on Chart 9.4.

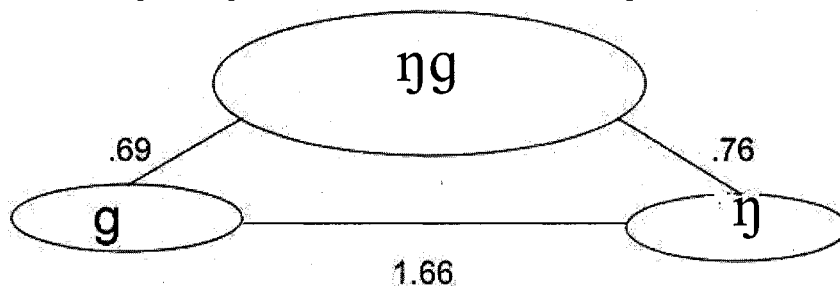


Figure 9.6 Perceptual map of relevant velar sounds, English speaker. Based on Chart 9.3.

Before discussing the patterns of perception reflected in the above perceptual maps, one possible objection to this study is worth addressing. A superficial inspection of the results of this study may give the impression that the Karitiana speaker simply did not perform the task with much accuracy. That is, he may have been at a disadvantage,

perhaps since he was relatively unfamiliar with this sort of activity. This, one might argue, may account for the different inter-speaker results. What should be stressed, then, is that the Karitiana and American subjects differed in their response patterns, not in their overall responding abilities. A close inspection of the confusion matrices listed previously suggests that, of the 189 noise-embedded stimuli perceived, the English speaker correctly categorized 109 of the tokens. The Karitiana speaker correctly categorized 97 of the tokens. However, the difference in number of correct responses overall was not even marginally significant. ($\chi^2=1.53$, $df=1$, $p<1$)

Perhaps the most insightful general comment to be made, based on the response patterns of the two subjects, is that the Karitiana speaker tended to mis-categorize pre-nasal stimuli. In fact, he only classified such sounds correctly in 18/63 occasions, while the American respondent classified them correctly on 45/63 occasions. (The difference here was clearly significant: $\chi^2=23.1$, $df=1$, $p<.001$.) Interestingly, the American respondent struggled with the categorization of plain nasals, which were categorized correctly on only 37/63 occasions, compared to 55/63 for the Karitiana speaker. (Again the difference here was clearly significant: $\chi^2=13.1$, $df=1$, $p<.001$.) These patterns in perception help to account for the above data. However, what we are most interested in is the difference between the perceptual maps for the Karitiana speaker, since they reveal the differences of perception among velar, alveolar, and bilabial sounds, in accordance with our initial objectives.

§9.5 Discussion

The results of the above study help us to better understand the categorization of the relevant sounds in the mind of the Karitiana subject.⁵¹ To better understand the results, it is worth mentioning some pertinent findings gleaned from other speech perception studies. One of the common findings of several noteworthy perception studies is the following: the native language of a speech experiment subject affects his/her categorization of phones. One of the best examples of this finding surfaces in Beddor and Strange (1982). In their study, Beddor and Strange tested the perception of nasal and oral vowels among Hindi, Thai, and English speakers. They discovered that, broadly speaking, Hindi speakers tended to make categorical judgements of nasality. Put simply, once a certain degree of velic aperture was perceived, the speakers categorized a vowel percept as nasal. In other words, the vowels generally fell into two categories, nasal or oral, for Hindi speakers, despite the fact that the percepts utilized by Beddor and Strange varied in a more scalar fashion. It is well established that Hindi has phonemic nasal vowels, while English does not. For this reason, it was significant that Beddor and Strange found that English-speaking subjects tended to perceive nasality in a more scalar and less categorical fashion. The researchers naturally hypothesized that this phenomenon was accounted for by the fact that English does not have phonemic nasal vowels. This study demonstrated, then, that the categorization of nasal percepts varied in accordance with the phonemic status of nasal vowels in the subjects' languages.

⁵¹ Of course, it is not *necessarily* the case that the results reflect the categorization of Karitiana speakers more generally. However, for the reasons given at the outset of this chapter, it was necessary at this point to rely on one Karitiana subject. Also, as I suggest in this discussion, the results are consistent with previous findings on language-specific effects on perception.

Other speech perception studies have been undertaken which relate even more closely to the discussion at hand. Harnsberger (2001) presented findings based on a speech perception study performed on speakers of Marathi, Punjabi, Malayalam, and English. This study also involved the categorization of nasal sounds. However, the nasal consonant percepts of Harnsberger's study varied according to place of articulation. One relevant discovery made during that study was that Malayalam speakers tended not to differentiate, perceptually, between coronal and alveolar nasals. Unlike the speakers of the other two languages in question, Malayalam speakers classified nasal percepts of these two POA's as the same sound. What is most noteworthy about this finding is that in Malayalam the alveolar and coronal nasals distribute in a nearly complementary fashion, despite the existence of some contrast between the two. (This observation is made in Johnson. [2003:167]) Harnsberger (2001) is another study, then, suggesting that the perception of nasality varies depending on the phonemic status of the relevant nasals in the subjects' languages.

Relevant findings have also been made vis-à-vis the perception of other, non-nasal phenomena. For instance, Huang (2004) presents a speech-perception study of tones, based on American English and Mandarin speakers. The results of that study suggest that two tones found in Mandarin, 35 (rising) and 214 (dipping), are perceived to be more similar by the Mandarin speakers than by American English speakers. The motivation for this seems to be a phonological relationship between the two tones in Mandarin, since tone 214 is converted to tone 35 in a certain environment⁵². Since in that

⁵² Prior to another dipping tone.

environment the tones no longer contrast, the tones seem to be found closer to each other in the perceptual space of Mandarin speakers.

One final study that is worth mentioning here is Pan (2004), which includes the results of a categorization study, based on Taiwanese subjects. In Taiwanese, Pan notes, voiced stops, while contrastive with nasal consonants in certain environments, are “nasalized when preceded by a nasal consonant across a word boundary.” (2004:267) In other words, in many word-initial contexts there is no phonetic difference between the putative voiced stops and the nasal consonants. This fact seems to help account for Pan’s finding, based on a “concept formation” experiment, that “Taiwanese listeners grouped homorganic voiced stops and nasal stops into the same category.” (267) The distributional evidence suggests a reduced contrast between the two sound categories, and this fact seems to effect the perception of the sounds by Taiwanese speakers.

The reason that the above studies have been mentioned is that they share a common thread, a thread that can assist us in our interpretation of the Karitiana data. The common thread in the findings of the studies is the following: language-specific differences in speech perception seem to result in large part from the levels of contrast of the relevant phones in the given languages. That is, given two or more related sounds, speakers of languages with allophonic or near-allophonic relationships between sounds tend to exhibit less perceptual distances between the sounds. If this common thread of the findings were to surface in our data, we would expect that the Karitiana speaker would have less perceptual acuity, vis-à-vis the prenasal and voiced stop segments, when contrasted to the English speaker. Furthermore, we might predict, based on these previous findings, that sounds that are phonemic or are approaching phonemic status

would exhibit greater perceptual distances between them, when contrasted to the distances between sounds with strictly allophonic relationships. Applying *this* expectation to our data, we would predict that, if in fact the alveolar and bilabial voiced stops are gaining phonemic status, they should exhibit greater perceptual distance, when contrasted to their homorganic prenasal counterparts, than the distance exhibited between the velar stop and velar prenasal.

As a close inspection of the perceptual maps provided in Figures 9.1-9.6 suggests, both of the above expectations based upon previous findings on speech perception are generally borne out in our data. The first expectation, that the Karitiana speaker should be less able (when contrasted to the control subject) to discern between prenasal and voiced stop segments, is evident when we contrast Figures 9.1, 9.3, and 9.5 with Figures 9.2, 9.4, and 9.6, respectively. In the case of each place of articulation, the Karitiana speaker demonstrated less perceptual acuity vis-à-vis the prenasal and voiced stop sounds. The Karitiana speaker more frequently confused all three relevant sound pairs: [nd]-[d], [mb]-[b], and [ŋg]-[g]. (Recall that this greater rate of confusion with respect to these sounds is *not* due to a significantly greater overall confusion rate for the task.) This finding is consistent with the fact that [d], [b], and [g] are in near-complementary distribution in Karitiana, with respect to their homorganic nasal and prenasal counterparts. Obviously this is not the case in English in which the three voiced stops have phonemic status. Therefore, we expect greater perceptual distances to exist between the relevant sounds, for the English subject. This expectation is met by the data.

Our second expectation is also borne out. This expectation is that, for the Karitiana speaker, the three relevant phones ([b], [d], [g]) should differ from each other in

terms of how perceptually close each sound is to its homorganic prenasal counterpart. If we examine Figures 9.1, 9.3, and 9.5, we see that the Karitiana subject distinguished between [d] and [nd], as well as between [b] and [mb], with much greater ease than he distinguished between [g] and [ŋg]. In fact, in the latter case the Karitiana speaker more frequently mis-identified the two percepts than identified them correctly. (Hence the negative distance between the two phones in the perceptual map.) This is the sort of finding we would expect, based on previous perception studies, if our diachronic account in the previous chapter is correct. Recall that we suggested that the distributional evidence points to the fact that [g] is less further along in its progression towards phonemic independence, when contrasted with [d] and [b]. Now we see that the Karitiana speaker seems to categorize [g] with [ŋg].⁵³ However, there is less perceptual evidence for the categorization of [b] with [mb] or [d] with [nd].

In considering the perceptual distance between voiced stops and homorganic prenasals for the Karitiana speaker, we see that the distance is greatest between [d] and [nd], and least between [g] and [ŋg]. While this is consistent with our expectations, one could argue that this fact is somehow coincidental, resulting perhaps from the nature of the sounds themselves rather than from any language-specific phenomenon. That is, it is possible that velar prenasals and velar voiced stops are simply more confusable, for acoustic reasons, than alveolar prenasals and alveolar voiced stops. There are two points that contradict such a claim however. First, as is apparent in Figures 9.2 and 9.6, the English speaker was able to distinguish between the relevant velar ([g]-[ŋg]) sounds at

⁵³ Interestingly, both of these sounds were not frequently confused with the velar nasal. This seems inconsistent, since, if all three phones are allophones of /ŋ/, we might expect greater confusability between all three sounds. It is unclear why this would be the case, though it seems to result in part from the already-mentioned fact that the Karitiana speaker was better at distinguishing the nasal consonants more generally.

roughly the same rate as she was able to distinguish between the relevant alveolar ([n]-[nd]) sounds. This suggests that the Karitiana subjects' responses cannot be simply attributed to some greater acoustic similarity between [g] and [ŋg], when contrasted with [d] and [nd]. The second point that supports the claim that the relevant perceptual patterns are not coincidental relates to another perceptual pattern, which surfaced in a brief follow-up experiment to this study and is discussed in the following paragraphs.

Having sketched the perceptual maps in Figures 9.1-9.6, it seemed that another prediction could be made, based on my account. If [d] is really further along its diachronic path of divergence, when contrasted to [g], it should exhibit greater perceptual distance from [t] as well, when contrasted to the perceptual distance between [g] and [k]. In §3.1 I presented evidence suggesting that the voiceless stops of Karitiana, /p/, /t/, and /k/, are frequently voiced in coda position. Based on this observation we know that [d] and [g] sometimes surface as allophones of /t/ and /k/, respectively. If our interpretation of the above speech perception data is correct, we should also predict that the perceptual distance between [g] and [k] is less than that between [d] and [t], for the Karitiana speaker. That is, if the [d] phone is really splitting from /n/, its greater phonemic independence should be reflected in its relationship with the other phoneme, /t/, that it is subsumed by.

To test this prediction, I performed a short follow-up speech perception experiment with the same two subjects and the exact methodologies of the previous study. However, in this case the speakers were only exposed to 60 noise-embedded stimuli. The stimuli consisted of voiced or voiceless stops, which were again followed by [a]. After hearing each noise-embedded stimuli, the subjects were asked to choose which

of *two* following syllables with homorganic stops—one voiced and one not—were most similar to the noise-embedded stimulus syllable. Perceptual maps (containing only two points, since there were only two choices for each stimulus) were then drawn based on the results. Interestingly, both the Karitiana and English speaker demonstrated an identical amount of perceptual distance between [d] and [t]. Significantly, however, the Karitiana speaker demonstrated greater perceptual proximity between [g] and [k], when contrasted to the distance between [d] and [t]. This proximity does not seem to be the result of the acoustic qualities of the sound in question, since the English speaker's responses suggested much *greater* perceptual distance between [g] and [k] than between [d] and [t]. All of these observations are apparent in the following two figures:

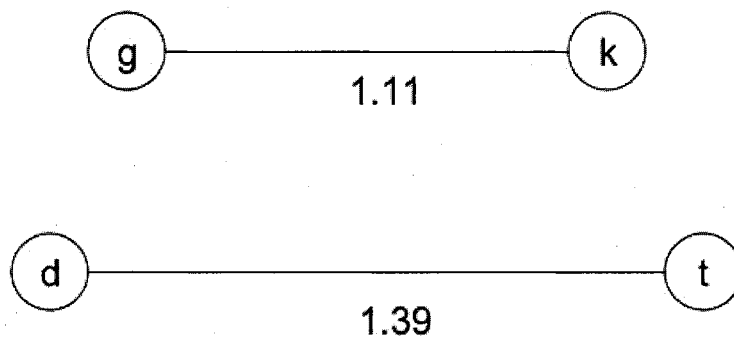


Figure 9.7 Perceptual distances between two pairs of voiced and voiceless stops, Karitiana speaker.

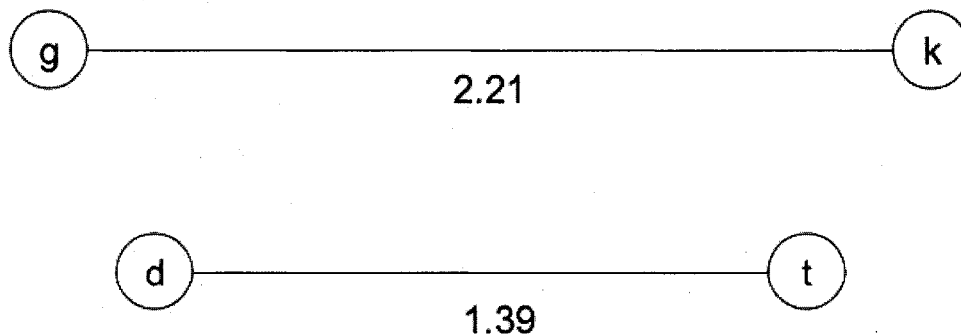


Figure 9.8 Perceptual distances between two pairs of voiced and voiceless stops, English speaker.

The findings presented in this chapter are remarkably consistent with our expectations, and seem to generally corroborate the diachronic account presented in the

previous chapter. The perceptual evidence, much like the distributional and comparative evidence, is consistent with the suggestion that [d] is splitting from /n/. This is supported by the fact that the Karitiana speaker perceives [d] to be quite different from [n]. (Contrast Figures 9.1 and 9.5.) To a lesser extent, the perception data are also consistent with the suggestion that [b] is splitting from /m/. This is supported by the fact that the Karitiana speaker perceives [b] to be quite different from [m]. (Contrast Figures 9.3 and 9.5) When contrasted to these two voiced stops, [g] appears to be more closely affiliated with its homorganic nasal counterpart and presents less evidence, both perceptual and distributional, of a split. (Contrast e.g. Figures 9.5 and 9.6) The lack of phonemic status in the case of [g] is also supported by the confusability of [g] with [k]. (See Figure 9.7)

Based on all of the relevant findings discussed in this and the previous chapter, it appears that /d/ and /b/ phonemes are arising in Karitiana, due to “secondary splits” (Bynon 1977:77) in the language. One could even choose to refer to these sounds as “incipient phonemes,” as was first suggested by Chart 2.2.

Common phonological processes

§10.1 Vowel epenthesis and stop lenition

Two important processes operating in Karitiana phonology are vowel epenthesis and stop lenition. Landin (1978) and Storto (1999) present discussions of these phenomena, and for that reason they will not be discussed in depth here. Nevertheless they surface in my data and should at least be touched on for the sake of comprehensiveness (and convenience for the reader). The discussion of these phenomena and most of the others mentioned in this brief chapter are framed by the findings in the literature. In other words, I present little elaboration of the previous findings, except in those cases where discrepancies with my data arise. However, §10.6 presents a novel examination of the non-productive reduplication found in Karitiana. This process of reduplication has not been mentioned in the literature.

The rule of vowel epenthesis is mentioned tangentially, but not formalized, in §6.1 above. Storto suggests that vowel epenthesis occurs “between a root ending in a [-cons, -nas] consonant and the consonant-initial suffix *-pa*”. Examples of this epenthesis in my data include the following:

- | | | | |
|------|---|------|--|
| 10.1 | /bik/ + /pa/
sit + NOM
[bikipa]
“chair/bench” | 10.3 | /hot/ + /pa/
walk.pl + NOM
[hotopa]
“place where people have passed by” |
| 10.2 | /keʔon/ + /pa/
cold/cool + NOM
[keʔonpa]
“fan” | 10.4 | /kat/ + /pa/
sleep + NOM
[katapa]
“place to sleep/bed” |

The [keʔonpa] example is also found in Storto (1999:52). Other examples of this phenomenon could be adduced, but the most crucial aspects are apparent in these three examples. First, we see that the epenthesized vowel is of the same quality as that of the preceding vowel. Second, we see that epenthesis does not occur following nasal consonants, which are typically the only consonants allowed in coda position in Karitiana. (Though as we saw in Chapter 6, this is a generalization rather than a hard and fast rule.)

There are other cases in my data in which epenthesis appears to occur, however it is unclear that the form of the word containing epenthesis contains any morpheme boundaries. Consider these examples:

10.5 /ep/ + sap
 "tree" + ?
 [epesap]
 "tree leaf"

10.6 ej + po
 dirt? + ?
 [ejepo]
 "stone"

In these examples the resultant forms, *epesap* and *ejepo*, appear superficially to have epenthesized *e* vowels. However, both of these resultant forms are lexicalized compounds, and the putative suffixes leading to epenthesis, *-sap* and *-po*, are not productive. Epenthesis operates at morpheme boundaries, as in the case of the *-pa* suffix and the *-wak* desiderative suffix discussed in §12.6. This is concordant with Storto's findings as expressed above. Storto also suggests (1999:55) that there is a type of epenthesis operating in compounds, in which a vowel is epenthesized between two morphemes of a compound when their coalescence creates an environment for stress clash, and the first morpheme ends in a consonant. The previous two cases may exemplify just this sort of stress clash, occurring compound-medially. However, the morpheme status of the components of the compounds is unclear.

The process of consonant lenition is described as follows in Landin (1978:5.3), a guide to Karitiana for language learners. He notes that “Verbs which end with p, t, or k change when they are followed by a verb suffix commencing with a or i.” Storto postulates a much more wide-ranging lenition rule, which is implemented before all vowels, not just [a] or [i], and affects a greater range of target consonants. She suggests that the rule “affects [-continuant, +consonantal] codas by making them [+continuant, +voiced] when they are followed by a vowel-initial morpheme.” (1999:37) Since this rule affects all [-continuant] segments, it also results in the lenition of nasal consonants, e.g. $m \Rightarrow \tilde{m}$. I have not observed clear cases of such nasal lenition, however other cases are clearly evident in my data, specifically the lenition of the remaining [-continuant] segments, namely /p/, /t/, and /k/.

As Storto notes, the lenition in question occurs before all sorts of vowels, across morpheme boundaries and word boundaries. The following are clear examples of this lenition process:

- | | | | |
|-------|------------------------|---|------------|
| 10.7 | /opok/ + /ako/ | ⇒ | [opoyako] |
| | ‘white man’ ? | | ‘chicken’ |
| 10.8 | /saʔep/ + /otit/ | ⇒ | [saewotit] |
| | ‘leg’ ‘joint’ | | ‘knee’ |
| 10.9 | /taka-tat/ + /i/ | ⇒ | [takatari] |
| | ‘SAP-go.singular + FUT | | ‘will go’ |
| 10.10 | /a/ + /kisep/ + /a/ | ⇒ | [akisewa] |
| | IMP.INT + jump + IMP | | ‘jump!’ |

We see in these examples that the lenition process results in the following transformations: /k/⇒[ɣ], /t/⇒[r], and p⇒[w]. These occur preceding word or affix boundaries, when a vowel follows the boundary in question.

The occurrence of this consonant lenition is seemingly exceptionless in those cases where the leniding environment is word-internal, e.g. before the future *-i* suffix and other affixes. However, when the leniding environment occurs *between* two words, the process sometimes occurs, as in [opoyako] above, and sometimes does not, as in the following elicited example:

10.11 /opok/ + /iso/ ⇒ [opok iso]
 'white man' + 'fire' ⇒ 'oven'

It is still unclear why lenition would occur in some cases, yet not in others. However, I think that examples such as the preceding hint at a possible explanation. The word [opoyaso] is a lexicalized compound. In fact, the second member of this compound is now semantically opaque. Chickens are now a common food of the Karitiana, and it is not surprising that this word, once consisting of two words, is now lexicalized. The word for 'oven' is likely less frequently-used, a point I will return to briefly. Both members of the sequence [opok iso] are semantically transparent, and it is not clear that the two words form a lexicalized compound.

It is a well-established fact that greater token frequency leads to greater reduction. There is a wide body of literature on this subject, which suggests that reduction is sensitive to token frequency (Hooper 1976b, Bybee 1985, *inter alia*), as well as other more subtle frequency patterns related to correlated syntactic constructions (Gahl and Garnsey 2004). One commonly-cited example of token-frequency effects relates to the deletion of post-stress schwa following /r/, /l/, or /n/ in English. By this process, the second vowel of *salary*, *celery*, *memory*, and *mammary* is often deleted. However, the rate of deletion in more frequent words such as *salary* and *memory* is much greater than the rate of vowel deletion in infrequent words such as *celery* and *mammary*. (Hooper

1976b) One plausible explanation for the Karitiana data is that a compound such as [opoyaso] owes its predictable lenition to its status as a frequent collocation. On the other hand, a compound such as [opok iso] does not exhibit lenition due to its relatively infrequent collocation⁵⁴. Another relevant observation is that the lexeme [opoyaso] *must* be pronounced in this fashion. When a Karitiana speaker was presented with [opokaso], he found this production unacceptable, correcting it to [opoyaso]. This suggests that the “lenition” in this case may not describe a synchronic state of affairs, through which [k] is reduced to [ɣ]. Instead, the process reflects a diachronic pattern whereby [k] came to be reduced to [ɣ] in this compound, perhaps due to its relatively high frequency. As a result, the velar fricative is now inextricably associated with this word, and the production of a velar stop in its place seems strange to the native speaker from whom the word was initially elicited. This is interesting as well since there is not yet a velar-fricative phoneme in Karitiana.

The suggestion that greater collocate frequency results in more predictable lenition is consistent with our expectations based upon the pressures of reduction due to token frequency. Of course, at this point this lone example is merely suggestive of reductive processes. I have yet to explore the effects of token or type frequency on Karitiana phonology, and any strong claims of frequency effects on consonant lenition must await such future explorations.

§10.2 Nasal assimilation

Storto notes that “When a morpheme-final oral stop is followed by a morpheme-initial nasal, a rule of assimilation applies according to which the place features of the

⁵⁴ This may be due, in part, to the existence of a synonym for ‘oven,’ [māndi].

former spread to the latter.” (1999:38) For instance, when the *-na* derivational suffix is added to a word, the place of the suffix-initial nasal varies according to the place of a preceding stop. Consider the following two examples:

10.12	ʔet	+	na	⇒	ʔe.dna	
	mother's child	+	ADJ		pregnant	
10.13	ʔop	+	na	⇒	ʔo.bma	
	hole	+	ADJ		pierced	(Storto 1999:38)

Nasal assimilation does seem to occur word-internally across morpheme boundaries. However, *-na* is apparently the only nasal-initial suffix in Karitiana, and I have not found examples of nasal assimilation operating across other morpheme boundaries. So, it seems that the nasal assimilation rule could also be considered a morphophonemic rule, specific to the *-na* morpheme. Nasal assimilation does not operate across word-level morpheme boundaries, as in the following example from my transcriptions:

10.14	se	-pip	naka-	hobma	-t	ōwā
	liquid	-ALL	NSAP	drown	-past	child
	'The child drowned in the water.'					

The emboldened nasal in this clause highlights a case of failed assimilation. That is, in this case, the alveolar nasal does not assimilate the place of the preceding stop of the intonational phrase. This and other similar examples suggest that nasal assimilation does not operate across word boundaries. In fact, it appears to be restricted to the *-na* suffix, as a morphophonemic process.

§10.3 Approximantization of /i/ and /o/

In some cases, the /i/ vowel in Karitiana is transformed into an approximant, [j]. This phenomenon surfaces when this vowel follows another vowel, with no intervening consonant, prior to a consonant. This approximantization does not occur in onset position, though [j] does surface in certain onsets, as an allophone of the palatal nasal

(see §4.4 above). Instead, palatalization is restricted to environments such as the following:

10.15 /koipa/ ⇒ [koj.pa] 'pineapple'

10.16 /eipat/ ⇒ [ej.pat] 'female'

Storto (39) suggests alternate transcriptions for these words: [ejpat] and [kojpa]. She postulates a rule that “transforms a high front vowel into a palatal stop between a vowel and a consonant.” Forms with palatal (actually, alveolo-palatal) stops also occur in my transcriptions, occurring in seemingly free variation with the approximant of the above forms. Apparently when this reduced form of the /i/ vowel is produced, the tongue blade is located very high in the oral chamber. Occasionally it makes contact with the palate, in which case [j] surfaces, and occasionally it does not, in which case the approximant [j] surfaces.

The unpredictability of this reduced vowel is underscored by the fact that it may also surface, albeit rarely, as a voiced palatal fricative. This has only been observed in a few cases, as in the following transcription where /aj/ is pronounced as [aʒ]:

10.17 [aʒ hor-a]
2PL.ABS go.PL-IMP
“You guys go.”

Another form of approximantization occurring in Karitiana applies to the /o/ vowel. The following three examples are cases demonstrating this process:

10.18 ĩn na- oki -t boroti
1S NSAP kill -Past paca
[ĩn **nawkit** boroti]
‘I killed the paca.’

10.19 a opiso an-o hĩ
2S.ABS hear 2S-Q Q
[**awpiso**]
‘Did you hear?’

10.20	a	okot
	PASS	bite
	[awkot]	
	'bitten'	

When /o/ becomes an approximant, it follows /a/ and precedes a voiceless stop.

The approximantization of /i/ and of /o/ occur in similar environments. Both reductive processes occur prior to stops and following vowels. The resultant approximant in each case occurs in coda position.

§10.4 Reduplication

There is a non-productive reduplication process evident in some Karitiana words.

The following list contains some clear cases I have of this process:

Reduplicated form	Gloss	Unreduplicated form	Meaning
terekterek	dance	terek	Walking (ideophone)
tómtóm	guitar	n/a	
ete?et	female's grandson	?et	Female's son
asoasok	riddled with arrows	asogŋ (?)	Make contact
harahara	lightning or mirror	N/a	
hokohoko	pealed	n/a	
hoho	run (ideophone)	n/a	
hōhō	yell	n/a	
okorokot	mythological character	okot	Bite?
siposipora	grated	sipo	Seed
takatakan	mix	n/a	
potpora	boil	n/a	
gojgojgoj	hit the water repeatedly	n/a	
tiptim	cough	n/a	
toptop	species of Ant	top (?)	Open
taktagn	swim	n/a	

Chart 10.1 Words with reduplicative patterns.

While the left-most forms in Chart 10.1 clearly exhibit patterns of reduplication, it is clear that the process is non-productive. In only four of the sixteen cases of reduplication is there a related base whose semantic relationship with the reduplicated form is readily apparent.

The reduplicated forms do exhibit semantic tendencies that can be extrapolated from the list as a whole. In general, we can say that verbal or participle forms containing reduplication typically represent motions involving repetition. This is evident in the glosses above. *Dancing, peeling, running, swimming, grating, coughing,* and *mixing* are all verbs of motion that are inherently imbued with the notion of repetition. The same is obviously true of a verb for ‘hitting water repeatedly.’ Even the majority of nominal forms in the above list can be said to involve the notion of repetition. For instance, the notion of ‘female’s grandson’ could be said to represent a ‘female’s son’s son.’ In a less transparent way, a word for a ‘species of ant’ may be seen to involve repetition, since ants are inextricably related to a notion of plurality. Finally, even the word for ‘guitar’ could be seen as being related to the notion of repetition, since playing a guitar involves an essentially repetitive motion.

Aside from this vague semantic categorization, there are other observations that can be drawn from Chart 10.1. In short, the forms in the chart allow us to draw observations on the *unmarked syllable* and *unmarked prosodic word* in Karitiana. McCarthy and Prince (1994) make the important observation that unmarked forms frequently surface in the reduplicated forms of a language. The unmarked forms surface in the *reduplicant* of the reduplicated *base*. The concepts of *reduplicant* and *base* are fleshed out by McCarthy and Prince (1994:6):

The *Reduplicant* R is the actual phonological projection of some reduplicative morpheme RED which has a phonologically-unspecified lexical entry. The *Base* b is the phonological material to which the reduplicant is attached—for reduplicative prefixes, the following structure, and for reduplicative suffixes, the preceding structure.

In a Karitiana word such as asoasok, then, the *reduplicant* is the underlined portion while the *base* is the remaining portion of the word.

McCarthy and Prince (1994), employing an OT framework (Prince and Smolensky 1993), suggest that the phonology of a particular language may exhibit a certain phonological constraint that is dominated in the vast majority of words and whose effects fail to surface in most cases. However, even in a language in which the constraint is “dominated” by another and therefore fails to surface in most cases, the effects of the constraint “can still be observed under conditions where the dominating constraint is not relevant.” (1994:1) Under such conditions, a structure that is unmarked with respect to the constraint emerges. This “**emergence of the unmarked** is quite conspicuous in the prosodic morphology of reduplication” (1994:1, original bold). The *emergence of the unmarked* in reduplicants occurs in languages that have a particular constraint that is outranked by Faithfulness⁵⁵, and therefore is frequently violated throughout the language, yet outranks Max⁵⁶, and therefore surfaces in reduplicants.

Many of the cases of emerging unmarkedness relate to syllable structure. For instance, consider the following three examples of Nootka reduplication, taken from McCarthy and Prince (1994:10), based on Stonham (1990:19,131):

10.21	ʔu-	ʔu-	'i:h	'hunting it'
10.22	ci-	cims-	'i:h	'hunting bear'
10.23	ta:-	ta:kwa-	'i:h	'hunting only that'

In the second example, we see that the reduplicant *ci-* contains no coda despite the fact that the reduplicated syllable of the base ends in a consonant. In general, reduplicants in Nootka contain only the CV or CV: structure of the following syllable of the base, but not the following consonants. In other words, the CV syllable structure appears to be the unmarked syllable structure, and emerges in reduplicants.

⁵⁵ A constraint dictating “identity between input” (resulting from GEN) and “output” (resulting from the constraint ranking).

⁵⁶ A constraint dictating that every element of the base has a corresponding element in the reduplicant.

The unmarked structure of prosodic words (rather than simply the unmarked syllable or foot structure)⁵⁷ in a language may also surface in a reduplicant. For instance, McCarthy and Prince (1994:16) highlight the following pattern of reduplication in Diyari,⁵⁸ an Australian language:

10.24	wila-	wila	'woman'
10.25	kulku-	kulkuja	'to jump'
10.26	tjilpa-	tjilparku	'species of bird'

What we observe in the case of these Diyari examples is the predilection of reduplicants for disyllabic prosodic words, ending in open syllables. Put simply, the reduplicants reflect the unmarked structure of a prosodic word in Diyari.

Given the crosslinguistic tendency towards the emergence of unmarked syllables and prosodic words in reduplicants, we should consider whether this tendency surfaces in the reduplicants of Karitiana. An inspection of reduplicated forms suggests that it does. Consider first the following reduplication tokens (taken from Chart 10.1) with monosyllabic bases:

	<u>Reduplicant</u>	<u>Base</u>	
10.27	tõm-	tõm	'guitar'
10.28	ho-	ho	'run' (ideophone)
10.29	hõ-	hõ	'yell'
10.30	tip-	tim	'cough'
10.31	top-	top	'species of ant'
10.32	tak-	taŋ	'swim'

We see in these cases that reduplicants copy the entire syllable structure of monosyllabic bases. That is, if a base consists of one CV syllable, the reduplicant is also one CV syllable. If a base consists of one CVC syllable, the reduplicant also consists of one CVC

⁵⁷ Prosodic words are generally defined as the units to which phonotactic rules, stress rules, and segmental word-level rules apply. (See McCarthy and Prince 1994:16.)

⁵⁸ In Diyari, the reduplicants are characterized as prosodic words since they carry primary stress, just as the base does. Also, prosodic words in Diyari are necessarily vowel-final, and the fact that reduplicants must also be vowel-final further supports the suggestion that they are prosodic words. (See McCarthy and Prince 1994:16.)

syllable. Based on these examples alone, there is no evidence that either CV or CVC represents the unmarked syllable type in Karitiana.

Another more subtle pattern also surfaces in these data. Consider the forms *tiptim* ‘cough’ and *taktaŋ* ‘swim.’ Note that in these cases the reduplicant consists of a CVC syllable, much as the base does. However, the second consonant of the reduplicant does not replicate exactly the second consonant of the base. In both of these cases, the features for voicing and nasality of the consonants in question do not match. It appears that, when a CVN base is reduplicated, the reduplicant consists of a CVC_x sequence where C_x is a voiceless stop.⁵⁹ However, in at least one case the entire CVN base *is* reduplicated: [tōmtōm], ‘guitar.’⁶⁰ This suggests that the co-occurrence of CVC_x reduplicants and CVN bases is a *tendency* rather than the predictable output from a rigid set of constraints.

While the monosyllabic reduplicants do not provide evidence for the unmarked status of either CV or CVC, polysyllabic reduplicants do provide evidence for a particular unmarked structure of the prosodic word in Karitiana. Consider the following reduplication tokens (from Chart 10.1 above):

10.33	hara-	hara	‘lightning’
10.34	aso-	asok	‘riddled with arrows’
10.35	sipo-	sipora	‘grated’
10.36	hoko-	hoko	‘pealed’
10.37	taka-	takan	‘mix’

All of the reduplicants in the above list share a common prosodic template: (C)VCV.

This template is maintained in these examples, even if the template of the base consists of

⁵⁹ This fact calls to mind a similar phenomenon in Makassarese (McCarthy and Prince 1994:33), in which base nasals may be replaced by a glottal stop in the reduplicant.

⁶⁰ It is unclear how exceptions such as this one could be handled by one OT ranking. They would not be amenable to a ranking similar to that presented by McCarthy and Prince for the Makassarese data, for instance. (In the case of that language, M&P account for the presence of nasals in some reduplicants by suggesting that the No-NAS constraint is ranked below R=ROOT.)

alternate forms such as CVCVC (*takan*) and CVCVCV (*sipora*). Based on these examples, we might claim that an unmarked prosodic template exists in Karitiana. That template, consisting of a (C)VCV sequence, surfaces in some reduplicants.

However, other evidence appears to contradict such a parsimonious analysis. We must also consider the following forms:

10.38	okor-	okot	mythological character
10.39	pot-	pora	'boil'
10.40	terek-	terek	'dance'

In these examples, the reduplicant in each case ends in a *closed* syllable. The latter two examples are particularly relevant, since in these cases the base of the word consists of a CVCV and CVCVC sequence, respectively. Based on the previous polysyllabic bases considered, we might expect the reduplicants in this case to consist of CVCV sequences. However, we see instead that in the case of *potpora*, the reduplicant consists of a CVC sequence, and in the case of *terekterek*, the reduplicant consists of a CVCVC sequence. While it appears, then, that the unmarked prosodic word in Karitiana consists of a CVCV sequence, which emerges in reduplicants, the evidence is mixed. The cases just considered suggest that there is a *tendency* toward a certain unmarked prosodic word template. However, there are exceptions to this tendency, much as there are exceptions to the tendency for coda nasals in the base to be reduced to voiceless stops in the reduplicant. These sorts of exceptions are not facily amenable to an OT-oriented account in which the surface tokens must be accounted for via a particular ranking of constraints. (The exceptions are also not amenable to a stress-oriented account.)

The investigation of reduplication has been a fecund field for optimality theory. Many studies have been promulgated that demonstrate the virtues of an OT framework

for parsimoniously accounting for reduplication data. It is worth stressing, then, that studies such as that of McCarthy and Prince (1994) are typically based upon a smattering of examples from various languages. For instance, M&P (1994) consider data from Nootka, Balangao, Timugon, Makassarese, and Indonesian. However, in the case of each of these languages no more than a few examples of reduplication are considered, after which an OT ranking consistent with these examples is often provided. Based on the Karitiana data we have considered, we could also provide a set of similar examples of a certain characteristic of reduplication, all of which would be entirely consistent with one particular OT ranking. For instance we might only consider the consistent examples of CVCV prosodic word structure emerging in reduplicants as the unmarked word structure. However, once *all* of the examples of reduplication are considered, we find that no particular generalization or OT ranking can account for all of the Karitiana reduplicants.⁶¹ So, while it would be a fairly straightforward endeavor to derive an OT ranking that accounts for some of the Karitiana cases of prosodic word reduplication (for example), any such ranking would be forced to overlook various exceptional cases.

The above data suggest simply that reduplicants in Karitiana are characterized by certain *tendencies*, though their form is not totally predictable. Such a finding is consistent with an exemplar-based model of phonology, in which phonological patterns, including similar reduplicant forms, are based upon analogical extension and perceptual/articulatory motivations, rather than hard-and-fast rankings (or rules).

In the Karitiana data, then, there is at least one pattern that superficially appears to demonstrate the *emergence of the unmarked* phenomenon vis-à-vis the prosodic word.

⁶¹ One wonders if this is also true of reduplicants in Nootka, Timugo, and Balangao, for example.

However, when a complete set of reduplication data is examined, we see that this pattern merely reflects *tendencies* in reduplicant forms, rather than an unequivocal instantiation of the *emergence of the unmarked* phenomenon.

Volume II

Patterns in Karitiana: Articulation,
Perception, and Grammar

Caleb Everett
Rice University

Part II

Patterns in the grammar:
Basic morphosyntax, grammatical
relations, and voice phenomena

Introduction to Part II

§11.1 The aims of Part II

Linguistic field work can provide insights into the articulatory patterns common to a given language's speakers, the perceptual patterns common to those speakers, as well as the basic morphosyntactic patterns evinced by the language of those speakers. Field work often focuses primarily on gestural phenomena, i.e. phonology from the perspective of production and morphosyntax from the perspective of utterances. In the first part of the dissertation, I sought to describe basic gestural patterns (via e.g. locus equations and the study of spectral tilt), but I also sought to describe perceptual patterns vis-à-vis one of the more fundamental aspects of the Karitiana sound system, variable velar lowering. However, the first part of the dissertation, given its focus on phonetics, had very little to say about the *conceptual* patterns reflected in the grammar of the language. Along with morphosyntactic description, one of the principal aims of this part of the dissertation is to describe conceptual patterns that seem to be distilled in the language's morphosyntax.

Many researchers sharing a functional-cognitive approach to morphosyntactic data have acknowledged the manner via which grammatical relations and voice alternations reflect basic conceptual patterns, reflected in the grammar of a given language. (Cf. Langacker 1987, 1991, 2002, Shibatani 2005, *inter alia*.) Therefore, it follows that a work interested in uncovering basic cognitive patterns reflected by Karitiana grammar should focus on grammatical relations (henceforth GRs) and voice

patterns in the language. This is not to suggest that GRs and voice are the only areas that reflect basic cognitive patterns reflected in Karitiana grammar. However, as the analyses contained in Chapters 15-16 demonstrate, these areas are in fact fecund sources for revealing basic cognitive schemas associated with construction types the language. As we will suggest then, the conceptual patterns to be considered generally relate to Karitiana speakers' construal of the origin, development, and termination of a given described action (Cf. Shibatani 2005).

In order to describe GR's and voice alternations in Karitiana, the wider morphosyntactic context of Karitiana must be appreciated. For instance, given the relevance of the verbal morphological paradigm to GR's and voice, it would be imprudent to describe GR's and voice without also providing the reader with a description of Karitiana verbal morphology. In Chapters 12-14 I provide the reader with an examination of the basic morphosyntactic "context" of Karitiana. One of the goals of this morphosyntactic sketch, then, is to provide a foundation for the remaining chapters of Part II, introducing much of the relevant morphology and syntax. However, this is not the only goal of these chapters and many of the phenomena discussed in chapters 12-14 do not necessarily relate to GR's and/or voice. The aim of the chapters is also to simply describe Karitiana morphosyntax in a way that is amenable to interested linguists, curious about various topics in the language. I should note from the outset that some of the phenomena described in these chapters have received attention in the literature. For instance, many basic morphological forms in Karitiana are described in Landin (1978,1984). Some of these forms are also evident in the glosses of Storto (1999, 2003). Both of these authors' works contain at least some discussions of syntax as well.

However, none of the previous studies on Karitiana contain basic morphosyntactic sketches, and many of the phenomena addressed in chapters 12-14 are not addressed in previous studies, or are not adequately addressed. For instance, it seems that many of the preceding analyses of basic verbal morphology are inadequate to one extent or another. In all cases, the analyses found here are mine, are based on my data, and, therefore, I am solely responsible for any inconsistencies in the presented accounts. Also, I should note that the treatments of some aspects of Karitiana morphosyntax are particularly abbreviated. This is the case when a particular aspect of Karitiana morphosyntax has already received more detailed attention in the literature, e.g. in Landin's and Storto's discussions of object-focus constructions (cf. Chapter 14). Other aspects of the language, e.g. basic verbal and nominal morphology, receive greater attention here since they are crucial aspects of Karitiana morphosyntax that receive insufficient attention in the literature.

§11.2 A note on the transcriptions in Part II

In Part I, narrow phonetic transcriptions were employed, since this facilitated the discussion of phonetic and phonological phenomena. In this section of the dissertation, I employ a broad phonetic transcription system, since certain phonetic details (e.g. the unreleased nature of word-final voiceless stops) are not relevant. I employ a broad phonetic transcription system, rather than a strictly phoneme-based system, since as we saw in Part II the status of certain allophones of the nasal consonants is unclear. For that reason, I felt it important to represent the variation of the relevant allophones of these nasal consonants, by employing a broad phonetic transcription.

§11.3 Methodological unity of Parts I and II

As the title of this dissertation suggests, the overarching goal of this work is to describe basic articulatory, perceptual, and morphosyntactic patterns in Karitiana. Such a goal entails an empirically-oriented approach to linguistic data. By that, I mean that the basic approach of this study is to examine the actual speech behavior/performance of Karitiana speakers, rather than their “competence.” (Chomsky 1965) As a result, the following pages do not contain many of the syntactic transformations and movement rules that characterize many of the studies of Amazonian languages, most of which fall within the generative tradition. The focus of this study is different in that the empirical speech data themselves are considered the ultimate object of analysis. As Port and Leary (2005) suggest:

In a linguistics committed to the physical world (rather than to some Platonic heaven), language needs to be naturalized so as to fit into a human body. That implies, first of all, casting it into the realm of space and time. It requires changing our focus of attention from our preconceived views of the form of linguistic knowledge toward the study of linguistic behavior and performance.

While Parts I and II are superficially quite different from each other, given their subjects of inquiry, they are united by the common goal of describing the actual linguistic behavior of the Karitiana. Furthermore they form a cohesive unit in that only together can the two parts describe the basic articulatory, perceptual, *and* morphosyntactic patterns that surface in Karitiana speech.

Verbal morphology

§12.1 Background to verbal morphology

§12.1.1 Terminology adopted

The notion of valency has wide-ranging effects on the morphosyntax of Karitiana. As we will see in the remainder of Part II, there are various valence-related verbal prefixes in Karitiana. These prefixes occur closer to the verb root than other prefixes, such as person agreement markers. In this sense, Karitiana is fairly typical of Tupí languages and Amazonian languages more generally. As Dixon and Aikhenvald (1999:9) suggest in their introduction to an extensive survey of the languages of this region:

If there are several prefix positions, the bound pronominal prefix(es) will typically appear further from the root than prefixes that mark valency-changing derivations (e.g. causative, applicative).

The prevalence of valence morphology in Karitiana, and in Amazonian languages more generally, is in some ways unremarkable typologically, given the prevalence of valence-related morphology in the world's languages. Bybee (1985) notes that over ninety percent of the languages in her survey have some morphological instantiation of valence marking, making valence the most frequent type of verbal affixation uncovered, with greater rates of occurrence crosslinguistically than categories such as tense and aspect.

As we will see in the discussion of verbal morphology in this chapter, verbal valence inflection is one of several phenomena that reflects the influence of semantic

valency on Karitiana morphosyntax. The most crucial valency distinction in Karitiana is the distinction between semantically monovalent and semantically polyvalent verbs. This distinction plays a prominent role in phenomena such as the formation of imperatives, the formation of interrogatives, and the formation of negative clauses. Not surprisingly, it also plays a prominent role in the establishment of grammatical relations.

Given the importance of the distinction between semantically monovalent and multivalent verbs, as well as the distinction between intransitive and transitive clauses in Karitiana, it is important to be clear about the terms related to these distinctions, as they are employed throughout Part II. It is particularly important to be clear about the distinction between semantic transitivity and syntactic transitivity. As Payne (1997:171) suggests:

Unfortunately, in the past linguists have not always been careful to distinguish semantic transitivity from grammatical transitivity. So, for example, there are some who would say eat is always a transitive verb. These linguists use the term transitive in the sense we use the term "semantically transitive." Others would say eat is sometimes transitive and sometimes intransitive. These linguists are most likely referring to syntactic transitivity.

To avoid confusion, when referring to valency and transitivity as semantic concepts, I will employ the terms semantic valency and semantic transitivity. When referring to intransitivity and transitivity as syntactic concepts, I will refer to syntactic intransitivity and syntactic transitivity. To further clarify how these terms are employed, given their relevance to the discussion below, consider the pithy definitions in the following paragraph:

...we will consider semantic properties to be properties of the conceptual representation of things and events in the message world, and syntactic properties to be properties of linguistic elements in sentences. From this perspective, the semantic valence of a verb, V, refers to the number of necessary participants in the scene expressed by V. Syntactic valence, then, is the number of verbal arguments in a clause in which V is the main predicator. (Payne 1997:173)

According to the definitions adhered to in this work, then, a semantically bivalent verb such as “eat” is semantically transitive. In some cases, this semantically transitive verb may be used in syntactically intransitive clauses (e.g. “He ate.”), but generally a semantically transitive predicate is expected to occur in syntactically transitive clauses (e.g. “He ate a banana.”).

Semantic valency and syntactic valency are correlated, given the obvious relationship between the “necessary participants in the scene expressed” by a verb and the number of “verbal arguments in a clause” in which the same verb is the main predicator. The classification of clausal arguments via grammatical relations in Karitiana, which will be discussed in Chapter 15, is based in large part on the semantic valency of the clausal predicate. Semantic valency, and more specifically the general semantic roles associated with particular verbs, is interrelated with the notion of so-called preferred argument structure. Since these concepts play such a prominent role in Karitiana morphosyntax, it is also worth clarifying the nature of “preferred argument structure.” As a clarification, consider the following excerpt:

The systematic mapping between these two parallel systems—semantic roles and grammatical relations (GRs)—lies at the core of the grammatical structure of simple clauses. The characteristic cluster of semantic roles of each verb have their ‘preferred’ mapping into grammatical relations in the simple clause. This is what some people call *preferred argument structure*.⁶² (Givón 2001:106-107)

Preferred argument structure, then, refers to the alignment of semantic role types, which are based on verbal semantics, with morphosyntactically delineated argument types, e.g. subjects and objects.

⁶² I should note that preferred argument structure, as defined here by Givón, differs markedly from the “preferred argument structure” introduced in DuBois (1987), which is oriented according to discourse-pragmatic factors, unlike the semantically-oriented definition adopted here. For a critical re-evaluation of preferred argument structure, in the discourse-pragmatic sense of DuBois (1987), see Everett (2004).

The above definitions of semantic valency, semantic/syntactic transitivity, and preferred argument structure are adopted simply to add clarity to the discussions in Chapter 12, and Part II more generally, which appeal to these notions. In the discussions below, I will generally use unambiguous terms such as semantic intransitivity and semantic transitivity. When the term transitivity is used in isolate below, it serves as a general reference to both semantic and syntactic transitivity.

§12.1.2 An overview of argument structure in Tupí languages

By way of relief for the discussion of Karitiana verbal morphology (and morphosyntax more generally), which as I have noted exhibits the pervasive influence of valency, transitivity, and argument structure, it is worth considering relevant findings from related languages. As Dixon and Aikhenvald (1999:8) note, Amazonian languages tend to be agglutinating and head-marking. Not surprisingly this is true of Tupí languages. Basic argument structure and semantic valency play a prominent role in the head-marking morphology of Tupí languages. In speaking of the approximately two dozen languages in the nine branches of Tupí (setting aside for the minute Tupí-Guaraní, the largest branch of Tupí), Rodrigues notes that “They typically have one pronominal prefix to the verb indicating a core argument and may also have a prefix that marks change in valency.” (1999:114) Core arguments are typically unmarked for case in Tupí languages (1999:115). All of these observations are generally accurate in the case of Karitiana.

In the forty-plus members of the Tupí-Guaraní branch, semantic valency also plays a large role in verbal morphology. These languages generally distinguish between semantically transitive and semantically intransitive verb types. (Jensen 1999:154)

Semantically intransitive verb types are usually separated into active intransitives and inactive intransitives. The way these verb types are distinguished morphologically is complex in many cases, typically involving variations in the pronominal crossreferencing attached to the verbs. Valency markers typically include transitivizing verbal prefixes, both for inactive and active intransitive verbs. (Jensen 1999:158) As in other Tupí branches, arguments of the predicate are not usually marked for nominative, accusative, ergative, or absolutive case. Case marking is not totally absent, however, since these languages do tend to mark core arguments, without distinguishing between them. Jensen (1999:148) notes that “In proto-TG, as demonstrated in many languages of the branch, any noun terminating in a consonant received a nominal case suffix *-a*, whenever it occurred in a subject, object or genitive function.” She notes as well that there were four oblique cases in proto-TG, judging from comparative data on Tupí-Guaraní languages.

What the findings in the literature generally suggest, then, is that semantic valency and the argument structure associated with particular verb types play a prominent role in Tupí morphosyntax. Particularly relevant to the discussion of Karitiana is the importance of the distinction between semantically intransitive and semantically transitive predicate types in these languages. The distinction between active semantically intransitive verbs and inactive/stative semantically intransitive verbs is important in some Tupí languages, particularly Tupí-Guaraní languages. This distinction, however, does not play a role in Karitiana morphosyntax.

Having considered the role of valency and argument structure in Tupí languages in very general terms, it is worth considering an overview of these phenomena in specific Tupí languages. Such overviews will assist in providing a reasonable background for, and

contrast with, the Karitiana data. In the following sections, I consider briefly the classification of verbs, largely according to semantic valency, exhibited in various languages. I also examine, in a very perfunctory manner, the basic mapping of verbal arguments with morphosyntactically-defined (via grammatical relations) argument categories. Several of the languages represented are from the Tupí-Guaraní branch of Tupí, since this branch is far and away the most well-represented in the linguistic literature. However, I also provide overviews of the relevant phenomena in the Sateré-Mawé and Mundurukú branches.

§12.1.2.1 Urubu-Kaapor

According to Jensens' classification of Tupí-Guaraní languages, Urubu-Kaapor is one of nine extinct or nearly-extinct languages forming subgroup 8 of Tupí-Guaraní. Judging from Kakumasu's (1986) description of the language, the distinction between active intransitive and inactive intransitive verbs does not play a prominent role in the establishment of argument types in Urubu-Kaapor morphosyntax, as it does in most Tupí-Guaraní languages. This is not to say that the semantic classification of verbs as active or stative does not surface morphologically. Kakumasu makes the following observation:

I shall refer to three clause types in Urubu-Kaapor, distinguished by the type of predicate they contain: declarative, stative, and equational. There is a subset of verbs I shall call statives, differing from declarative verbs in that they do not take the first and second person pronominal prefixes or the imperative prefix. (1986:326)

It is interesting that, in Urubu-Kaapor, the effects of verb categorization affect the sorts of person agreement markers occurring with a particular predicate. In fact, this appears to be one of the commonalities in the Tupí data surveyed here: the presence or types of person markers vary according to verb type.

Despite the presence of a distinction between stative and non-stative verbs in Urubu-Kaapor, the solitary arguments of stative intransitive verbs are treated like agentive nominals, excepting the fact that they are not cross-referenced with person markers on the predicate. For instance, verbs agree with these nominals in other ways, much as they do with other “subjects” (see Kakumasu 1986:327). In general, the core arguments of Urubu-Kaapor are classified so that the nominals of syntactically intransitive verbs are grouped with the more agentive of the two nominals occurring with a syntactically transitive verb. This classification is evident in the language’s case-marking system, for instance. Kakumasu notes that “The only element that might be considered a case marker is the suffix *ke*, which marks the object in a transitive clause when two nominals occur.” (1986:368) This claim suggests that the case marker *-ke* is sensitive to syntactic transitivity, since it does not occur whenever an argument occurs with a particular verb type, but only when it occurs in a syntactically transitive clause. In conclusion, then, Urubu-Kaapor argument classification is sensitive to syntactic transitivity. In this sense, it seems to differ from the other Tupí-Guaraní languages surveyed here, in which semantic transitivity/intransitivity seems to play a dominant role in the classification of argument types. Nevertheless, the classification of verb types according to the stative-active parameter does surface in Urubu-Kaapor as it does in most Tupí-Guaraní languages.

§12.1.2.2 Sateré-Mawé

The Sateré-Mawé language is spoken by approximately 6,000 people between the lower Tapajós and lower Madeira rivers, and forms its own subgroup of Tupí. (Rodrigues 1999:109) In Sateré-Mawé, verbs are generally classified as requiring active

or stative actors. The classification of arguments occurring with different verb types is evident by the person agreement markers prefixed to the verb. One set of markers is used to refer to agentive-like arguments, and another set is used to refer to stative-like or patientive-like arguments. In their study of personal prefixes in Sateré-Mawé, Graham and Harrison (1984:177) make the following relevant observations:

Membros do Conjunto 1 de prefixos pessoais são empregados para marcar: a) a pessoa do sujeito dos verbos transitivos; b) a pessoa do sujeito dos verbos intransitivos...

Os membros do Conjunto de Prefixos 2 marcam: a) o objeto dos verbos transitivos; b) o sujeito dos verbos descritivos; c) o possuidor dos substantivos e das expressões verbais nominalizadas...

Translation:

Members of the first set of personal prefixes are employed in order to crossreference a) the person of the subject of transitive verbs; b) the person of the subject of intransitive verbs...

Members of the second set of personal prefixes cross-reference a) the object of transitive verbs; b) the subject of descriptive verbs; c) the possessor of nominals and nominalized verbs...

By “descriptive verbs,” Graham and Harrison appear to refer to a set of stative-type verbs (though not all stative-type verbs, see 1984:186). For instance, consider the following example of a verb prefixed with **u-**, a 1st singular marker:

12.1 u-i-kahu
 1.SG-Class1-attractive
 “I am attractive.” (1984:188)

The **u-** prefix may also be used to cross-reference patient type nominals in semantically transitive clauses, e.g.:

12.2 u-h-enoi
 1.SG-ClassH-teach
 “I am taught.” (1984:179)

When the person cross-referenced on the verb is an agent-like nominal of a semantically transitive verb, a different set of person markers is used. Note in the following example, with the same verb used in 12.2, that the 1st singular marker changes:

12.3 a-h-enoi
 1.SG-ClassH-teach
 “I teach.” (1984:178)

The **a-** 1st singular prefix in this example is also prefixed to semantically intransitive verbs, though not descriptive-type verbs such as in example 12.1.

Based on Graham and Harrison's study it is clear that the classification of verbs, according to basic semantic factors, plays a prominent role in the grammar of Sateré-Mawé. It is worth stressing that arguments are classified according to verbal semantics, rather than syntactic valency. So, for example, in clause 12.3 the 1st singular prefix **a-** is used to cross-reference a transitive "sujeito" (subject), even though this clause, like other similar clauses provided by Graham and Harrison, is syntactically intransitive.

Based on this Sateré-Mawé data, we can conclude that, in this language, verbs are classified as semantically transitive, non-descriptive intransitive, and descriptive-intransitive. In the case of the first type of verb, co-occurring arguments may be marked as patient-like (e.g. with **u-** in 12.2) or agent-like (e.g. with **a-** in 12.3). In the case of the second verb type, the co-occurring arguments are marked as agent-like. In the case of the third verb type, co-occurring arguments are marked as patient-like or "objetos" (objects).

§12.1.2.3 Guajajara

Guajajara is spoken by approximately 10,000 people in northeast Brazil, and is classified as part of subgroup 4 of Tupí-Guaraní according to the genetic classification found in Jensen (1999:131). In Guajajara, "Verbs and verbal pieces are classified as transitive, intransitive, or stative because they fall into three such sub-classes which are mutually exclusive in membership, and because of their occurrence with these sets of pronominal prefixes." (Bendor-Samuel 1972:89) Transitive verbs are classified as such because they are permitted to occur with the "sentence element object," while intransitive and stative ones may not. Since the transitive verbs are not *required* to occur with a

“sentence element object,” it seems that the transitivity being discussed is semantically-oriented, rather than strictly syntactic.

Arguments in Guajajara are cross-referenced on the verb. Stative verbs with one argument cross-reference this argument using the same set of affixes used to cross-reference the patient-like nominal of a syntactically transitive clause. Consider the following examples from Harrison (1986:419):

- 12.4 he- rurywete ihe
 1SG happy I
 “I’m happy.”
- 12.5 he- kisi takihe-pupe a?e
 1SG cut knife-with he
 “He cut me with a knife.”

Non-stative intransitive verbs are prefixed with the same person agreement affixes as those attached to transitive verbs. In other words, the person agreement affixes in Guajajara clearly reflect a distinction between stative and active verbs.

§12.1.2.4 Mundurukú

Mundurukú is one of two languages from subgroup six, along with Puruborá, according to Rodrigues’ (1999:109) classification of Tupí. There are about 7000 speakers of this language, making it the most widely-spoken Tupí language outside the Tupí-Guaraní branch. Crofts (1985), a pedagogically-oriented treatment of the language, contains relevant findings on the verb classification system in the language. Crofts notes (1985:19-38) that verbs are classified as intransitive or transitive. Unlike Sateré-Mawé, for instance, the person prefixes attached to the verb root do not vary according to the basic argument structure of a given verb. Consider the following two examples:

- 12.6 o³-‘at³
 1.SG-fall
 “I fell.”

12.7 o³-y-a³o²ka³
 I.SG-OBJ-kill
 “I killed it.”

As we see in these examples, the 1st person marker prefixed to the verb does not change according to the verb’s semantic valency.⁶³

Crofts notes that verbs are generally classified as intransitive and transitive. It appears that she is speaking of semantic transitivity, since her analysis suggests that transitive verbs are required to occur with an “object” marker in all cases, whether or not they occur with two explicit arguments in the clause. (1985:27) This suggests that the object markers in question are used to express semantic transitivity, even when not referring to a specific second argument. Nevertheless, the markers in question can also be used to refer to overt second arguments. In such cases, they refer to the more patient-like of two arguments in a syntactically transitive clause. Given that these markers refer to O-like arguments, while the person prefixes can refer to either S arguments (solitary arguments of semantically intransitive verbs, e.g. in 12.6) or A arguments (agentive-like arguments of semantically transitive verbs, e.g. in 12.7), it appears that verbal morphology generally groups the S and A arguments together in Mundurukú.

§12.1.2.5 Kamairá

According to Jensen (1999:132), there are approximately 270 Kamairá, who live in the region of the upper Xingu river. Kamairá has been described extensively by Seki (1990, 2000). She notes that verbs in the language are generally classified as either active, stative, or descriptive. In speaking of the distinction between active and stative

⁶³ Crofts (1985:43-45) notes that there are three separate object markers prefixed to Mundurukú verbs. It does not appear that these prefixes are chosen according to the categorization of the relevant verbs based on any basic semantic distinction. In the case of one of the object prefixes, it is used with indefinite objects, and is clearly based on pragmatic factors associated with a given object-type nominal.

verbs, she notes that “this distinction correlates with a semantic one involving control versus lack of control.” (1990:367) As in many Tupí languages, the classification of verb types is evidenced by separate person agreement and pronominal categories. In indicative and hortative moods, the following generalizations hold:

...transitive verbs occur with subjective prefixes (Set I forms) and with dependent pronouns (Set II forms)... Active intransitives take only Set I forms; descriptives take only Set II forms. (1990:368)

Semantically active verbs require Set I agreement prefixes, regardless of their syntactic transitivity. Consider the following two examples:

- 12.8 ita o-momot
 stone 3-throw
 “He throws stones.”
- 12.9 o-kotuk
 3-pierce
 “He pierces it.” (1990:372-373)

In 12.8 and 12.9, the same 3rd person prefix is used, since both verbs are classified as active. In 12.9, there is no overt patient-type argument present, yet the person prefixation is the same as the syntactically transitive 12.8.

Semantically inactive verbs in Kamaurá are preceded by pronouns from Set II, not by the person agreement markers in Set I, such as *o-* in the above examples. Set II pronouns are also used to refer to patient-like nominals in syntactically transitive clauses.

Consider the following examples:

- 12.10 akwama'e-a je r-ecak
 man-NF 1SG REL-see
 “The man saw me.”
- 12.11 je r-oryp
 1SG REL-glad
 “I am glad.” (1990:374)

In both 12.10 and 12.11, the pronoun *je* is used, since in Kamaurá “O and So participants” (1990:373) are treated in a similar manner.

The distinction between active and inactive verbs, which leads to split-ergativity in the grammatical relations of Kamauirá, is based on a simple semantic factor. Active verbs, according to Seki, are those that represent volitional acts like “talking,” “running,” and “singing.” Inactive verbs represent less volitional acts. She does note that, “Although the two classes cannot be characterized in an absolute way by their lexical content, an opposition between control vs. lack of control seems to be generally true.” (1990:371) As we will see in this chapter, Karitiana verbs are also classified according to a general, non-absolute semantic distinction.

§12.1.2.6 Summary of Tupí data

Based on the Tupí data considered in the previous sections, it is clear that verbs are generally categorized into two or three basic types in each language. Often this categorization relates to whether a given verb is semantically intransitive or semantically transitive. In some languages, the distinction between active and inactive/stative verbs is important. In all of these languages, the basic argument structure associated with a given verb plays a role in the verbs’ classification. For instance, in the case of Kamauirá, verbs that typically occur with volitional arguments are classified as active.

The grouping of basic argument types, instantiated via grammatical relations, is largely oriented according to verbal semantics in these languages. These alignments are most evident in the pronoun sets and person marker sets prefixed to the verb.

These general conclusions based on an array of Tupí languages serve as a useful background to the Karitiana data. As we will see in subsequent sections, Karitiana exhibits many of the basic phenomena mentioned here. Specifically, in Karitiana verbs are classified into two categories according to very basic argument-structure parameters.

Specifically, they are classified as semantically intransitive or semantically transitive. The basic distinction in argument structure between these two types of verbs will be refined in the discussion below. As we will see in Chapter 15, the distinction between these two main argument-structure types affects the alignment of basic argument types evident in the grammatical relations of the language.

Finally, I should note that the Karitiana data are consistent with the other Tupí data surveyed in that the categorization of verb types surfaces in the pronouns and person agreement prefixes. The latter, as in most Tupí languages, precede the valence prefixes in the verbal template.

Language	Tupí branch	Major verb categories	Basic grouping of argument types
Urubu-Kaapor	Guaraní, subgroup 8	Stative vs. non-stative	S with A. O-case marking based on syntactic transitivity.
Guajajara	Guaraní, subgroup 4	Semantically transitive, semantically intransitive, stative-intransitive	S with A: non-stative verbs S with O: stative verbs
Sateré-Mawé	Sateré-Mawé	Semantically transitive, semantically intransitive, descriptive-intransitive	S with A: most verbs S's of descriptive verbs with O
Kamaiurá	Guaraní, subgroup 7	Active, stative, descriptive	S with A: active verbs S with O: stative verbs
Mundurukú	Mundurukú	Semantically transitive, semantically intransitive	S with A
Karitiana	Arikém	Semantically intransitive, semantically transitive	S with A, S with O See Chapter 15

Chart 12.1 General verb classification systems and basic argument structures in Tupí languages surveyed. **S** refers to solitary argument occurring with semantically intransitive verbs. **A** refers to the only argument, or the more agentive of two arguments, occurring with semantically transitive verbs. **O** refers to the less agentive of two arguments occurring with semantically transitive verbs.

Chart 12.1 encapsulates the very basic findings from the previous sections. The genetic classifications represented in the table are taken from Rodrigues (1999) and Jensen (1999). Not surprisingly, the findings in Chart 12.1 ignore many subtle patterns in the classification of verb types and argument types in the languages surveyed. Nevertheless, they encapsulate accurately the general patterns of verb classification according to semantics. The *basic* argument groupings evident in each language, which are exhibited via grammatical relations not considered here, are also found in Chart 12.1.

In this section we have considered various data from Tupí languages on valency, transitivity, and argument structure. This section serves as a relief to the Karitiana data presented in the following sections. Much of the data in the following sections does not relate to valency or transitivity. However, much of it does, and the effects of these phenomena are pervasive, surfacing in various facets of Karitiana morphosyntax. For that reason, I have provided the preceding outline of some basic facts regarding the instantiation of these phenomena in other Tupí languages.

§12.1.3 Overview of Karitiana affirmative constructions

There are four basic affirmative types of constructions in Karitiana. The extensive morphosyntactic differences between these construction types will surface in the remaining chapters of Part II, as these constructions are discussed in relation to most of the phenomena considered below. However, since most of the phenomena discussed below cannot be discussed apart from these constructions, it is worth outlining the four relevant constructions now. At this point, I do not attempt to justify the relevant glosses and analyses. I simply provide the outline here by way of further background for the

remainder of this chapter, and for the upcoming chapters. In Chapter 16, I examine the basic semantic/cognitive underpinnings of the relevant constructions.

The first basic affirmative construction will be referred to as the “valence” construction. In this construction, a given semantically intransitive verb is prefixed with *i-*. Recall the above quote from Payne, where semantic valence is defined as “the number of necessary participants in the scene expressed by V.” According to this pithy definition, a semantically monovalent (semantically intransitive) verb has only one “necessary participant” in the scene it expresses. This simple definition, which will be refined in the discussion of *i-* prefixation in §12.2, characterizes accurately most of the verbs that can receive the *i-* prefix in Karitiana with a basic affirmative reading. The following clause occurs with the basic “valence” construction:

12.12 *ãn* *i-pekera-t*
 2S INT-float-NFUT
 “You floated.”

A semantically transitive verb cannot occur with this prefix in an affirmative clause:

12.13 *ĩn* *i-ʔasika-t* *pikom*
 1S INT-shoot-NFUT woolly monkey
 *“I shot the monkey.”
 OK as “I didn’t shoot the monkey.” (See §14.2.4)

Another affirmative construction in Karitiana is the “Speech Act Participant” construction. This construction has been characterized as the declarative construction in previous studies, but this characterization misses some important semantic generalizations as we will see later in §12.8 and in Chapter 16. This construction, which is the most frequent affirmative construction type in Karitiana discourse (see frequency data in Chapter 16), is characterized by a *na(ka)-* or *ta(ka)-* verbal prefix. Consider the following clause, excised from a segment of transcribed discourse:

12.18	i	na-aka-t	i-kisep-ø
	3	NSAP-COP-NFUT	INT-jump-COP.AGR
		“He’s jumping.”	

The morphology of predicates in copular clauses is discussed in greater detail in §12.3.

The final basic construction to be considered is the “Verb-focus” construction, which like the Speech Act Participant construction represents one of the basic voices of Karitiana. Therefore, the general cognitive/semantic pattern associated with this construction is discussed in detail in Chapter 16. In this construction, verbs are prefixed with **pir-** (or one of its allomorphs). First and second person absolutive arguments are prefixed to the verb. Consider the following examples:

12.19	ij-piri-seŋa-n
	1PL.ABS-VB.FOC-crouch-NFUT
	“We crouched down.”

12.20	i-piri-ki:p-in
	1S.ABS-cut-NFUT
	“I was cut.”

As we will see in §12.9, in the Verb-focus construction, the verb is required to occur clause-initially. The tense suffixes employed in this construction also differ from those employed in the other construction types, as is evident by contrasting 12.19 and 12.20 with the previous examples. The relevant tense differences will be discussed in §12.4.

Each of the above constructions will be discussed in greater detail during subsequent sections of Part II. However, by acquainting the reader with the affirmative constructions now, even in this basic manner, I hope to facilitate the discussion of various other phenomena that interact with these construction types. The morphosyntactic correlates of the constructions themselves will be discussed again in this chapter, and their semantic/cognitive bases will be brought to the fore in Chapter 16.

In this section I first defined the basic terminological conventions adopted here, vis-à-vis valency and transitivity. Next I outlined relevant findings from the literature, demonstrating the importance of basic verbal categories (such as semantically intransitive and semantically transitive) to the morphology of Tupí languages. Finally, I outlined the basic constructions of Karitiana affirmative clauses. This section, then, serves as a useful background/introduction to the discussion of Karitiana verbal morphology and to the discussion of Karitiana morphosyntax more generally.

§12.2 Basic valence inflection

Dixon (1979:68-69) makes the following observation:

“all languages appear to distinguish activities that necessarily involve two participants from those that necessarily involve one...Then all languages have classes of transitive and intransitive verbs, to describe these two classes of activity.”

Of course, the extent to which the semantically transitive/semantically intransitive distinction is entrenched in languages' grammars varies considerably. We have already suggested that in Karitiana, the bifurcation of verbs into two classes has a profound effect on various verbal inflections and on clausal constructions more generally. We have also shown that this is a fairly typical finding in Tupí languages.

In §12.1.3 we introduced the basic affirmative constructions of Karitiana. As we will see in the more detailed discussions of these construction types in e.g. §12.8 and §12.9, the verbal (and in some cases nominal) morphology found in Karitiana clauses is affected by the semantic classification of the matrix verb. The clearest way to illustrate the existence of this classification system, however, is to consider basic affirmative clauses with predicates that are inflected only for semantic intransitivity and tense. For instance, consider the following clauses:

- 12.20 i i-nēŋã-t
 3 INT-lie.down-NFUT
 “He laid down.”
- 12.21 ñn i-otãm-ø
 1S INT-arrive-NFUT
 “I arrived.”

Verbs such as those in 12.20 and 12.21 are semantically intransitive or monovalent according to the definition adopted here, according to which “the number of necessary participants in the scene expressed by V” is one. In the vast majority of cases, if the number of necessary participants in a scene expressed by a verb is more than one, the verb may not be prefixed with *i-* in an affirmative clause. (Such verbs may be prefixed with *i-*, but only in negative clauses, cf. §14.2.4.) If such verbs occur in affirmative clauses, but not in the Verb-focus construction, they must occur with the Speech Act Participant prefix set, which is discussed in greater detail in §12.8. Consider the following examples of semantically transitive verbs occurring in affirmative clauses:

- 12.22 ñn naka-pidn-ø bola
 1S NSAP-kick-NFUT ball
 “I kicked the ball.”
- 12.23 ãn naka-ki:p-ø hĩm
 2S NSAP-cut-NFUT meat
 “You cut the meat.”

Put simply, verbs in Karitiana can be inflected for semantic valence, with intransitive predicates receiving an *i-* prefix. This prefix is nearly homophonous with the third person pronoun, as evident in example 12.20⁶⁴. For this reason, the *i-* prefix has been previously analyzed as a 3rd person marker. This analysis is evident in Landin’s (1978) pedagogical approach to Karitiana, and is also evident in some of the glosses found in Storto (1999, 2003). However, there appears to be no semantic basis for considering the *i-* prefix to be

⁶⁴ The reason I suggest that the prefix is *nearly* homophonous with the third person pronoun is that the prefix, which is typically unstressed, may be reduced to a semi-vowel in some productions, while the third person pronoun is not reduced in the same manner.

some sort of dummy 3rd person agreement prefix. In fact, it is difficult to imagine how the presence of a third person marker would be compatible with the semantics of verbs such as those in 12.20 and 12.21, or with verbs such as **koroʔop hadnã** (“think”), **pop** (“die”), and **ke:t** (“live”), all of which are prefixed with **i-** in the given construction. On semantic grounds, then, it is more accurate to consider **i-** a valence marker rather than a third person morpheme, though this does not necessarily preclude a diachronic affiliation between this form and the third person pronoun.

One of the ways in which the inherent semantic intransitivity of verbs occurring with the **i-** prefix is attested is through the marked status of second nominals in clauses with such predicates. Nominals following intransitive verbs in Karitiana are generally marked with an oblique suffix, as in the following two examples:

12.24 ñn i-diwit-ø manga-ti
 1S INT-forget-NFUT mango-OBL
 “I forgot the mango.”

12.25 i i-seʔi-t ese-ti
 3 INT-drink-NFUT water-OBL
 “He drank the water.”

This pattern is not attested in clauses with transitive verbs. Consider examples

12.22 and 12.23 above, as well as 12.26:

12.26 a:tʃa naka-mĩ:-t taso
 2PL NSAP-hit-NFUT man
 “You guys hit the man.”

Clearly the oblique suffix is not required in the case of nominals following verbs marked with the **naka-** prefix, and this is further evidence of the grammar’s recognition of the semantic transitivity of such verbs.

The *i-* intransitive prefix occurs with verbs that are classified by the grammar as semantically intransitive⁶⁵, regardless of the verbs' phonological structure. In contradistinction to this regularity of the intransitive prefix, the prefix sets used in the Speech Act Participant and Verb-focus constructions vary according to the stress of the verb root's first syllable. The relevant phonological alternations are found in the discussion of the **na(ka)-/ta(ka)-** prefix set in §12.8, as well as in the discussion of the Verb-focus construction in §12.9.

It should be noted that semantically intransitive verbs are not truly contrasted with semantically transitive verbs alone by Karitiana grammar. Instead, they are contrasted with all semantically multivalent verbs, such as the following verbs that cannot occur with *i-* prefixation in affirmative clauses:

12.27	ĩn	naka-hit-∅	tiʔi-ti	elivar
	1S	NSAP-give-NFUT	food-OBL	Elivar
		"I gave the food to Elivar."		
12.28	ãn	na-msoʔo:t-∅	õ:m-ti	elivar
	2S	NSAP-show-NFUT	image-OBL	Elivar
		"You showed the picture to Elivar."		

The semantic "scene" entailed by the verbs in 12.27 and 12.28 require more than two participants according to their default readings. In other words, the verb for "give" is typically used when there is a giver, a givee, and something given. Similarly, the verb for "show" is typically used when there is a shower, a showee, and something shown.

Perhaps the best way for the reader to understand the nature of the distinction between semantically monovalent and semantically multivalent verbs is to consider a wider array of examples representing each sort of verb. To that end, below I provide

⁶⁵ As we will see later in this section, not all verbs that are classified as semantically intransitive by Karitiana grammar are in fact semantically intransitive according to the pithy definition employed here. Nevertheless, the correlation between semantic intransitivity and the ability to take *i-* prefixation is quite strong.

modest lists of several dozen verbs from each category, taken from my data. In Tables 12.1 and 12.2, the relevant verbs are placed within a simple matrix clause.

Intransitive verb	Gloss
ĩn i-taktãnj-ãt	I swam.
ĩn i-sombak	I looked.
ĩn i-se?i-t	I drank.
ĩn i-hã:nã-t	I breathed.
ĩn i-seja-t	I crouched.
ĩn i-mbik	I sat.
ĩn i-pikina-t	I ran.
ĩn i-tarika-t	I walked.
ĩn i-tat	I went.
ĩn i-kisep	I jumped.
ĩn i-tepik	I dived.
ĩn i-irit	I arrived.
ĩn i-otam	I returned.
ĩn i-he:t	I exited.
ĩn i-mēm	I entered.
ĩn i-andij-t	I laughed/smiled.
ĩn i-kat	I slept.
ĩn i-kat	I dreamt.
ĩn i-ke:t	I lived.
ĩn i-pop	I died.
ĩn i-eŋgi-t	I vomited.
ĩn i-tãm	I flew.
ĩn i-hõrõŋ	I lied.
ĩn i-aŋgat	I stood up.
ĩn i-karinã-t	I turned.
ĩn i-?ot	I fell.
ĩn i-sadnã-t	I stank.
ĩn i-hadnã-t	I said.
ĩn i-pomã-t	I played.
ĩn i-pekera-t	I floated.
ĩn i-peka-t	I swelled.
ĩn i-pipop	I was burnt.
ĩn i-ambo-t	I laid down.
ĩn i-nã:rĩjã-t	I woke up.

Intransitive verb	Gloss
ĩn i-hi:rĩjã-t	I sang.
ĩn i-amhã:na-t	I rested.
ĩn i-amĩ-t	I bought.
ĩn i-sa?epsa?em-ãt	I walked a long ways.
ĩn i-oti:t	I returned.
ĩn i-oti-t	I bathed.
ĩn i-akikinĩnã-t	I got close.
ĩn i-awpijt	I left.
ĩn i-pimbo-t	I left it.
ĩn i-pikiŋkiŋã-t	I slipped.
ĩn i-dzikinã-t	I moved.
ĩn i-dziŋnã-t	I stopped.
ĩn i-terektereŋ-ãt	I danced.
ĩn i-pitimadnã-t	I worked.
ĩn i-amkakaŋã-t	I mixed it.
ĩn i-kiwiti-nãt	I believed.
ĩn i-diwit	I forgot.
ĩn i-pitĩ:t	I wanted.
ĩn i-pasa-t	I loved.
ĩn i-sondip	I knew.
ĩn i-pipĩ:d	I knew (how to do it).
ĩn i-so?o:t	I saw.
ĩn i-opiso-t	I heard.
ĩn i-ahi-t	I drank.
ĩn i-a:pi-t	I fought.
ĩn i-põn	I hunted.
ĩn i-terep	I visited.
ĩn i-pike-t	I got it.
ĩn i-pitaŋã-t	I robbed.

Table 12.1 Verbs with the intransitive *i-* prefix and NFUT suffixation (the default interpretation of the glosses is that of an event in the past). Highlighted glosses indicate inconsistent semantics, i.e. more than one argument implied by the “scene” of the verb in question.

First, let us consider Table 12.1. The most crucial observation to be made, based on this table, is that there is a remarkable semantic consistency shared by the verbs, almost all of which entail only one argument's participation in the scene or event expressed by the verb. The most notable exceptions to this trend are highlighted in the table. Even these exceptions appear to be amenable to a semantic characterization, but I set aside any attempts at such a refined characterization until my discussion of Karitiana voices in Chapter 16.

Transitive verb	Gloss
ĩn naka-mĩ-t	I hit X.
ĩn naka-ki:p	I cut X.
ĩn naka-ʔi-t	I ate X.
ĩn naka-mʔa-t	I made X.
ĩn naka-mhip	I cooked X.
ĩn naka-hĩfã-t	I smelled X.
ĩn naka-sẽ:wã-t	I sucked X.
ĩn naka-hi:t	I gave X.
ĩn naka-pi:t	I took X's.
ĩn naka-mhõfõn	I cleaned X.
ĩn naka-ampiŋ	I pierced X.
ĩn naka-a:tip	I met X.
ĩn naka-pidn	I kicked X.
ĩn naka-o:t	I took X.
ĩn na-okot	I bit X.
ĩn na-ʔasika-t	I shot X.
ĩn na-atik	I threw X.
ĩn na-okẽŋ	I cut X.
ĩn na-apĩŋgi:ri-t	I scratched X.
ĩn na-opĩ-t	I cut/split X.

Transitive verb	Gloss
ĩn na-otʃak	I bit X.
ĩn na-apese:ka-t	I squeezed X.
ĩn na-mkiwakiwa-t	I rubbed X.
ĩn na-asokoʔi-t	I tied X.
ĩn na-pipařami-t	I sewed X.
ĩn na-ate:t	I pulled X.
ĩn na-miŋgidni-t	I swallowed X.
ĩn na-soki-t	I broke X.
ĩn na-pe:tet	I burned (the field).
ĩn na-pajop	I grated X.
ĩn na-potpo:ra-t	I boiled X.
ĩn na-tatarika-t	I brought X.
ĩn na-kindop	I opened X.
ĩn na-kĩnõn	I closed X.
ĩn na-pimbop	I looked for X.
ĩn na-atot	I took X to Y.
ĩn na-hei:t	I blew on X.
ĩn na-pimbik	I pushed X.
ĩn na-mbiherenã-t	I showed X to Y.
ĩn na-bipok	I dried X.

Table 12.2 Some multivalent verbs in Karitiana, occurring in the NFUT tense and with NSAP prefixation.

Next consider Table 12.2, containing semantically multivalent verbs. (The sample clauses do not contain overt objects, which are not required for them to be grammatical and are omitted in the table for the sake of space.) Again, there is a definite semantic cohesion to this set of verbs, since a careful investigation of this table reveals that all of the actions conveyed by these verbs typically require at least two participants. It is worth stressing that the glosses in Table 12.2 are accurate, in that an indefinite patient-type referent is understood by the interlocutor when one of the clauses in the table is uttered. So, for example, a clause such as **ĩn na-opĩ-t** is understood as “I split/cut something.”⁶⁶ This something is as an indefinite patient in the absence of a definite referential patient understood from the discourse context. This clause cannot be understood, however, as e.g. “I did cutting,” in which there is no patient clearly implied. Various language resource personnel have rejected Portuguese translations of such clauses, when these translations involved non-patient type readings. They insist that clauses such as those in Table 12.2 entail that something was cut, however they are not sure what.

To this point, we have been employing pithy definitions of semantic monovalence and semantic multivalence. We have suggested that verbs such as those in Table 12.1 are generally semantically monovalent⁶⁷, in that they require only one participant for the scene they express. Conversely, verbs such as those in Table 12.2 are generally semantically multivalent in that they require at least two participants for the scene they express. Employing this admittedly general semantic distinction seems to be the most

⁶⁶ There are two verbs for “cut” in Table 12.2. In fact, there are several verbs that can be glossed as “cut” or “split” in Karitiana, and these are used according to which sorts of objects are cut. For instance, **ĩn na-okẽn** would be used when hair or wood are being cut, but not when meat is being cut.

⁶⁷ Not surprisingly, there are some exceptions to this tendency. As Seki notes with respect to the Kamaiurá inactive/active verb categories, the morphosyntactic affiliation of basic verb categories tend to be amenable to basic semantic categorizations, but these inevitably suffer at least a few exceptions.

parsimonious means of accounting for the basic verbal categories in Karitiana. This general distinction can be refined somewhat, however. To do so, it is worth employing a more well-defined approach to verbal argument structure. One approach that can be fruitfully applied to the Karitiana data is found in Van Valin (2005).

According to Van Valin (2005:59), the sorts of thematic relations that a given verb occurs with are based on the argument structure (which follows from “logical structure”) associated with the verb. More specifically, each verb has a characteristic lexical representation and associated logical structure, and this logical structure defines the sorts of thematic relations that can occur with a given verb. While there are many thematic relations, there are also semantic “macroroles,” which are generalized semantic roles, namely “actor” and “undergoer.” (2005:60) Each of these two macroroles subsumes a wide variety of thematic roles. According to Van Valin:

Macroroles are motivated by the fact that in grammatical constructions groups of thematic relations are treated alike. For example, themes and patients function alike for certain purposes in the grammar. It is necessary to distinguish them on semantic and other grounds. But nevertheless, the grammar, for certain purposes, treats these roles as essentially the same, e.g. they can be both the direct object in an active and the subject in a passive. (2005:60)

The interaction between macroroles and the logical structure of verbs is defined in specific ways in Van Valin (2005). An “actor” macrorole is only defined as such because of its position in the logical structure of a given verb, and the same is true of the “undergoer” macrorole. Nevertheless, there are general semantic tendencies associated with these macroroles. The actor macrorole typically represents a thematic relation such as *agent, effector, mover, creator, performer...* The undergoer macrorole typically represents thematic relations such as *patient, theme, consumed, possessed...* Consider the following semantic generalizations of the macroroles:

...one could say that the actor is the participant which is responsible for the state of affairs, in the sense that it is impossible to have an action without an entity doing the action, a perceptual situation without a

perceiving entity, or a cognitive or emotional situation without a participant experiencing the cognitive or emotional state... In general, the undergoer represents the non-instigating, affected participant in a state of affairs. (2005:61-62)

According to this approach, the logical structure of a given verb is associated with particular thematic relations and, more generally, with the “actor” and “undergoer” macroroles.

If we examine the verbs in Tables 12.1 and 12.2 carefully, it is readily apparent that there are a wide variety of thematic relations associated with the logical structure or argument structure of such verbs. Nevertheless, the postulation of these two basic macroroles assists in clarifying the distinction between the two verb categories. Rather than simply stating that the verbs in Table 12.2 require “two participants,” we can claim that the verbs in Table 12.2 require the two semantic macroroles, an actor and an undergoer. The verbs in Table 12.1, however, require only one semantic macrorole, which is an actor in some cases, and an undergoer in other cases.

The approach to logical structure (and therefore argument structure) suggested in Van Valin (2005) can be implemented to classify a wide-range of logical structure types, based on the lexical representation of a given verb. However, it can also be used to refine the two-part semantic valence distinction evident in the Karitiana data. We can state, according to this approach to argument structure, that Karitiana grammar groups numerous semantic relations in a similar manner. Clausal predicates are classified according to whether they are expected to occur with one semantic macrorole or two semantic macroroles. If they are expected to occur with only one semantic macrorole, they are prefixed with *i-* in the valence construction. If they are expected to occur with more than one macrorole, they are classified as semantically multivalent. These semantically multivalent predicate types may occur with both an actor and an undergoer.

Having refined the basic semantic categorizations that can be applied to the verbs in Tables 12.1 and Tables 12.2, we can now turn our attention to other semantically-oriented findings that can be gleaned from data such as those found in these tables. More specifically, we can consider commonalities between the relevant verbal categories that are not oriented according to the semantic monovalence/semantic multivalence distinction. As a background to these comments, it is worth considering some well-known typological findings on the notion of grammatical transitivity. In their oft-cited work, Hopper and Thompson (1980) make several important observations regarding the “component parts of the Transitivity⁶⁸ notion” (1980:252). These component parts are: participants, kinesis, aspect, punctuality, volitionality, affirmation, mode, agency, affectedness of O, and individuation of O. According to Hopper and Thompson’s survey, transitivity in the world’s languages correlates strongly with actions that require two-participants, are highly kinetic, are telic, punctual, and involve a volitional agent that is high in potency. Transitivity also correlates with affirmative, non-negational semantics, the realis mode, and actions that entail an individuated and highly affected O participant.

Considering the component parts of transitivity, we find that several of the semantic correlates of transitive actions are evidenced in the grammar of Karitiana. The most obvious way in which these correlations surface is reflected in the semantic generalizations that can be drawn from the verb classes delineated in Tables 12.1 and 12.2 respectively. With these tables again serving as a reference, let me draw a few general conclusions.

⁶⁸ Hopper and Thompson (1980) are concerned with semantic *and* grammatical transitivity, according to the terminology adopted here. They discuss the number of participants inherent to a given predicate type (semantic valence or semantic transitivity according to the terminology utilized here), but also discuss various morphosyntactic correlates of such semantic transitivity. In other words, they discuss transitivity as a “global property of the entire clause.” (1980:251)

First, the actions described by the verbs in Table 12.2 tend to involve volitional agents who are high in potency, unlike most of the actions described by the verbs in Table 12.1. While not a hard-and-fast rule since the verbs entail participants of varying degrees of potency and agency, this generalization captures the fact that verbs such as **pidn** ('kick'), **mī:** ('hit'), and **ki:p** ('cut') generally entail agents that are acting volitionally and are high in potency.⁶⁹ Conversely many of the verbs in Table 12.1 involve one patientive participant, e.g. **pikiŋkiŋa** ('slip'), **diwit** ('forget'), and **opiso** ('hear'). This generalization does have exceptions of course, as some verbs in Table 12.1 involve agentive nominals, e.g. **hirīnā** ('sing') and **oti** ('bathe').

Second, the actions described in Table 12.2 tend to involve highly affected O participants. By affected, I mean O's "to which an action is transferred" (Hopper and Thompson 1980:252) to a high degree. For instance, this is the case of **soki** ('break'), **pajop** ('grate'), and **potpo:ra** ('boil'). Again, this is only a tendency since many of the verbs in Table 12.2 involve O's that may have been affected to a lesser extent, e.g. **atip** ('meet'), **kindop** ('open'), or perhaps not at all **apimbop** ('look for').

Third, with respect to the individuation of O, that is the extent to which the O is distinct from A and distinct "from its own background" (Hopper and Thompson 1980:253), I should state that clauses in my data containing verbs such as those in Table 12.2 tend to include individuated O's. That is, they include O's that are distinct from A and are referential and definite. However, the fact that the clauses in the table are

⁶⁹ Of course, verbs such as these could in principle be done nonvolitionally, but they are generally used when referring to volitional agents. In the case of all these verbs, most tokens in my transcriptions refer to non-reflexive actions in which an agent intentionally transfers energy to a patient.

grammatical without overt O's suggest that Karitiana certainly does not require the O of a clause with a semantically transitive predicate to be individuated, since they can be omitted altogether. In most cases the omitted O's are understood to refer to some indefinite, unidentified O. In other cases I have transcribed, this O is a definite referent understood from context. In other words, the referent in question has a high degree of pragmatic relevance, which leads to its omission.

Fourth, in regards to their internal temporal structure one could make the case that many of the verbs in Table 12.2 by nature represent events that could be described by high degrees of telicity and punctuality, for instance **pidn** ('kick') and **ʔasi:ka** ('shoot'). Many of the verbs in Table 12.1 could be described as having an internal temporal structure that is inherently atelic and non-punctual, e.g. **hi:rɨŋã** ('sing'), **sondip** ('know'), and **kiwiti** ('believe'). However, the tendency towards atelicity and non-punctuality is contravened in the case of some intransitive verbs, e.g. **pikiŋkiŋa** ('slip').

Transitive verbs such as those in Table 12.2, while inherently more telic and punctual than many of the verbs represented in Table 12.1, are not necessarily incompatible with atelicity and non-punctuality. That is, Karitiana grammar allows for atelic and non-punctual interpretations of these verbs. This is reflected by the fact that the verbs in Table 12.2, like those in 12.1, may co-occur with a progressive aspect marking.

This is apparent in the following example:

12.29	ãn	naka-mĩ:gi-t	i
	2S	NSAP-hit-PROG.PL-NFUT	3
	"You are hitting them."		

In this case, the prototypically transitive verb "to hit" is found to be compatible with a present progressive interpretation.

Having considered some of the expected correlations with transitive actions, we find that many of these correlations are present in Karitiana. Transitive verbs tend to represent actions that could generally be described as telic, punctual, kinetic, entailing one volitional agent that is high in potency and an O that is highly affected and individuated. The operative word here is “tend,” however, since all of these generalizations have exceptions, exceptions that are not altogether uncommon. When considering data such as those represented in Tables 12.1 and 12.2, the general impression given is that many of these correlations with the semantically transitive verbs in Karitiana are epiphenomenal, and result from the fact that verbs marked with *i-* in affirmative clauses generally entail only one macrorole, while other verbs require more than one macrorole. In other words, the most concise generalization that can be offered to characterize *i-* prefixed verbs in Karitiana affirmative clauses, is that they typically occur with one macrorole.

Before concluding this brief delineation of transitivity in Karitiana, it is worth considering one final correlation with transitivity reflected in the grammar of the language. Recall from Hopper and Thompson’s list that in some languages transitivity tends to correlate with affirmative morphosyntax, and some conflict between negative morphosyntax and transitivity may arise. They suggest that, “In a number of languages, the O of a negated clause appears in a form which shows that the action of the verb is deflected and less direct.” (Hopper and Thompson 1980:276) With this observation in mind, it is worth observing that in Karitiana there is an interesting correlation between the morphology of negated semantically transitive verbs and intransitive verbs inflected

with the *i-* valence prefix. Specifically, negated transitive verbs also display an *i-* prefix.⁷⁰

Consider the following pair of contrasted clauses employing the same verb:

- 12.30 *ĩn* *na-kindop-i* (*karamã tõm*)
 1S NSAP-open-FUT (door)
 “I will open something.” or “I will open the door.”
- 12.31 *ĩn* *i-kindop-i* *padni* (*karamã tõm*)
 1S IRR-open-NEG NEG (door)
 “I will not open anything.” or “I will not open the door.”⁷¹

Note that, in example 12.31, the negated verb is prefixed with *i-*, like the intransitive verbs in Table 12.1. As was mentioned, the 3rd person pronoun in Karitiana is also *i*, and for this reason Landin (1984) considers examples such as 12.31 to contain third person pronouns, said to be fronted before the verb. Such an interpretation is awkward in that, as in the case of intransitive verbs marked with *i-*, there is often no evidence of a third person referent of any sort in negated transitive clauses (cf. the first reading of 12.31). While there *may* be a diachronic affiliation between the relevant *i* forms, there does not seem to be sufficient semantic evidence to consider the *i-* prefix, found in intransitive verbs such as those in Table 12.1 and negated verbs such as that in 12.31, to be a third person marker.⁷² Judging from the glosses in Storto (1999, 2003), she, much like Landin, concludes that the *i-* prefix attached to both transitive negative verbs and intransitive verbs in declarative clauses is a 3rd person marker (in the case of her analysis it is an agreement marker). I believe this analysis is incompatible with the fact that this prefix occurs in many clauses, such as those found in Table 12.1, in which there is no third person referent present, either explicitly or implicitly. (As we will see in section §14.2

⁷⁰ This prefix was first described in Landin (1978:5.4).

⁷¹ These are my own translations, based on discussions with the Karitiana.

⁷² For instance, there is no more evidence for this analysis than there is for an analysis that treats the *-i* NEG suffix in example 12.31 as a first person marker, given the existence of a 1st person verb agreement *i-* prefix.

transitive predicates to require volitional, potent agents and highly affected patients. In fact, these straightforward tendencies could plausibly be considered epiphenomenal, resulting from the fact that verbs that are classified as transitive by Karitiana grammar always entail two macroroles, an “actor” and an “undergoer.” One of the relevant observations made by Hopper and Thompson is less straightforward, though, and, judging from the paucity of relevant examples in their study and the literature more generally, this observation relates to a typologically less frequent phenomenon. Specifically, this observation relates to the correlation between intransitive morphology and negative morphology.

§12.3 Copular clauses

In order to successfully describe the copula of Karitiana, it is crucial to clarify the criteria being employed in order to classify a particular verb or particle as a copula. The primary criterion used in this case is the behavior of the relevant verb vis-à-vis predicate nominals. This criterion is based on suggestions made in surveys of crosslinguistic generalizations of copula, such as Payne’s (1997:114-115):

...a copula is any morpheme (affix, particle, or verb) that joins, or “couples,” two nominal elements in a predicate nominal construction. It marks the clause as a predicate nominal and often carries the tense/aspect and other information necessary for predications in the language.

The selection of this criterion does not imply that the copula is only used in clauses with predicate nominals, it merely implies that, if there is in fact a copula in Karitiana, it will surface in such clauses. In the examples such as 12.34-12.37, which contain predicate nominals, we see that this in fact the case. (In subsequent examples in this section, we consider other types of predicates found in copular clauses.)

12.34	nelson nelson "Nelson is a man."	na-aka-t NSAP-COP-NFUT	taso-t ⁷⁴ man-COP.AGR
12.35	marilena Marilena "Marilena is a woman."	na-aka-t NSAP-COP-NFUT	ɲõnso-t woman-COP.AGR
12.36	kojpa pineapple "The pineapple is a fruit (literally head-thing)."	na-aka-t NSAP-COP-NFUT	kinda o-t thing head-COP.AGR
12.37	pikõm monkey species "The <i>macaco prego</i> is an animal."	na-aka-t NSAP-COP-NFUT	hĩm-ø animal-COP.AGR

As we see in these cases, the copula is used to convey proper inclusion, signifying that the first nominal in the clause is a member of the class represented by the post-copula nominal. It should be noted, though, that in some cases the class nominal occurs clause initially. This is apparent in clause 12.38 (a variant of 12.34):

12.38	taso man "Nelson is a man."	na-aka-t NSAP-COP-NFUT	nelson-t Nelson-COP.AGR
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The Karitiana speaker who produced clauses 12.34 and 12.38 insists that there is no perceptible semantic difference between them. (What pragmatic distinction may be represented by this order variation remains uncovered.) Nevertheless, the order represented by clauses 12.34-12.37 seems to be the unmarked pattern.

The presence of the **na-** verbal prefix, which as we noted in §12.1 occurs when the absolutive nominal of a clause is a non-speech act participant, may seem odd in such cases. As we saw in the previous section, this NSAP marker is often (and most typically used) with semantically transitive verbs, which cannot occur with **i-** prefixation in declarative clauses. Since clauses such as 12.34-12.37 consist of a nominal-predicate sequence, and a stative predicate at that, it may seem odd, given the factors associated

⁷⁴ This morpheme is discussed below, in this section.

with transitivity that were discussed in the previous section, that the copula would be inflected with this same prefix so often attached to transitive verbs. However, this inflection seems more straightforward when we consider one of our previous conclusions regarding semantic transitivity in Karitiana, namely that the crucial correlate of transitively-marked verbs in the language is the expectation of two macroroles. In prototypical copular clauses such as those above, there are two nominal referents in each clause. This is consistent with the expectations based on the approach to logical structure outlined in Van Valin (2005:55), where it is noted that identificational, attributive, and equative clauses are expected to have two separate thematic referents. The fact that copular clauses are expected to have two referents, even though these referents are not separate participants in the real world (cf. 12.34), may explain the fact that they exhibit similar verb prefixation, when contrasted to many semantically transitive verbs.⁷⁵

Landin (1984:230) suggests that **aka** is transitive, in part because it is prefixed with **na-** in non-embedded clauses. While he does not classify this verb as a copula, he calls it the “transitive verb **-akar**”⁷⁶ ‘be’.” He notes as well that the verb should be considered transitive “on the basis of its co-occurrence with the ergative subject pronoun series.” The presence of the relevant pronouns, which are ergative-like but not, strictly-speaking ergative (as I suggest in Chapter 13), is apparent in the following three clauses:

12.39	ĩn	na-aka-t	taso-t
	1S	TRANS-COP-NFUT	man-COP.AGR
	“I am a man.”		

⁷⁵ This does not imply, though, that the copula is classified as a semantically transitive verb. After all, the **na-** prefix is not in fact a transitivity marker, as we have already mentioned and will discuss in greater detail in Chapter 16.

⁷⁶ The copula described by Landin as **akar**, rather than **aka-t**, since /t/ is frequently lenited in Karitiana, as described in Chapter 10.

12.40	ãn	na-aka-t	jõnso-t
	2S	TRANS-COP-NFUT	woman-COP.AGR
	“You are a woman.”		
12.41	i:tʃa	na-aka-t	opok-ø
	1PL	TRANS-COP-NFUT	white people-COP.AGR
	“We are white people.”		

The clause-initial pronouns in 12.39-12.41 do exhibit ergative-type tendencies, as is evident in Chapter 13. The fact that these pronouns may precede the copula is evidence, to Landin, of the copula’s transitivity. The copula cannot be preceded by one of the absolutive verbal agreement markers mentioned in §12.1 and described in greater detail in Chapter 13. While I would not consider the copula **aka** to be transitive (given the absence of features associated with transitivity as discussed in the previous section), it is worth noting the fact that its morphosyntactic correlates are similar to those of a semantically multivalent verb, that is, one that requires more than one macrorole. Again, this is consistent with the fact that clauses such as those in 12.34-12.41 are expected to have more than one referent according to the approach to argument structure adopted here. For instance, in clause 12.40, there are two nominal referents, **ãn** and **jõnso**, though both of these referents refer to the same participant in the discourse scene.

Given the characteristic **na-** prefixation of the copula, it is worth stressing that the **na-** prefix is not a grammaticized part of the copula. In embedded clauses, Karitiana verbs are non-finite. This is true of the copula as well, which is not prefixed with **na-** in such clauses. Consider the following clause, which can be contrasted with 12.39:

12.42	ĩn opok	aka	tikiri i-pipi:d-i	padni
	1S white person	COP	then 1S.ABS-know-NEG	NEG
	“If I am a white person, I don’t know.”			

Two further observations to be made about the Karitiana copula, which are apparent in examples 12.39, 12.40, and 12.41, are that the copula does not vary according

to the gender of the preceding or following nominal, and that it does not inflect for the number of the preceding *or* following nominal. This is consistent with nearly all verbs in Karitiana, though as we will see in Chapter 15 there are some verbs that do exhibit suppletive inflection for the number of an absolutive nominal.

Typologically, copulas tend to serve as dummy verbs, and do not actually serve as the clausal predicate. Instead, predicate adjective and predicate nominals serve as the predicates in copular clauses. Consider the following observations made by Givón:

Semantically, copular clauses represent permanent or temporary states. Their subject occupies the semantic role of either patient or dative of state. What is more, most of the lexical-semantic load of the predication is not carried by the copular verb itself, but rather by its non-verbal predicate—either an adjective (or adjective phrase; AP) or a noun phrase (or noun phrase; NP)... (2001:119)

As we have seen, the copula does co-occur with predicate nominals as expected. It also occurs with predicate adjectives, as in the following two examples:

12.43	õmbaki jaguar “The jaguar is black/dirty.”	na-aka-r TRANS-COP-NFUT	i-ẽm-ø INT-black/dirty-COP.AGR
12.44	taso man “The man is clever.”	na-aka-r TRANS-COP-NFUT	i-sopipok-ø INT-smart/clever-COP.AGR

Since adjectives such as those found in the predicates of 12.43 and 12.44 occur with verbal prefixes in copular clauses, it may seem based on these sorts of clauses alone that there is not a distinct class of adjectives in Karitiana. However, as we will see in our discussion of adjectives in §13.2, there is in fact evidence for such a class.

Having established the co-occurrence of the copula with predicate nominals and predicate adjectives, I should emphasize that these uses of the copula, so common typologically as noted by Givón, are not the only ones present in Karitiana. As we might expect based on the verbal inflection apparent in the predicates of the two preceding

examples, the Karitiana copula also occurs with verbal predicates. Consider the following examples:

- 12.45 *õmbaki* *na-aka-t* *i-pitʔi-t*
 jaguar TRANS-COP-NFUT INT-eat-COP.AGR
 “The jaguar is eating.”
- 12.46 *i* *na-aka-t* *i-tepik-ø* *ese koroʔop*
 3 TRANS-COP-NFUT INT-dive-COP.AGR water in
 “She is diving into the water.”
- 12.47 *i* *na-aka-t* *i-ambo-t* *ese okiri*
 3 TRANS-COP-NFUT INT-climb-COP.AGR water ELA
 “She is climbing out of the water.”

As we see in these examples, the copula is used with verbal predicates. However, not all verbs may occur in this copular construction. Consider the following ungrammatical possibilities:

- 12.48 **ĩn* *na-aka-t* *naka-pidn-ø* (bola)
 1S TRANS-COP-NFUT NSAP-kick-COP.AGR (ball)
 “I am kicking.” or “I am kicking the ball.”
- 12.49 **i* *na-aka-t* *naka-kip-ø* (hothoroti)
 3 TRANS-COP-NFUT NSAP-cut-COP.AGR (watermelon)
 “He is cutting.” or “He is cutting the watermelon.”

One possibility is that these cases are ungrammatical due to the presence of the **naka-**NSAP morpheme. However, the same clauses remain ungrammatical even when the **naka-** morpheme is replaced with the **i-** intransitive marker found in previous examples. The clauses also remain ungrammatical if the objects (in these cases ‘ball’ and ‘watermelon’) are omitted. Apparently, the reason clauses 12.48 and 12.49 are ungrammatical is simply that the copula in each case is not followed by a semantically intransitive verb. In other words, the copula in Karitiana cannot co-occur with verbs belonging to the class of semantically multivalent verbs, e.g. any of the verbs found in Table 12.2. However, it can co-occur with any of the verbs found in Table 12.1. So while it is not accurate to suggest that the Karitiana copula only occurs with predicate

adjectives and predicate nominals, it is also not accurate to suggest that it occurs with these predicates and all verbs. The copula occurs with predicate nominals, predicate adjectives, and with semantically intransitive verbal predicates⁷⁷.

Recall Givón's characterization of copular clauses as representing permanent or temporary states. Despite the fact that that the copula in Karitiana does not occur with transitive (and therefore prototypically active) verbs, we should observe that this characterization is not generally accurate in Karitiana, since many of the usages of the copula involve very un-stative-like actions, e.g. those in 12.45-12.47. Nevertheless, there is clearly a co-occurrence restriction militating against the use of copula-highly active/semantically transitive verb sequences.

One observation that has yet to be made about the copular construction, which is readily apparent in the above examples, is that the predicate following the copula is followed by a suffix, which surfaces as **-t** if the predicate is vowel-final. If the predicate is consonant final, the suffix takes a null form. Interestingly, this suffix exhibits the same form as the NFUT suffix attached to verbs. In fact, judging from all of the examples so far adduced, the suffix could plausibly be glossed as NFUT. Consider this further example:

12.50	i	na-aka-t	i-hĩ:ĩĩnã-t
	3	TRANS-COP-NFUT	INT-sing-COP.AGR
		"She is singing."	

Note that the form of the predicate in such cases is the same as that found in the intransitive valence construction in Table 12.1, i.e. **i-PREDICATE-t**. In the case of the intransitive verbs in the valence construction, the **-t** was considered a NFUT morpheme,

⁷⁷ These predicates are not resultative-like. This may be due in part to the frequent present-like or ongoing temporal sense associated with the copula construction. See the discussion of tense in the following section.

since it only occurs in predicates with present and past interpretations. There are two reasons, however, that the **-t** suffix attached to copular predicates should **not** be considered a NFUT marker. The first reason is that, in clauses with predicate nominals, the **-t** suffix is still present. The second and strongest reason is that this suffix also occurs in those cases where the relevant predicate represents a future event. In such cases, the copula inflects for future tense, however the predicate retains the **-t** suffix. This is apparent in example 12.51, which can be usefully contrasted with example 12.50 above:

12.51	i	na-aka-j	i-hĩ:ĩjã-t
	3	TRANS-COP-FUT	INT-sing-COP.AGR
		"She will sing."	

Similar examples could be adduced in which a predicate occurring in the future tense, as reflected by the **-j** suffix attached to the copula, still retains the **-t** suffix on the post-copular predicate. In fact, the **-t** suffix is required for all vowel-final predicates following the copula, and for this reason I have chosen to gloss it as a "copular agreement" morpheme.

As Landin (1978:9.2) notes, the verb **aka-t** may be used to express the present continuous tense in Karitiana. In such uses, Landin suggests that **aka-t** is used to express "on-going activities and also internal emotions and feelings or states." This generalization is also supported by my data, as reflected by examples such as 12.50 as well as 12.52 and 12.53 below.

12.52	õwã	na-aka-t	i-pomã-t
	child	TRANS-COP-NFUT	INT-play-COP.AGR
		"The child is playing."	
12.53	pat	na-aka-t	i-tãm-ø
	macaw	TRANS-COP-NFUT	INT-fly-COP.AGR
		"The macaw is flying."	

In other words, the copula **aka** may be used as part of a construction whose usage is more consistent with tense semantics than copula semantics. Other languages, including English and Romance languages such as Portuguese (with which the Karitiana have had extensive contact over the past 50 years or so), exhibit similar overlap, in which a copula is used to express present-progressive events. However, despite the fact that the copula can be used to help express present tense semantics, it seems that this usage is less robust than it was at the time of Landin's description. In general, it seems that, when used to describe a present tense action, the copula construction typically co-occurs with one of the present-progressive aspect markers discussed in §12.5. (The present tense construals reflected in the glosses of examples such as 12.52 and 12.53 *can* be replaced by past-tense construals, depending on the context.)

When linking a nominal to a stative predicate such as a predicate nominal or a predicate adjective, the copula serves an equative function. However, some equative clauses in Karitiana do not require **aka**. When the predicate of a clause is adjectival, the copula is optional. Consider the following example, contrasted with 12.43 above:

12.54 ōmbaki ē̃m
 jaguar black/dirty
 "The jaguar is black." or "The jaguar is dirty."

The copula is not optional with predicate nominals however. Consider:

12.55 ōmbaki na-aka-t hīm-ø
 jaguar TRANS-COP-NFUT animal-COP.AGR
 "The jaguar is an animal."

12.56 *ōmbaki hīm
 jaguar animal
 "The jaguar is an animal."⁷⁸

⁷⁸ This distinction between predicate adjectives and predicate nominals often corresponds to a distinction between stage (more temporary qualities) and individual (stative or permanent qualities) predication. This is evident if we contrast the second reading of 12.54 with 12.55.

§12.4 Tense

The tense morphemes in Karitiana vary according to the type of declarative construction utilized. The following table encapsulates the tense suffixes of Karitiana. The analysis represented by this table will be explored in this section, however it is worth presenting the table as a reference for the following discussion:

Copula construction (<i>na-aka-tense</i>) SAP construction (<i>ta[ka]/na[ka]-Verb-tense</i>)			
Nonfuture		Future	
C-final	V-final	C-final	V-final
-∅	-t	-i	-j
Verb focus construction (<i>piri-Verb-tense</i>)			
Nonfuture		Future	
C-final	V-final	-ndaki	
-in	-n		
Valence construction with intransitive verbs (<i>i-Verb-tense</i>)			
Nonfuture		Future	
C-final	V-final	Tense-suffixation disallowed	
-∅	-t		

Table 12.3 The binary tense system in Karitiana.

The basic tense patterns in Karitiana are outlined in Landin's (1978:9.1-9.4) pedagogically-oriented discussion of Karitiana. The distinction between aspect and tense is not made in that study, though in Landin (1984:229-230) some relevant observations on aspect are made. Some conclusions about the tense system of Karitiana are apparent in the glosses of Storto (1999, 2003), though in neither of these works is the tense/aspect system actually delineated. In this section I briefly outline the tense morphology, leaving the discussion of aspect for the following section.

Karitiana exhibits a binary tense system, with verb suffixes distinguishing actions that have occurred prior to or at the same time as a given utterance from those that have yet to occur. This future/non-future distinction was apparent in the preceding discussion of the copula construction, in which it was found that the -t suffix on the copula referred

to nonfuture events (often present in the case of the copula), while a *-j* suffix (see example 12.51) is used to denote the future status of predicates following the inflected copula. This distinction is relevant to other constructions as well. Before examining further examples, it is important to bear in mind a caveat based on findings from similar systems in other languages. Comrie (1985:49) makes the following observations:

Turning to the possibility of a future versus non-future binary split, it is important to be able to distinguish this as a tense split from a split which is occasioned primarily by mood, but gives the impression of a tense split because of the implicature links between certain modal and time reference oppositions. Thus, in Dyrbal, for instance, although it would at first appear that there is a split between future and non-future, investigation suggests rather that there is a distinction between realis and irrealis, with future and (most present) time reference happening to be on opposite sides of the dividing line.

While this is an important caveat to consider when examining binary tense systems, it does in fact seem that the putative future/non-future system of Karitiana can only be understood in terms of tense, rather than mood. In declarative clauses, we observe that all events occurring in the past or present must receive the same nonfuture verbal inflection, while in such clauses verbs relaying a future event must have the same future suffix added. (This will become clearer in the examples below.) In other words, there is not a *tendency* for nonfuture events to receive a certain suffix that could alternatively be glossed as irrealis—in such clauses there is an obvious *rule* of suffixation that correlates precisely with the future/non-future distinction.⁷⁹ This sort of tense system is relatively uncommon in the world's languages, though it is attested in, for instance, Hua, a language of New Guinea. Another case of such a language is the Amazonian language

⁷⁹ In a footnote, Storto (1999:158) suggests the following: "The only tense marker that clearly marks tense in Karitiana is the nonfuture suffix." She suggests that the *(-i/-j)* suffix in fact serves as an irrealis marker since "it also occurs in nonfuture environments." However, the only clear case I can find of an irrealis usage of the *-i* morpheme in Storto's data is when it is supposedly attached to the adverbial negational **padn**, which could be analyzed as one morpheme, **padni**. Even if we except this analysis of the negational, this evidence seems insufficient to consider *-i/-j* an irrealis marker. I should also note that the decision to consider the *(-i/-j)* suffix to be an irrealis marker implies a typologically unusual contrast between irrealis and nonfuture actions, rather than a more straightforward nonfuture/future contrast (or irrealis/realis, for that matter).

Warí, which has a “past/present” tense as well as a “future tense” (Everett and Kern 1997:322-323).⁸⁰ With respect to Tupí languages, there is relatively little data on their tense systems in the literature. Jensen’s (1998:536-537) survey of Tupí-Guaraní languages is significant in that its discussion of tense makes no mention of a present tense marker in any Tupí-Guaraní language. Past and future (sometimes these are actually desiderative) markers are apparent in her survey, however, perhaps suggesting that a two-part tense system is more characteristic of Tupí languages. However, as Rodrigues (1999:118) points out, it appears that Tupí languages vary significantly in the manner in which tense categories are instantiated. (He also suggests that this is true of the categories of mood and aspect.) It is hoped that future basic studies will enrich the literature on Tupí tense morphology, allowing for the better understanding of tense patterns in Tupí more generally.⁸¹

Having mentioned the general pattern of the nonfuture/future distinction, let me illustrate the tense opposition evident in declarative clauses in Karitiana. Consider the following examples of clauses with nonfuture interpretations:

- 12.57 ñn naka-mĩ:-t i-o
 1S NSAP-hit-NFUT 1S.GEN-head
 “I hit my head.” or “I’m hitting my head.”
- 12.58 ãn naka-ʔi-t asiriti
 2S NSAP-eat-NFUT banana
 “You ate the banana.” or “You’re eating the banana.”

⁸⁰ Significantly, the authors note that there is a realis past/present inflection, as well as a realis future inflection in Warí. This makes Warí an interesting example of a language that clearly distinguishes between irrealis and realis while also maintaining a binary tense system that appeals to the nonfuture/future dichotomy.

⁸¹ This is not to imply that there is no available information on Tupí tense systems. For instance, Crofts (1985:68) notes that in Tupí-Mundurukú, present progressive meanings are expressed via root reduplication. This calls to mind an observation made in Chapter 10, in which I discussed the examples of reduplication in Karitiana. I noted then that, while not productive, reduplication in Karitiana tends to be found on verbs that involve an internal temporal structure that can be characterized as re-iterative action, e.g. **terekterek** (‘dance’) and **taktan** (‘swim’). This reduplication applies to verbs, and does not mark distributive nominals, for instance.

- 12.59 i-ta-seʔi-t
 1S.ABS-SAP-drink-NFUT
 "I drank." or "I'm drinking."
- 12.60 i-ta-iri-t
 1S.ABS-SAP-come-NFUT
 "I came." or "I'm coming."

As we see in these examples, the $-t$ suffix designates an event as occurring in the past or present. However, it should be noted that in the case of present ongoing events, one of the progressive aspect markers described in the following section is typically employed. Nevertheless, verbs occurring without aspect inflection can be interpreted as occurring in the present in certain environments. For instance, the present readings found in examples 12.57-12.60 apply to situations in which the speech act participants are witnessing an ongoing event. In such cases, the tense suffix does not change, but the interpretation is of a present, rather than past, event. I should stress though that the default interpretation associated with the $-t$ suffix is of a past-tense event, when the relevant verb occurs without any aspect suffixes.

In clauses with consonant-final predicates, unlike those in examples 12.57-12.60, the $-t$ suffix does not occur. Nevertheless, the events described by such predicates are construed as having occurred in the nonfuture. Consider the following examples (in 12.61-12.64, the translations are based on the default past interpretations):

- 12.61 ĩn naka-m-tat-ø hĩm pisip ambi-p
 1S NSAP-CAUS-go-NFUT animal meat house-ALL
 "I sent the meat to the house."
- 12.62 ĩn naka-atip-ø i
 1S NSAP-meet-NFUT 3
 "I met her."
- 12.63 a-ta-tepik-ø
 2S.ABS-SAP-dive-NFUT
 "You dove."

12.72 ɪn naka-pidn-i/aj manga
 1S NSAP-kick-FUT manga
 "I will kick the manga."

Note that, in cases 12.69 and 12.70, the stem-final /p/ and /t/ consonants surface in their lenited forms, in accordance with the lenition process discussed in Chapter 10.

There is some peculiar, as yet not understood allomorphy that occasionally surfaces in future tense marking. This is apparent in example 12.72. In this example, we see that the verb can be suffixed with either **-i** or **-aj**, while maintaining a future tense interpretation. Landin (1978:9.2) suggests that the **-aj** form is required after all consonants besides /p/ or /t/. However, this is not the case, or at least it is no longer the case. Instead, the **-aj** suffix now surfaces *optionally* in some cases as in 12.72, and cannot be predicted by phonological rule. (For instance **-aj** cannot be suffixed to the /k/-final verb in 12.71.) However, we can state confidently that the **-i** future suffix can always be attached to consonant-final verbs in the future tense.

Based on the above examples, we can conclude that, in copular clauses and clauses with Speech Act Participant morphology, the tense marking in Karitiana adheres to the general pattern found in Table 12.4 (and also evident in the more complete Table 12.3 above):

Nonfuture tense verb/copula		Future tense verb/copula	
C-final	V-final	C-final	V-final
-∅	-t	-i	-j

Table 12.4 Tense in clauses with copula and SAP-inflected verbs.

Table 12.4 does not reflect the full range of tense inflections evident in Karitiana. As we have already noted, the copular construction occasionally functions as a periphrastic present-progressive construction. However, with respect to the future and nonfuture tenses, there is also variation once other affirmative clause types are considered. While

copular and Speech Act Participant clauses are very frequent, these are not the only types of affirmative-clause⁸² constructions in Karitiana. In fact, these are only two of the four main affirmative-type constructions used in Karitiana affirmative clauses, as outlined in §12.1. Interestingly, the “Verb-focus” construction is inflected for tense in a different manner than the copula and verbs in the SAP or valence constructions. Consider the following examples of tense-inflected verbs in the Verb-focus construction:

- 12.73 i-piri-tat-ĩn⁸³
 1S.ABS-VB.FOC-go-NFUT
 “I went.”
- 12.74 pir-aŋgat-ĩn i
 VB.FOC-stand up-NFUT 3
 “He stood up.”
- 12.75 a-pi-kisep-ĩn ãn
 2S.ABS-VB.FOC-jump-NFUT 2S
 “You jumped.”

As we see in examples 12.73-12.75, if the verb root in a Verb-focus construction is consonant final, the **-ĩn** suffix is employed to denote nonfuture events. Vowel-final verb roots in this construction are inflected for nonfuture tense via an **-n** suffix (sometimes **-dn**, cf. Chapter 8), as we see in the following two examples:

- 12.76 i-pit-pitʔi-n ãn
 1S.ABS-VB.FOC-eat-NFUT 1S
 “I ate.”
- 12.77 i-piri-karĩna-n
 1S.ABS-VB.FOC-turn-NFUT
 “I turned.”

⁸² Here I am simply referring to clauses that are not used as exclamatory remarks, as interrogatives, or as imperatives. For information on the relative frequency of the Speech Act Participant construction, see Chapter 16.

⁸³ This suffix’s vowel is often glide-like, and in some cases the suffix, even when following a consonant, could be transcribed as a syllabic nasal.

When referring to future events, verbs in this construction are suffixed with **-ndaki**. This is evident when clauses such as 12.76 and 12.77 are contrasted with their future counterparts, 12.78 and 12.79 below:

12.78	i-pit-pit?i-ndaki	ĩn	(dĩbm	onĩõnĩ)
	1S.ABS-VB.FOC-eat-FUT	1S	(tomorrow	next)
	“I will eat (the day after tomorrow).”			
12.79	i-piri-karĩna-ndaki	ĩn		
	1S.ABS-VB.FOC-turn-FUT	1S		
	“I will turn.”			

This future suffix occasionally surfaces as **-daki**,⁸⁴ due to the variation in the production of /n/ in Karitiana, which is described in Chapter 8.

We see, then, that while the future/nonfuture distinction seems to apply across Karitiana affirmative constructions (whether in the SAP, valence, or copular construction) the form of these suffixes does vary significantly in the case of the Verb-focus construction.

In a few cases I have transcribed, the suffix **-ndaki** occurs with verbs in other constructions, such as those marked with the speech-act-participant-oriented **na(ka)-/ta(ka)-** prefix set. In these cases, it represents actions that are about to happen:

12.80	i-ta-amhana-ndaki	ĩn		
	1S.ABS-SAP-rest-FUT	1S		
	“I will rest now.” or “I’m about to rest.”			

Before concluding this discussion of Karitiana tense, we must consider briefly the tense inflections associated with the valence construction, in which semantically intransitive verbs are prefixed with **i-**. In the case of nonfuture events, this construction inflects in the same manner as the copula and verbs in the SAP construction inflect, i.e.

⁸⁴ Landin (1978:9.3) transcribes this suffix as **anyki**. In some cases in my data it is transcribed as **ndiki**, which is generally consistent with Landin’s transcription. Apparently the first vowel is reduced in some cases.

with a **-t** suffix following vowel-final verbs. This is apparent in the examples of Tables 12.1, one of which I recapitulate below for convenience:

12.81 ĩn i-pikinā-t
 1S INT-run-NFUT
 “I ran.”

Given the presence of the **-t** suffix in such examples, we might predict that the future tense in the valence construction would be expressed via the **-i/-j** suffix alternation. However, the behavior of future semantically intransitive verbs in the valence construction does not fit the general paradigm found in these other constructions. In fact, semantically intransitive verbs marked with the prefix **i-** cannot occur in the future tense. Consider the following ungrammatical example:

12.82 *ĩn i-karĩna-j
 1S INT-turn-FUT
 “I will turn.”

When describing future intransitive events, Karitiana grammar does not allow for the basic valence construction to co-occur with tense marking. Instead, the copular construction may be used to represent future semantically monovalent actions, in a manner similar to the copula’s use in the expression of present-progressive semantically monovalent actions. The way in which the copula construction is utilized in such cases is evident in example 12.83 below. (This utilization regularly occurs with all intransitive verbs rather than as an irregular sort of suppletion.)

12.83 ĩn na-aka-j i-karĩna-t
 1S NSAP-COP-FUT INT-turn-COP.AGR
 “I will turn.”

The fact that the inflected copular auxiliary verb can only be used to express present and future tenses in the case of semantically intransitive verbs illustrates one of the recurring

themes of this study, namely that the semantically transitive/semantically intransitive dichotomy has profound effects on various aspects of Karitiana morphosyntax.

Given the above examples and analyses, we can make some basic conclusions regarding the binary tense system of Karitiana. First, the tense inflections vary in affirmative clauses, depending on whether the inflected form is the copula, a verb occurring in the Speech Act Participant construction, a semantically intransitive verb occurring in the valence construction, or a verb that occurs in the Verb-focus construction. In other words, tense suffixation in Karitiana varies according to the construction type characterizing a given clause. (The morphology of the Speech Act Participant and Verb-focus constructions, outlined in §12.1, will be described in greater detail in §12.8-§12.9.) The binary tense suffix forms of Karitiana are summarized in Table 12.3, which was presented at the outset of this discussion as a reference.

While the suffixes of Karitiana do in fact generally reflect a binary tense system, as suggested by Table 12.3, we should recall as well that, for semantically intransitive actions, a present progressive construal of a given verb can also be denoted in some cases via the periphrastic strategy of placing the copula prior to the relevant intransitive verb, which is inflected with the *i-* prefix and suffixed with the *-t* COP.AGR marker.

§12.5 Aspect

Mention of the copular present-progressive construction serves as a natural ligature to the discussion of aspect in Karitiana. As we have seen, the progressive aspect can be denoted in the case of some semantically intransitive verbs by implementing a copular auxiliary. (See e.g. 12.65.) However, the progressive aspect can also be denoted via other morphological means, specifically a series of verbal suffixes.

Before delineating the aspectual suffixes, it is important to be clear about the definitions of the aspectual terms employed here. In keeping with Comrie (1976:25), I consider “imperfective” any aspect inflection that refers explicitly to the internal temporal structure of an action. The imperfective aspect is therefore opposed to the perfective, which does not refer to an event’s internal temporal structure. The Karitiana aspect enclitics are therefore, as we will see below, imperfective markers. However, as Comrie notes, the category of imperfectivity can be further broken down into two broad categories, the habitual and the continuous. As we will see the Karitiana aspect markers do not refer to habitually occurring actions, and should therefore be classified as continuous markers. According to Comrie’s taxonomy of aspect, the category of continuous aspect can be further divided into two broad categories, progressive and nonprogressive. The former can be characterized as describing an action as ongoing (regardless of tense), and with nonstative connotations. (1976:35) This characterization seems to hold true of Karitiana aspect markers, and for that reason I employ the term progressive in referring to the relevant suffixes. It would not be improper to apply alternate terms such as imperfective or continuous, however such terms would be less specific according to the chosen taxonomy. That taxonomy is represented by the following diagram, taken from Comrie (1976:25):

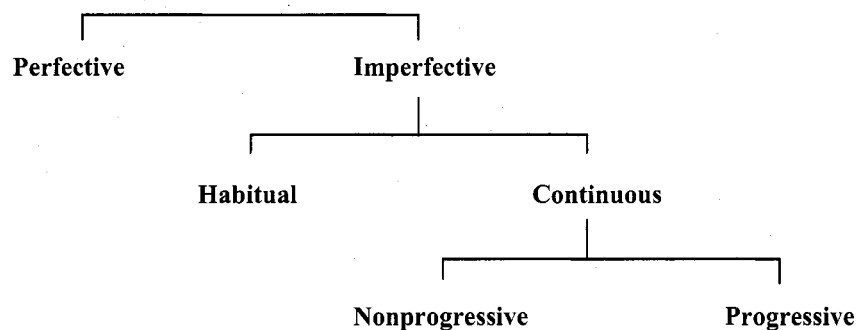


Figure 12.1 General classification of aspect types.

Karitiana aspect has been described briefly in Landin (1984), who notes that the aspect markers of the language vary according to the position of the “subject” of the clause. As we will see in the examples below (and in those found in the discussion of grammatical relations in Chapter 15) the aspect markers can actually vary according to the position of the nominative (S or A) nominal of a given clause. However, two of the aspect markers vary instead according to the plurality of the absolutive (S or O) nominal. Due to this interaction of factors, Karitiana employs at least five separate aspect markers.

Let me begin by exemplifying the aspect markers with clauses that contrast only according to these suffixes:

12.84	i	na-oki-tiso-t	sa:ra
	3	TRANS-kill-PROG.SG.STAND-NFUT	alligator
		“He is killing the alligator.” (He’s standing)	
12.85	i	na-oki-tika-t	sa:ra
	3	TRANS-kill-PROG.SG.MOTION-NFUT	alligator
		“He is killing the alligator.” (He’s in motion)	
12.86	i	na-oki-tĩpã-t	sa:ra
	3	TRANS-kill-PROG.SG.SEAT-NFUT	alligator
		“He is killing the alligator.” (He’s right on top of the alligator)	

All of the above aspect markers are mentioned in Landin (1984:229-230). However, my interpretation of the aspect markers differs from Landin’s in that I consider them to be separate from the tense suffix, rather than fusional tense/aspect forms. If we do not choose the suggested analysis, then we must consider it coincidental that four of the five aspect markers (including those in examples 12.89 and 12.90 below) end in **-t**. The only aspect marker which is not followed by **-t** is consonant-final (**tisip**), and as we have already seen the verbs in the nonfuture tense are not suffixed with **-t** anyhow when consonant final. Therefore, all of the aspect markers are consistent with this interpretation. Also, the account of aspect suffixation I am suggesting concords with the

fact that the progressive markers cannot be used to yield future progressive readings. In fact, the aspect markers evinced above can only occur in the nonfuture tense, with a present progressive interpretation. For instance, the following variation of 12.86 is ungrammatical:

12.87	*i	na-oki-tɨnã-j	sara
	3	TRANS-kill-PROG.SG.SEAT-FUT	alligator
		“He will be killing the alligator.”	

The aspect markers, like the tense suffixes in Karitiana, do not generally vary according to the transitivity of the verb, as we see when contrasting examples such as 12.84-12.86 with 12.88:

12.88	õmbaki	i-pitʔi-tiso/tɨna/tika-t	
	jaguar	INT-eat-PROG.SG-NFUT	
		“The jaguar is eating.” ⁸⁵ (Standing, seated, or in motion, respectively.)	

Any of the aspect markers in 12.88 can be suffixed to the given intransitive verb, yielding a present progressive reading.

One important observation about the aspect markers is that they can reflect the body posture of the more agentive of two nominals in a syntactically transitive clause, or of the solitary nominal of a syntactically intransitive clause (cf. Landin 1984:229). So, in examples 12.84-12.86, the relevant body posture connotations reflect the position of the person killing the alligator, while in example 12.88 the relevant posture permutations reflect various possible postures of the jaguar. Interestingly, these aspect markers *can* reflect the body posture of the relevant nominals, however the relevant body posture semantics are not obtained for all speakers. Several Karitiana young adults I have spoken with insist there is no semantic distinction between examples 12.84-12.86, for instance.

⁸⁵ There are two verbs for the process of eating. The verb in this example is classified as intransitive, while the other, “i”, is classified as transitive.

This suggests that the grammaticization of these body posture forms into progressive aspect markers is resulting in the loss of the body posture semantics first noted by Landin.

There are two aspect markers in Karitiana that reflect the plurality of the absolutive nominal. These markers are **-gi** and **-tisip**, which are found in the following sample variations of clause 12.88.

- | | | |
|-------|------------------|---|
| 12.89 | ōmbaki
jaguar | i-pitʔi-tisip-ø
INT-eat-PROG.PL-NFUT |
| | | “The jaguars are eating.” |
| 12.90 | ōmbaki
jaguar | i-pitʔi-ŋgi-t
INT-eat-PROG.PL-NFUT |
| | | “The jaguars are eating.” |

This number and aspect conflation is returned to in the discussion of grammatical relations in Chapter 15, where we provide further examples demonstrating that these two aspect markers inflect for the number of the absolutive nominal.

It should be noted that Landin (1984:229) suggests the suffix **-tisip** reflects a supine posture of the “subject” nominal. However, the body posture semantics of this aspect marker have apparently been completely lost.

The conflation of body posture semantics with aspect is not unique to Karitiana. In fact, this phenomenon surfaces in a related manner in English, in expressions such as “He’s sitting pretty right about now,” in which the body posture verb is now used in part to express aspectual connotations. For other crosslinguistic examples, I refer the reader to Newman (2002).

The conflation of plurality and aspect marking is also not unique to Karitiana, as demonstrated in previous studies of so-called “pluractionality” (cf. Van Geenhoven

2001). Nevertheless, Karitiana aspect markers appear to be unique typologically in their conflation of both body posture and number distinctions.

One final comment that should be made about the form of Karitiana aspect suffixes relates to their position within the verbal template. Note that, in the above examples, we see that the aspect suffixes occur closer to the root than the tense suffixes.

This pattern of aspect-to-verb proximity has been found in a number of languages. As

Van Valin (2005:11) notes:

If, for example, tense is a prefix and aspect is a suffix on the verb, then no relative ordering can be determined and therefore this claim is not applicable; if, on the other hand, both are suffixes, then the claim is that the aspect suffix would be between the verb stem and the tense suffix... A large number of languages are surveyed in Foley and Van Valin (1984) and Bybee (1985), and no exceptions to this general claim are found.

§12.6 Desiderative inflection

As was first noted in Landin (1978:11.1), there is a verbal suffix in Karitiana that signifies desire. According to Landin, this suffix is used in yes or no questions. He provides the following examples, which I have corroborated:

- | | | | |
|-------|---------------------------------|------------------------------|------------------|
| 12.91 | a-tat-awak
2S.ABS-go-DES | ān-o
2S-Q.NOM | (hĩ)
Q |
| | "Do you want to go?" | | |
| 12.92 | a-soʔot-owak
2S.ABS-look-DES | ān-o
2S-Q.NOM | (hĩ)
Q |
| | "Do you want to look?" | | |
| 12.93 | ān
2S | i-amāŋ-īwak
IRR-plant-DES | ān-o
2S-Q.NOM |
| | "Do you want to plant it?" | | |

These examples demonstrate the form the desiderative suffix takes following consonants.

Specifically, the suffix takes the **-Vwak** form, where the first vowel is the same as the final vowel of the verb root, in those cases where the root ends in a non-nasal consonant.

If the verb ends in a nasal consonant, as is the case in 12.93, then the first vowel of the desiderative suffix is **ĩ**. In those cases in which the verb root ends in a vowel, the suffix

simply takes the **-wak** form, with no intervening vowel. This is apparent in the following example from my data:

12.94 a-pitʔi-wak ãn-o (hĩ)
 2S.ABS-go-DES 2S-Q.NOM Q
 "Do you want to eat?"

One important observation about this suffix is that its use is not in fact restricted to yes/no questions such as those presented in the above examples. For instance, in the following clause, the suffix is used to describe the speaker's desire to eat:

12.95 ĩn i-pitʔi-wak
 1S INT-eat-DES
 "I want to eat."

Significantly, though, the suffix can also be used to yield a different, non-desiderative, interpretation. When it occurs with verbs that are marked with SAP morphology, this is the case. In such cases, the suffix is employed to denote events that nearly occurred.

Consider the following variation of clause 12.95:

12.96 i-ta-pitʔi-wak ĩn
 1S.ABS-SAP-eat-DES 1S
 "I almost ate."

The contrastive meanings of **-wak** in the SAP construction (12.96) and the valence construction (12.95) are also apparent in the following contrastive clauses:

12.97 i-taka-tat-awak ĩn
 1S.ABS-SAP-go-DES 1S
 "I almost went."

12.98 ĩn i-tat-awak
 1S INT-go-DES
 "I want to go."

Examples 12.94-12.98 contain syntactically intransitive clauses, with only one nominal argument. The suffix can also be used in syntactically transitive clauses, however. This is evident in the following example:

12.99	ĩn	na-kindop-owak	karāmā tōm
	1S	NSAP-open-DES	door
		“I almost opened the door.”	

It seems clear then that the desiderative suffix in Karitiana is not restricted to usage in yes/no questions, though this is in fact one of the central functions of the suffix. However, the form is also used in cases such as those in 12.95-12.99.

§12.7 Evidentiality

Karitiana employs an evidentiality suffix that may be optionally attached to verb stems in order to suggest that the speaker heard second-hand that a particular event occurred. Willet (1988), in his crosslinguistic study of evidentiality, makes some observations that suggest that Karitiana evidentiality is fairly unremarkable typologically. First, Willet (1988:57) notes that:

Earlier studies treating epistemic contrasts (e.g. Akatsuka 1985; Bybee 1985; Givón 1982) have shown that the primary evidential parameter expressed in natural language is that of **direct evidence** versus **indirect evidence**; that is, whether the source of the speaker’s information is of a primary or a secondary nature.

Willet elaborates on this observation by noting that, according to his survey, all evidential markers can be generally classified as instantiating the categories of “Direct-Attested” evidence or “Indirect” evidence. The latter category can be further sub-divided into the categories of “Reported” and “Inferring” evidentials. Reported indirect markers include so-called “hearsay” evidentials. These evidentials are generally used to suggest that a given reported event is only known about (by the speaker) via second-hand or third-hand knowledge. According to Willet’s data (1988:58), “reported” evidentials constitute the most common sub-category of evidentials. In other words, hearsay evidentials are quite common crosslinguistically.

Another observation on evidentials made by Willet, which is relevant for our purposes, relates to the form often taken by such evidentials. Willet notes (1988:64) that

the most common way grammaticized evidential contrasts are instantiated is through verb suffixes. Based on this and the preceding observation, then, we can conclude that one of the most frequent sorts of evidential markers in the world's languages are suffixes that serve as hearsay evidentials, i.e. suffixes that reflect a speaker's lessened degree of certainty about a given event, since s/he has only heard about the event from another person.

In Karitiana, we find exactly this sort of evidential: a verb suffix used as a hearsay evidential. This pattern has been observed in at least one other Tupí language, Tupí-Suruí, a relatively proximate (geographically) Tupí-Mondé language. Rodrigues (1999:119) suggests that evidentiality is only found in a few Tupí languages. The evidence that it is found in Suruí comes from clauses such as the following, taken from Bontkes and Dooley (1985:167):

12.100	é	Mérésór	ĩyã	aka	be	káne
	DEM	Name	HEARSAY	kill	COMP	want
	"He wanted to kill Meresor, I heard."					

As we see in this case, the morpheme **ĩyã** serves as a hearsay evidential in Suruí.

Similarly, in Karitiana, we find a hearsay evidential marker occurring in clauses such as the following:

12.101	a-taka-tat-sarit-ø	
	2S.ABS-NSAP-go-EVID-NFUT	
	"You went, I heard."	
12.102	i	naka-pidn-sarit-ø
	3	NSAP-kick-EVID-NFUT
		bola
		ball
	"He kicked the ball, I heard."	

Two important observations about this suffix can be made based on these examples. First it should be noted that the form of the evidential does not vary according to whether or not the preceding verb is classified as semantically transitive or intransitive. Second, and

more interestingly, we see in both of these examples that the hearsay evidential marking is compatible with Speech Act Participant morphology. This is noteworthy since the relevant morpheme, glossed above as NSAP, only occurs in declarative clauses and has been previously treated (Storto 1999) as a declarative mood marker. In some languages, declarative markers co-occur with events that were directly witnessed by the speaker and, generally speaking, declarative mood markers reflect a high degree of epistemic certainty regarding the conveyed event. For instance, Willet (1988:65) notes that in Patwin, described events occur with a *bee* declarative-type particle when they were witnessed first-hand by the speaker. Event descriptions that are based on second or third-hand information occur with an *ʔupu* hearsay evidential, but not with the *bee* particle. In other words, in languages such as Patwin the hearsay evidential and the declarative marker are mutually-exclusive, with the latter reflecting a degree of epistemic certainty that is inconsistent with hearsay evidence. This mutual-exclusivity does not hold in Karitiana. In fact, I believe that this absence of mutual-exclusivity suggests that the **na(ka)-ta(ka)-** set of prefixes, previously glossed as “affirmative” (Landin 1984:225) or “declarative” (Storto 1999) markers, should not be considered affirmative/declarative markers. There are other reasons for this conclusion, which are inferable from the outline of Karitiana affirmative constructions in §12.1. These reasons are more readily apparent in the discussion of the prefixes associated with the “Speech Act Participant” construction, found in the following section, as well as in the discussion of voice phenomena in Chapter 16. However, I should stress from the outset of the following discussion that the **na(ka)-/ta(ka)-** prefix set *usually* occurs in declarative clauses, and there is a strong

association, though not a direct correlation, between the relevant prefixes and declarative semantics.

§12.8 The **na(ka)**-/**ta(ka)**- prefix set

Of the four basic affirmative construction types outlined in §12.1, two have been examined in greater detail. We have examined clauses in the copula construction and the valence construction. However, the “Speech Act Participant” construction and the “Verb-focus” construction have yet to be considered in great detail. I believe that these constructions are best understood, given their pragmatic and semantic correlates, as *voices* in Karitiana. In Chapter 16, I offer cognitively-oriented accounts of both of these constructions, utilizing the framework of relevant studies such as Langacker (2002) and Shibatani (2006). For now, I will direct my focus towards providing a description of the morphology of the relevant constructions.

As mentioned in the preceding section, Storto (1999) considers clauses containing predicates inflected with a **na(ka)**/**ta(ka)**- prefix to be declarative clauses. This characterization essentially adopts Landin’s (1984:224-225) description of such clauses, which he considers “affirmatives.” In Storto (1999), verbs inflected with one of the **na(ka)**/**ta(ka)**- prefixes are said to represent pragmatically unmarked declarative clauses, i.e. they do not serve in responses to polar questions⁸⁶, nor in imperative or negative statements. In Landin (1984) affirmative clauses, denoted by **na(ka)**/**ta(ka)**- verb prefixation, are also understood to be the basic type of declarative clauses in Karitiana.

⁸⁶ In such responses, the Verb-focus construction, outlined in the following section, is typically used.

In many,⁸⁷ though certainly not all, declarative clauses in Karitiana, the verb is in fact prefixed with either **na(ka)-** or **ta(ka)-**. This is evident in the following four sample clauses:

- | | | | | | |
|--------|-------|-------------------------------|--------------------------|-----------|-----|
| 12.103 | i | naka -mĩ:t | õnĩ | taso | aka |
| | 3 | NSAP-hit-NFUT | DEM.DIST | man | DET |
| | | "He hit that man." | | | |
| | | | | | |
| 12.104 | kaʔit | i-taka -mbík-tĩpã-t | | ĩn | |
| | today | 1S.ABS-SAP-sit-PROG-NFUT | | 1S | |
| | | "Today I'm sitting." | | | |
| | | | | | |
| 12.105 | kaʔit | ĩn | naka -mĩ:t-tĩpã-t | | i |
| | today | 1S | NSAP-hit-PROG-NFUT | | 3 |
| | | "Today I'm hitting him." | | | |
| | | | | | |
| 12.106 | ãn | naka -i-j | | kojpa | |
| | 2S | NSAP-eat.TRANS-FUT | | pineapple | |
| | | "You will eat the pineapple." | | | |

Each of the above highlighted morphemes (glossed as SAP or NSAP) has at least one alternate allomorph. Specifically, both **taka-** and **naka-** also occur without their final syllable, as **ta-** and **na-**, respectively. As Landin notes (1984:225), these reduced forms occur prior to unstressed syllables.⁸⁸ This is apparent in the following examples, in which the relevant morphemes occur adjacent to unstressed syllables, unlike the above examples with monosyllabic verb roots (recall that stress is typically word-final in Karitiana):

- | | | | |
|--------|--------------------------|---------------------|------------|
| 12.107 | i-ta -aggár-i | | ĩn |
| | 1S.ABS-SAP-stand.up-FUT | | 1S |
| | "I'm going to stand up." | | |
| | | | |
| 12.108 | ĩn | na -kĩndóp-ø | karãma tãm |
| | 1S | NSAP-open-NFUT | door |
| | "I opened the door." | | |

⁸⁷ In Chapter 16 I present data suggesting that the majority of matrix clauses in Karitiana discourse occur in the Speech Act Participant voice.

⁸⁸ Landin states the following: "The presence of the particle **-ka-** is simply explained on the basis of a phonological rule which inserts this particle preceding a verb root with initial stress." I choose to consider the basic forms of the relevant prefixes to be **naka-** and **taka-**, since the elision of **ka** seems more natural than its insertion.

- 12.109 i-ta-kisép-ø ĩn
 1S.ABS-SAP-jump-NFUT 1S
 "I jumped."
- 12.110 i na-oków-i i-ɲóŋǒ
 3 NSAP-break-FUT 3.GEN-arm
 "She's gonna break his arm."

When examples 12.107-12.110 are contrasted with examples such as 12.103-12.106, we see that in fact the absence of **ka** can be explained according to phonological factors. The verbs in 12.107-12.110 are unstressed initially, while those in 12.103-12.106 *are* stressed initially.

Interestingly, the **naka-** prefix has another allomorph, which surfaces in discourse and, less frequently, in slower elicited contexts. This allomorph is **ga-**, and it occurs in exactly the same contexts as **naka-**. For example, contrast 12.105 and 12.106 with the following examples:

- 12.111 kaʔit ĩn ga-mĩ-tĩɲǎ-t i
 today 1S NSAP-hit-PROG-NFUT 3
 "Today I'm hitting him."
- 12.112 ān ga-i-j kojpa
 2S NSAP-eat.TRANS-FUT pineapple
 "You will eat the pineapple."

During the initial stages of my analysis, it appeared that this allomorph was a separate morpheme altogether, marking semantically transitive verbs much as **i-** is used to mark semantically intransitive verbs. However, it became apparent that **ga-** was used in the same contexts as **naka-**, and that there is no semantic distinction between them. This is supported by the fact that, when Karitiana are played segments of discourse with **ga-**

inflected verbs, and are asked to repeat the relevant segments, they often replace **ga-** with **naka-**, insisting there is no difference between the forms.⁸⁹

Clauses such as 12.103-12.110 help us begin to understand the distinctions between the **na(ka)-** prefix and its **ta(ka)-** counterpart. Based on examples such as these, it appears that **na(ka)-** is typically used with semantically transitive verbs (those from the set represented in Table 12.2) in declarative clauses, while **ta(ka)-** is prefixed to semantically intransitive verbs (those from the set represented in Table 12.1) in such clauses. However, while this assessment often holds true, the situation cannot be described so simply. There are cases in which the **na(ka)-** prefix is attached to semantically intransitive verbs. Specifically, when the argument of such a verb is a third-person referent, the **na(ka)-** prefix is normally utilized.⁹⁰ In such cases, the third person referent is represented by a null pronoun. Consider the following two examples:

12.113	∅	na-iri-t		
	3	NSAP-arrive-NFUT		
		“He arrived.”		
12.114	∅	naka-mbik-∅	bik-ipa	okip
	3	NSAP-break-FUT	sit-NOM	on
		“He sat on the stool/chair.”		

As we see in 12.113, in syntactically intransitive clauses displaying the relevant morphology, the prefix attached to the verb is **na(ka)-** in those cases where the clause’s argument represents a third-person nominal. We see, then, that **na(ka)-** is not restricted to

⁸⁹ Some of the Karitiana suggest that **ga-** is actually pronounced as **ka-**, with a voiceless velar stop. However, those that do only produce **ka-** during slow deliberate productions of this form. In actual speech, all tokens of this allomorph exhibit word-initial voicing. (Of course, **ka-** would seem a more plausible reduction of the relevant morpheme, since the only difference between **naka-** and **na-** is the presence of this syllable.) This may be further evidence of the fact that [g] appears to be gradually obtaining phonemic status in Karitiana, as was suggested in Chapter 9.

⁹⁰ The **ta(ka)-** prefix set is also occasionally used in such cases, for a particular effect. This fact will be discussed in Chapter 16.

semantically transitive verbs. On the other hand, the **ta(ka)-** prefix is not restricted to semantically intransitive verbs. Consider:

12.115 i i-taka-mī:-t
 3 1S.ABS-SAP-hit-NFUT
 “He hit me.”

Landin (1984:225) suggests that the selection of **na(ka)-** or **ta(ka)-** in a given declarative clause is based upon the ergative/absolutive status of the preceding noun. Specifically, in cases where the preceding nominal is a null form or a pronominal referent from what he considers the ergative set (see Chapter 13), the verb prefix chosen in declarative clauses is **na(ka)-**. Conversely, in those cases where the preceding agreement marker is an absolutive form according to his classification, the verb prefix selected in affirmative-declarative clauses is **ta(ka)-**. While generally accurate, this account has at least two weaknesses. First, as I will suggest in Chapter 13, the free pronouns are non-ergative-like in several respects. More importantly, though, I believe that the account glosses over an important pragmatic factor that is revealed by examples such as 12.113 and 12.114. That factor is the presence of a 3rd person referent. As we will see more clearly in the exploration of voices in Chapter 16, the **na(ka)-/ta(ka)-** distinction is sensitive to the presence of a 3rd person referent in the clause. For now, it is sufficient to note that in all cases in which there is a 3rd person anaphoric S or O referent in the above examples, the declarative marker selected is **na(ka)-**. (This sensitivity to the pragmatic status of the absolutive referent was mentioned in the brief outline of this construction type in §12.1.)

In a footnote, Storto (1999:163) also provides a brief analysis of the **na(ka)/ta(ka)-** verb prefix set. Like Landin, she considers the choice between these prefixes to be based on the status of the preceding referents. Specifically, in those cases where there is overt preceding person agreement found on the verb, the “declarative”

prefix chosen is said to be **ta(ka)-**. In the remaining cases, the declarative prefix chosen is **na(ka)-**. There are two problems with this account, however. First, there are exceptions to the account, as we see in the following example, in which the **ta(ka)-** prefix set occurs on a verb despite the absence of a preceding person agreement prefix:

12.116 calipos ta-iri-t
 Carlinhos SAP-come-NFUT
 “Carlinhos came/arrived.”

Second, and most importantly, this account also overlooks important pragmatic factors, specifically the fact that the **na(ka)-** prefix only occurs in clauses with 3rd person absolutive nominals, as is evident in 12.103-12.106 and 12.113-12.114.

As I have said, Storto essentially maintains Landin’s analysis of the function of the relevant morphemes, suggesting that they are declarative markers. She states the following (1999:163):

Non-declarative clauses include exclamatives, negatives, imperatives, interrogatives, quotes, and direct speech. Declarative clauses are always prefixed by **na(ka)-/ta(ka)-** and mark a statement that the speaker believes to be true.

It is true that this prefix set is not evident in exclamatives, negatives, imperatives, and quotes. In fact, the distribution of **na(ka)-** and **ta(ka)-** does in fact suggest that these prefixes only occur in declarative clauses. However, beyond this observation, the claim that these prefixes mark a statement that the “speaker believes to be true” is somewhat problematic, for two reasons. First, as I have already suggested, there are other basic declarative constructions possible that are also not used as exclamatives, imperatives, interrogatives, quotes, or direct speech. I have no evidence that when speakers use these other declarative constructions, e.g. the Verb-focus construction discussed in the following section, they do not believe that their statements are true. Furthermore, there is evidence that it is possible to use the **na(ka)-/ta(ka)-** prefix set without being sure of the

truth value of the relevant event described. The evidence is that the **na(ka)-/ta(ka)-** prefix set can co-occur with the hearsay evidential **sarit**, as was discussed above with respect to examples 12.101 and 12.102.

For the reasons so far adduced, I believe that the accounts of **na(ka)-** and **ta(ka)-** provided by Landin and Storto, while generally capturing the distribution of these morphemes, do not account for the semantic and pragmatic correlates of the so-called “declarative” construction (in my terms, the Speech Act Participant construction). While I have hinted at an alternate analysis, I will save this analysis for the discussion of voices found in Chapter 16.

§12.9 The Verb-focus construction

The final basic declarative construction to be considered here is the Verb-focus construction. The form of this construction has already been discussed in §12.4, with respect to the tense suffixes attached to the verb in this construction. In that section, it was noted that the verb in this construction receives an **-n/-in** suffix when referring to a nonfuture event, and a **-ndaki** suffix when referring to a future event. In Chapter 16, I will suggest that this construction, like the construction characterized by the **na(ka)-/ta(ka)-** prefix set, can most accurately be considered to represent one of the primary *voices* of Karitiana. At that time I will also provide a more systematic characterization of the semantic properties of this construction. For the present, I will simply describe the relevant morphology.

The Verb-focus construction is characterized primarily by a verb prefix that takes the form of either **piri-**, **pir-**, or **pi-**. The choice between the relevant prefixes is made according to phonological criteria, which are evident in examples such as the following:

12.117	i-piri-séŋã-n ⁹¹	ĩn
	1S.ABS-VB.FOC-crouch-NFUT	1S
	“I crouched.”	
12.118	piri-héj-ĩn	i
	VB.FOC-hide-NFUT	3
	“He hid.”	
12.119	i-pi-seʔít-in	ĩn
	1S.ABS-VB.FOC-drink-NFUT	1S
	“I drank.”	
12.120	a-pir-irít-ĩn	ãn
	1S.ABS-VB.FOC-came-NFUT	2S
	“You came.”	

When prefixed to verbs with initial stress, such as those in examples 12.117 and 12.118, the verb-focus morpheme takes the form of **piri-**. When prefixed to verbs with non-initial primary stress, the morpheme takes one of two forms, either **pir-** or **pi-**. The former variant is attached to onset-less unstressed syllables, as we see in example 12.120, while the latter variant is attached to consonant-initial unstressed syllables, as we see in example 12.119.

In his discussion of this morphology, Landin (1984:242-243) suggests that this construction is used in “positive responses” to polar questions. For instance, were someone to ask me, “Did you drink?” I might respond with clause 12.119 above. Landin’s observation that this construction is frequently used in polar responses is an important one. However, my data suggest that the **piri-** prefix⁹² is used in a wider variety of contexts. In fact, I have heard this construction used frequently, in elicited and non-

⁹¹ This word is a counterexample to the general pattern of word-final stress in Karitiana. As noted in Chapter 7, such counterexamples are not altogether infrequent.

⁹² Landin considers the relevant morpheme to be circumfix like, since **piri-** (or one of its variants) and **-n** typically co-occur. However, as I suggested in the discussion of tenses, the **-n** suffix serves as a NFUT marker in this construction and is not required. Also, I should note that Landin describes a **miri-** variant of the morpheme, said to occur following ergative pronouns. Judging from the fact that this variant is not apparent in my data, and is considered ungrammatical by Karitiana speakers, it appears that the morpheme may have fallen out of use.

elicited contexts, without the use of a preceding question. Nevertheless, the usage of this construction in question responses underscores semantic correlates of focusing on an event.

Besides its use in question responses, which crosslinguistically often correlate with focus semantics, the verb-focus semantics of this construction are also hinted at by the fact that the verb in the construction must always occur clause-initially, as in examples 12.117-12.120. The verb cannot be preceded by other focused or clefted elements in a pre-core slot or left-detached position. The fact that verbs with **piri-** prefixation must occur clause-initially supports the choice to employ the term “construction” when referring to the Verb-focus morphology and its correlates since this construction cannot be described by morphology alone. Instead, it represents a general “form-meaning pair <Fi, Si> such that some aspect of Fi or some aspect of Si is not strictly speaking predictable from C’s component parts” (Goldberg 1995:4). The formal side of this construction (Fi) is comprised of various morphosyntactic components (i.e. -n NFUT marking, **piri-** prefixation, and verb-initial syntax) that, examined independently, do not result in predictable semantic correlates (Si). But, taken as a whole, the formal correlates do correspond to a cohesive semantic characterization, which involves profiling the predicate of a described event (cf. Chapter 16).⁹³

Storto (1999:206) suggests that the **pir-** prefix serves as an assertative marker. She notes that, “Assertative morphology is prefixal (**pit-**, **pir-** before a vowel), as other mood markers are, and occurs obligatorily in positive answers to yes-no questions.” Her

⁹³ Similar assessments of the Speech Act Participant construction, the valence construction, and the copular construction could also be made, and for that reason I employ the term *construction* in all of these cases.

claims are generally correct in her acknowledgement that the relevant prefixes occur in positive responses to polar questions. However, as we have suggested, in many cases the relevant morphology is attached to verbs in clauses that do not serve as polar responses.

It seems then that the true semantic motivations for the use of the **piri-** prefix do not crystallize in the literature. The same can be said of the **na(ka)-/ta(ka)-** prefix set, which, like the **piri-** prefix, plays a prominent role in Karitiana. In fact, as I will suggest in Chapter 16, the constructions represented by these prefixes reflect two major voices of Karitiana, according to the definition of voice adopted in that chapter. One of these, represented by the **na(ka)-/ta(ka)-** prefix, serves to highlight the presence of a non-speech act participant (3rd person referent) in a given “scene.”⁹⁴ The other construction, represented by the **piri-** prefix and its variants, is used to focus on the event or action in a given “scene”.

§12.10 Summary of constructions

In this chapter, I have surveyed in some detail the predicate morphology of Karitiana. However, there are certain verbal morphemes that have not been touched on, e.g. the **a-** passive prefix and the **m-** causative prefix. These prefixes fall under the category of voice, and so our examined in Chapter 16. The prefixes examined in the previous sections, reflecting the Speech Act Participant and Verb-focus constructions, also represent Karitiana voices. They have been outlined in this chapter, however, since they are extremely frequent in Karitiana discourse and any discussion of Karitiana verb

⁹⁴ As I will note in greater detail in Chapter 16, other Tupí languages display morphosyntactic phenomena that are sensitive to the distinction between speech act participants and non-speech act participants. This is demonstrated in Seki (1990) for Kamaiurá, as well as in Rodrigues (1990) for Tupinambá. Of course, this distinction is also apparent in the inverse constructions found in many languages.

forms that did not at least describe their distribution would be incomplete. Nevertheless, I believe that they too can best be understood as voice phenomena.

In the preceding discussions of Karitiana morphology, I have suggested at various points that there are four basic constructions and concomitant morphological paradigms associated with verb forms in Karitiana declarative clauses. By way of conclusion to this

Valence Construction			
Semantically intransitive Prefix			
i-			
Examples:			
ĩn i-ohi:t-ø	'I fished.'		
ĩn i-oti-t	'I bathed.'		
Speech Act Participant Construction			
3 rd person absolutive referent		SAP absolutive referent	
Verb with initial stress	naka-/ga-	Verb with initial stress	taka-
Verb with non-initial stress	na-	Verb with non-initial stress	ta-
Examples:			
ĩn naka-i-t ngok	'I ate the manioc'	an i-taka-mĩ:t	'You hit me.'
ø na-otãm-ø	'He arrived.'	i-ta-oti-t	'I bathed.'
Verb-focus Construction			
Verbs with initial stress		Verbs with non-initial stress	
piri-		V-initial	C-initial
		pir-	pi-
Examples:			
i-piri-tam-ĩn ĩn 'I flew.'	i-pir-otãm-ĩn ĩn 'I returned.'	i-pi-karak-ĩn ĩn 'I'm sleepy.'	
Copular Construction			
Auxiliary		Main intransitive verb	
na+COP+tense		Prefix	Copular agreement suffix
na-aka-j/t		i-	-t/-ø
Examples:			
marilena	na-akar	i-otam-ø	'Marilena is returning.'
marilena	na-akar	i-oti-t	'Marilena is bathing.'

Table 12.5. Basic verbal affixes associated with Karitiana declarative clauses.

chapter, in Table 12.5 I provide a summary of the verbal paradigms that have been discussed vis-à-vis the verb forms of declarative clauses. The table consists of verbal template information for each paradigm (listed by associated construction type), as well as examples of each of the prefixes (and their variants) associated with each paradigm.

Nominal morphology and remaining word classes

§13.1 Nominal morphology

§13.1.1 Introduction to nominal morphology

Like most Amazonian languages, Tupí languages generally present little dependent-marking or nominal morphology. Karitiana adheres to this general pattern, evincing relatively abbreviated nominal morphology, though, as we saw in the preceding chapter, there is a robust set of agglutinative verbal affixes. Case-marking is generally absent in the language, with the exception of oblique markers suffixed to non-core arguments. There are no grammatical classifiers or gender markers. With one exception discussed in §13.2, number inflection is restricted to the singular/plural distinction found in the set of pronouns and pronominal prefixes attached to the verb, discussed in §13.1.3 below. Also, some nouns end in a derivational morpheme, discussed in the following section, which can be used productively to derive nouns from verb forms.

§13.1.2 The nominalizer

When the **-pa** suffix or one of its allomorphs is attached to verb forms in Karitiana, the resulting form represents a noun that is central to the accomplishment of the given verb. That is, when a noun is used that consists of a **verb-pa** sequence, it can be used to represent any of several objects associated with the given verb. One good example of this general semantic association is evident in the following derivation:

13.1	tarika	+	-pa	⇒	tarikipa
	'walk'		NOM	⇒	'thing related to walking/going'

In this case, the gloss for **tarikipa** is extremely vague. The Karitiana language resource person who first provided this form suggests that, given the proper context, this word can be used for any of the following items: canoe, car, bicycle, and airplane. However, derivation involving the **-pa** nominalizer does not necessarily result in a nominal that is used for the actual performance of a given event (though this seems to be the most common semantic correlate of the resultant nominal, as is apparent in Table 13.1 below). For example, **tarikipa** is not used simply to refer to vehicles. The nominal may represent something that is merely associated with a given action. For instance, **tarikipa** can also be used to represent items as diverse as make-up and nice clothing, since these items are associated, for some Karitiana, with going out in the city. Finally, **-pa** suffixation can be used to represent places that are generally associated with a given action. For instance, **tarikipa** could refer to a friend's house that one frequently visits.

The **-pa** suffix is generally attached to non-finite verbs. However, these verbs may be preceded by a noun, resulting in a **noun+verb+-pa** sequence. In such cases, the noun preceding the verb helps to restrict the semantic scope associated with the resultant **-pa** nominal. This is evident when the glosses of 13.2 and 13.3, for example, are contrasted:

13.2	mihōrōn	+	-pa	⇒	mihōrōnpa
	clean		NOM	⇒	'thing related to cleaning'
13.3	osop + mihōrōn	+	-pa	⇒	osop mihōrōnpa
	hair + clean	+	NOM	⇒	'hair cleaning thing' (usually shampoo)

The **-pa** suffix is quite productive. (For example, I generated the grammatical form in 13.3, prior to hearing it spoken by a Karitiana.) This is evident in Table 13.1, containing various examples of the nominalizer:

Non-finite verb	Gloss	+pa	Gloss
bik	sit	bikipa	chair, stool
hot	go, walk (plural)	hotopa	place where people walk
pitʔi	eat	pitʔipa	table, place to eat
kat	sleep	katapa	place to sleep, bed
ambo	climb, lie down	ambopa	bed, tree, something used for climbing, laying down...
pieja	write	piejipa	notebook, school, something associated with writing
ahi:	drink	ahi:pa	cup
tarika	walk (singular)	tarikipa	thing associated with going
kinda mihōrōn	thing + clean	kinda mihōrōnpa	steel wool, sponge, soap, sink...
pikip mihōrōn	clothes + clean	pikip mihōrōnpa	laundry detergent, washboard
osop mihōrōn	hair + clean	osop mihōrōnpa	shampoo, something used to wash hair
taktaŋā	swim	taktaŋipa	place to swim
oti	bathe	otipa	place to bathe
koroʔop hadna	think (lit. 'inside talking')	koroʔop hadnipa	university
pōn	hunt	pōnpa	hunting spot
pōma	play	pōmipa	place to play
terekterek	dance	terekterekipa	place to dance
ohi:t	fish	ohi:tipa	place to fish
so:si	armadillo	so:sipa	armadillo habitat/trail
so:tʃa	wild pig	so:tʃapa	pig trail/habitat
taso	man	tasopa	place where man lives, trail
pikom	woolly monkey	pikompa	monkey habitat

Table 13.1 The **-pa** use nominalizer. Highlighted examples demonstrate **-pa** affixation to nouns.

Several relevant observations can be made based on the examples in this table. The first is that, despite the vague semantics of the **-pa** use nominalizer, it is often used to represent specific items. For instance, **bikipa** seems to always refer to a 'chair/stool.' In other words, it appears that in some cases certain **verb-pa** sequences have lexicalized. Given the undoubtedly high collocate frequency of such forms, this lexicalization is expected according to stochastic approaches to grammar such as that found in Bybee and

Hopper (2001) and Barlow and Kemmer (1999), which stress the importance of collocate frequency in generating lexicalized forms.

The second observation to be made is that the **-pa** suffix is not attached only to verbs in order to derive nouns, but is also attached to certain nouns to derive other nouns. As we see in the last four highlighted examples in Table 13.1, the **-pa** morpheme can be attached to nouns representing animal types, in order to refer to the relevant animal's habitat or to a trail used by the given animal.⁹⁵ Nevertheless, we can say based on examples such as these that the **-pa** morpheme is usually attached to verbs. Interestingly, all of the non-finite verbs in Table 13.1 are semantically intransitive verbs. In other words, all of the verbs in question can occur with **i-** prefixation in the valence construction described in the preceding chapter. When **-pa** is attached to semantically transitive verbs, the result is considered ungrammatical by Karitiana speakers.

The allomorphy associated with **-pa** is summarized in the following table:

Verb ends in:	Suffix takes form:	Examples
Non-nasal consonant	Vpa	bik+pa = bikipa, hot+pa = hotopa
Nasal consonant	pa	mihorõn+pa = mihorõnpa
[a]	ipa	tarika+pa = tarikipa põma+pa = põmipa
Remaining vowels	pa	pit?i+pa = pit?ipa

Table 13.2 Nominalizer allomorphy.

⁹⁵ It is worth noting here that there is also a nominal **pa**, meaning 'road' or 'trail', in Karitiana. Diachronically, it seems plausible that this word may be the source of the nominalizer, given the fact that when **-pa** is attached to a given nominal X the resultant nominal often signifies "X's trail." Since possessors precede possessees in Karitiana, it seems possible that some of the highlighted forms in Table 13.1 were once simply possessor-'trail' collocates. This might help to explain the nominalizer's limited distribution on nouns, occurring primarily with animal names. If this speculative account is correct, such phrases would have resulted in the grammaticization of the **pa** morpheme, which would then have been extended to its current frequent use as a nominalizer, attached to verbs as well. Of course this account does not address the fact that **-pa** does not attach to all verbs, but perhaps it is not surprising that the suffix would be sensitive to the semantically intransitive/transitive distinction, given the pervasive influence of this dichotomy on Karitiana morphosyntax.

In other words, the suffix takes the form of **-pa** unless the preceding verb ends in a non-nasal consonant, in which case the preceding vowel of the verb is reduplicated in order to prevent a word-medial consonant cluster. Also, if the preceding verb ends in [a], the [a] is replaced by [i] during suffixation. (The existence of **-ipa** calls to mind the allomorphy of the **-wak** desiderative suffix described in §12.6, since **-iwak** surfaces in some cases.)

§13.1.3 Karitiana person pronouns

In this section, I present a brief overview of the pronominal system of Karitiana. In the discussion of grammatical relations in Chapter 15, certain aspects of the distribution of pronouns will be considered in more detail.

In Karitiana, as in all other Tupí languages, there is a set of pronominal prefixes attached to the verb (cf. Rodrigues 1999:117). These prefixes serve to crossreference the absolutive nominal of a given clause. They also serve as prefixes to nouns when used as possessors, as in other Tupí languages. Karitiana also maintains a set of free pronouns. This set of pronouns often occurs before the verb, however, as was first noted in Landin (1984:228), they may also occur after the verb, in which case they are “ambi-fixed”. When occurring pre-verbally in the SAP construction, the free pronouns may only refer to “actor” referents. However, the free pronouns refer to absolutive referents in other environments, as is evident in various previous examples. This interesting distribution is discussed further in the outline of grammatical relations in Chapter 15.

In general, Tupí languages exhibit the following pronominal categories in their verbal prefixes: 1st person singular, 1st person plural inclusive, 1st person exclusive, 2nd person singular, and 2nd person plural. As Rodrigues notes (1999:119), Karitiana presents no exception to this general pattern. However, phonologically the Karitiana pronominal

prefix paradigm differs somewhat systematically from that found in other Tupí branches, at least with respect to the 1st singular and 2nd singular pronominal referents. In many Tupí languages, the 1st singular pronominal agreement prefix is instantiated by either **o-** or **u-**. Karitiana is the only language in which the 1st singular prefix is **i-**. Similarly, in almost all Tupí branches, the 2nd singular agreement prefix is **e-**, or at least contains the **e** vowel. However, in Karitiana the 2nd singular pronominal prefix is **a-** rather than **e-**. This set of correspondences (between Karitiana /i/ and /o-/ /u/ in other Tupí languages, as well as between Karitiana /a/ and /e/ in other Tupí languages) is a piece of evidence supporting the putative the proto-Arikém vowel shift suggested in Storto and Baldi (1994) and discussed in Chapter 5 of Part I. (As was noted at that time, however, the supposed shift requires further substantiation.)

In most Tupí languages, only one pronominal referent may be crossreferenced on a given verb. There are exceptions to this tendency, for instance in Kamaiurá (Seki 1990, 2000) and Tupinamba (Rodrigues 1990) some of the prefixes are portmanteau forms referencing both A and O nominals in a transitive clause. Karitiana conforms to the general tendency, however, with verb agreement restricted to one pronominal referent.

To understand the distribution of Karitiana pronominal referents, it is crucial to understand the basic declarative constructions of Karitiana, delineated in the previous chapter. The reason this understanding is crucial is that pronominal prefixes only occur in the Verb-focus construction and the Speech Act Participant construction. The distribution of pronominal forms in the relevant declarative constructions is evident in the following examples containing the same intransitive pronominal referent (2nd singular), occurring in the four different declarative constructions of Karitiana:

- 13.4 *ãn* *i-diwit-ø*
 2S INT-forget-NFUT
 “You forgot.” *Valence construction*
- 13.5 *ãn* *na-akar* *i-diwit-ø*
 2S NSAP-COP INT-forget-COP.AGR
 “You forgot.” *Copular construction*
- 13.6 *a-ta-diwit-ø* (*ãn*)
 2S.ABS-SAP-forget-NFUT (2S)
 “You forgot.” *Speech Act Participant construction*
- 13.7 *a-pi-diwit-ĩn* (*ãn*)
 2S.ABS-VB.FOC-forget-NFUT (2S)
 “You forgot.” *Verb-focus construction*

As we see in these cases, the 2nd singular pronominal referent is expressed as a free morpheme in the first two constructions, and as a verbal prefix in the final two constructions. In Karitiana, free pronouns such as *ãn* can generally occur in any of the constructions. However, as we will see in Chapter 15, there are subtle restrictions on the distribution of free pronouns in the various constructions. For instance, in the Verb-focus construction (exemplified by 13.7), such referents can only be placed after the verb when referring to an absolutive nominal. The relationship between pronouns and grammatical relations is fairly involved, as we will see more lucidly in Chapter 15. It is important when describing the basic forms of the pronominal referents, however, to note that pronominal prefixation only occurs in the SAP and Verb-focus constructions, as in 13.6 and 13.7.

The forms of specific pronouns and pronominal prefixes in Karitiana, aside from the 2nd singular forms presented in the above examples, are evident in many of the examples presented in Chapter 12, as well as in the following two examples:

- 13.8 *ĩn / irtʃa / ita / artʃa / i* *i-diwit-ø*
 1S / 1PL/1PL.INC/1PL.EX/2PL/3 INT-forget-NFUT
 “I/We/We(not you)/You guys/He or she forgot.” *Valence construction*

- 13.9 **i-/ij-/ita-/aj-** pi-diwit-ĩn
 1S.ABS-/1INC-/1EX-/2PL- VB.FOC-forget-NFUT
 "I/We/We(not you)/You guys forgot." *Verb-focus construction*

Based on examples such as these, the following pronoun paradigm (similar to that in Landin 1984:229) can be established for Karitiana:

	Free pronouns	Absolute verbal agreement prefixes, only in Verb-focus and SAP constructions
1S	ĩn	i-
1PL.INC	itʃa	ij-
1PL.EX	ita	ita ⁹⁶
2S	ãn	a-
2PL	artʃa	aj-
3	I	ø-

Table 13.3 Pronominal forms in Karitiana.

One obvious observation to be made, based on the data in Table 13.3, is that the verbal prefix pronominal forms appear to represent reduced versions of their free pronoun counterparts. Similar patterns are evident in many languages, of course, including other Tupí languages as well as unrelated languages such as Acehnese (Durie 1985).

The verbal prefix pronominal forms also serve as possessors in genitive phrases. In contradistinction to some other Tupí languages such as Mundurukú (Crofts 1973, 1985), Karitiana does not distinguish between alienably and inalienably possessed items. Possession is generally expressed by the juxtaposition of possessors with possessed nominals, as in the following two examples:

- 13.10 Ignacio hadni-pa
 Ignacio talk-NOM
 "Ignacio's cellphone."

- 13.11 Ignacio so:jt
 Ignacio wife
 "Ignacio's wife."

⁹⁶ This form does not occur in the SAP construction.

- 13.12 Ignacio ꞑõŋo
 Ignacio arm
 "Ignacio's arm."

As we see in the following examples, possessors can be expressed by the same set of prefixes found in Table 13.3. The contrastive versions of 13.16 support the conclusion that there is no distinction between alienably and inalienably possessed items.

- 13.13 ij-hadni-pa
 1PL.GEN-speak-NOM
 "Our cellphone."

- 13.14 a-so:jt
 2S.GEN-wife
 "Your wife."

- 13.15 i so:jt
 3S.GEN wife
 "His wife."

- | | | | |
|-------|------------|------------------|-------------|
| 13.16 | a. i-ꞑõŋõ | b. i-hadni-pa | c. i-so:jt |
| | 1S.GEN-arm | 1S.GEN-speak-NOM | 1S.GEN-wife |
| | "My arm." | "My cellphone." | "My wife." |

Excepting the third person *i*, free pronouns are not used to express possession. They cannot occur along with the pronominal prefixes in examples 13.16a, 13.16b, and 13.16c, for instance.

Having established the forms of the person pronouns and pronominal prefixes in Karitiana, as well as their *basic* distribution in particular verb paradigms and genitive phrases, I will turn now to the examination of case affixes in Karitiana.

§13.1.4 Case and locative postpositions

In Tupí languages, nouns are generally unmarked for case when serving as core dependents of a verb. (Rodrigues 1999:115) This is true in Karitiana as well, in which there are no nominative, accusative, absolutive, or ergative case inflections or adpositions. However, in several Tupí languages including Mundurukú (Crofts 1973) and Tuparí (Caspar and Rodrigues 1957, Rodrigues 1999), non-core arguments may be

marked for some sort of case. This is also true in Karitiana, which employs allative and oblique case markers.

The oblique/adjunct case marker, **-ti**, is attached to non-core arguments occurring with intransitive and transitive verbs. When the main verb of a clause is classified as intransitive, such as **pitʔi**, a non-agentive nominal receives the **-ti** suffix. This is apparent in the following example in which the valence construction is used:

13.17 *ĩn* *i-pitʔi-t* *kojpa-ti*
 1S INT-eat-NFUT pineapple-OBL
 “I ate some pineapple.” or “I ate of the pineapple.”

If a verb is classified as semantically transitive (i.e. cannot be used with the **i-** prefixation in an affirmative clause), then a co-occurring patientive nominal does not receive the relevant inflection. This is apparent in the following example, in which the transitive verb **i**, which means ‘to eat X,’ is used in the Speech Act Participant construction:

13.18 *in* *ga-ʔi-t* *kojpa*
 1S NSAP-eat-NFUT pineapple
 “I ate the pineapple.”

When verbs that are classified as intransitive occur in the SAP construction, any patient or theme-type nominal is suffixed (as in 13.17) with the oblique marker:

13.19 *i-ta-pitʔi-t* *kojpa-ti*
 1S.ABS-SAP-eat-NFUT pineapple-OBL
 “I ate the pineapple.” or “I ate of the pineapple.”

The oblique marker also occurs in clauses with multivalent verbs and three nominal arguments, in which case one of the nominal arguments is usually marked with the oblique suffix. This is true in the case of semantically ditransitive verbs such as **hɪt**, ‘to give,’ for instance:

13.20 *i* *a-taka-hɪt-ø* *ãn* *i-ti*
 3 2S.ABS-DECL.ABS-give-NFUT 2S 3-OBL
 “She gave you to them.”

As we see in this example, the recipient nominal is suffixed with the relevant inflection, marking its peripheral or non-core status.⁹⁷

The oblique suffix is not required when a postposition is present following a given nominal. For instance, it is not present in the following clause:

13.21	ĩn	i-mbik-ø	biki-pa	okip
	1S	INT-sit-NFUT	sit-NOM	on
	“I sat on the chair.”			

In cases such as 13.21, in which the non-core nominal of a syntactically intransitive clause is followed by a locative postposition, the **-ti** suffix is absent. Similarly, the suffix is absent when the allative suffix **-pip/-p** is employed. Consider the following example:

13.22	i	na-aka-t	i-tepik-ø	ese-pip ⁹⁸
	3	NSAP-COP-NFUT	INT-dive-COP.AGR	water-ALL
	“He dove into the water.” or “He’s diving into the water.”			

In this case, the allative suffix meaning ‘towards’ or ‘into’ is attached to the peripheral nominal of an intransitive clause. Therefore, the adjunct affix is absent. The following example demonstrates the same pattern in a semantically ditransitive clause, while also illustrating the allomorph of the allative suffix, which is simply **-p** when following /i/:

13.23	ĩn	naka-m-tat-ø	hĩm pisip	ambi-p
	1S	NSAP-CAUS-go-NFUT	animal meat/fat	house-ALL
	“I sent the animal meat to the house.”			

In conclusion then, the oblique marker cannot co-occur with the allative marker. Neither suffix can co-occur with a locative or directional postposition, of which Karitiana has

⁹⁷ In this case, the suffix seems to play a similar role as the preposition in the English gloss. It is not the case, however, that **-ti** serves as an indirect-object marker, as we will see in the discussion of ditransitive clauses in Chapter 15.

⁹⁸ While the best gloss for this morpheme seems to be allative, it should be noted that the suffix occurs in less-easily-characterized environments, for example as a temporal locative. Consider the following example:

	i-ta-otir-i	kintafera-pip
	1S.ABS-SAP-return-FUT	thursday -ALL
	“I will return on Thursday.”	

many. One of these, **okip**, ‘on,’ is evident in example 13.21 above. Two other frequent postpositions are evident in examples 13.24 and 13.25:

13.24	i	na-aka-t	i-taktaŋ-ø	ese	koroʔop
	3	NSAP-COP-NFUT	INT-swim-COP.AGR	river	inside
		“He’s swimming in the river/water.”			
13.25	i	na-atik-ø	kinda o	ohĩnt	
	3	SAP-throw-NFUT	thing fruit	upwards	
		“He threw the fruit upwards.”			

In the following table I list the locative/directional postpositions of Karitiana. This list represents the locative/directional postpositions I have come across so far in the language, though I do not think it is an exhaustive list of Karitiana postpositions:

Postposition	Gloss
okip	on top of
ẽŋgori	underneath
okitiki:ri	behind (literally ‘to the back’)
iripaki:ri	in front of
pitip	near
koroʔop	inside
ohĩnt	upwards
otʔot	downwards
oki:ri	elative, out of
dewota	to the side of
piri	from
kĩn	towards
tĩ:m	through, also
sogŋ	with/associative

Table 13.4 Common postpositions in Karitiana.

The distribution of each of these postpositions is the same as that of the allative case marker. In other words, the above postpositions occur following non-core arguments in clauses. In that way, they function similarly to locative adpositions in languages such as English, in which prepositions such as “near”, “under,” and “across” serve not only to represent a spatial relationship between two nominals, but also serve to mark a given nominal as an oblique, non-core argument.

In concluding this section, I should note that nominals suffixed with case markers or followed by locative postpositions are treated similarly according to another grammatical phenomenon. Specifically, they can be promoted to arguments via diathesis, as we will see in Chapter 16.

§13.2 Adjectives

Karitiana has a set of words that can be accurately termed an adjective class. The status of adjectives as a putatively universal word class has been the subject of some debate in the literature, with some works suggesting that adjectives are not a universal class (e.g. Dixon 1977, Croft 2001), and others suggesting that adjectives are in fact a universal category (e.g. Baker 2003, Dixon 2004). What is indubitable is that in some languages adjectives pattern morphosyntactically in a manner that is similar to nouns, while in other languages they pattern much like verbs (if not identically). So, while, all languages have a means of expressing “property concepts” of the sort presented in Thompson (1988), they vary with respect to how these concepts are instantiated, and to what extent the concepts are instantiated in a separate word class. For this reason it is important to demonstrate the manner in which Karitiana grammar distinguishes the class of adjectives from nouns and verbs.

The differentiation of adjectives from nouns and from verbs is apparent in four principal ways. First, their behavior in copular constructions distinguishes them from nouns. Second, they can occur without inflections when following nouns, so distinguishing them from verbs. Third, they can be derived from nouns via an adjectivizing morpheme, **-nã**. Fourth, and finally, they can be suffixed with a **-ra** suffix when following a plural noun. I will illustrate each of these characteristics in turn with a

few short examples. For the sake of clarity, I will use the same adjective, **ẽm** (meaning ‘black’ or ‘dirty’) in each of the following examples.

In clause 13.26, we see that, when found in the copula construction, the word **ẽm** inflects as an intransitive verb would, with an **i-** prefix. This is supported by clauses such as 13.27. In example 13.28, we see that, not surprisingly, nouns cannot be inflected in the same manner in this construction.

13.26	õmbaki na-aka-t jaguar NSAP-COP-NFUT “The jaguar is black/dirty.”	i-ẽm-ø INT-black/dirty-COP.AGR
13.27	õmbaki na-aka-t jaguar NSAP-COP-NFUT “The jaguar is running.”	i-pikina-t INT-run-COP.AGR
13.28	õmbaki na-aka-t jaguar NSAP-COP-NFUT “The jaguar is an animal.” * õmbaki na-aka-t	hĩm animal ihĩm

Adjectives such as **ẽm** are clearly differentiated from the class of nouns in Karitiana, then, and demonstrate some verb-like properties. However, they can also be distinguished from verbs in their ability to occur post-nominally without inflection, as is evident in the following two examples:

13.29	õmbaki ẽm jaguar black “The jaguar is dirty/black.” or “The black/dirty jaguar.”
13.30	õmbaki pitʔi ⁹⁹ jaguar eat *“The jaguar is eating.”

More examples such as these could be adduced. For our present purposes, however, it is sufficient to note that there is a set of property-concept words such as **ẽm** that can clearly

⁹⁹ This form is ungrammatical as a bare clause, however such a noun-non-finite verb sequence could occur in an embedded clauses. The important point is that 13.30 cannot be uttered grammatically in isolation, while 13.29 can.

be distinguished morphologically from nouns *and* from verbs. In the following table I provide several other examples of words that behave similarly to *ẽm*, which could easily be characterized semantically as words that describe the properties of a given nominal. This short list is merely representative. (There appear to be at least several dozen words that could be considered adjectives in Karitiana according to the above criteria, but the class has yet to be fully demarcated.)

Adjective	Gloss
sikirip	foolish
sopipok	clever
minda	slow
hirinã	fast
asoaso	fast (human referent)
pok	white
sõm	red
ket	green
pikõõõŋ	strong
kiʔep	sharp
kindit	dull
seʔa	good
saraʔit	bad
horop	long

Table 13.5 Sample of Karitiana adjectives.

Adjectives in Karitiana can also be derived from nouns via a *-nã* suffix. This suffix is quite productive. (However, it cannot be attached to nouns that are derived via the *-pa* nominalizer, e.g. those in Table 13.1.) Consider the following examples in which a head nominal of an NP is followed by an adjective consisting of a **noun-nasal-ã** sequence:

- 13.31 põnso ed-nã
 woman child-ADJ
 “the pregnant woman”

- 13.32 owā otid-nā
child pain-ADJ
“the hurting child”
- 13.33 owā okib-mā
child injury-ADJ
“the injured child”
- 13.34 owā patid-nā
child sore-ADJ
“the hurt child” (i.e. having a sore)
- 13.35 hīm saʔeb-mā
animal leg-ADJ
“the legged animal.”
- 13.36 hīm sa:d-nā
animal smell-ADJ
“the smelly animal”

As we see in the above examples, the relevant suffix is used to signify that the noun to which it is attached is associated with the head nominal.

As examples 13.31-13.36 also demonstrate, internal sandhi also plays a role in words with the **-nā** suffix. As we clearly see in the examples, two processes are at work: When following a non-alveolar consonant, the nasal of the suffix adapts to the preceding place of articulation. (This process is also described in Storto 1999.) Also, when a preceding stop is voiceless, it becomes voiced during suffixation (e.g. ‘et’ ⇒ ‘ed,’ ‘okip’ ⇒ ‘okib,’ and ‘patit’ ⇒ ‘patid’).

The **-nā** suffix is significant since, as was noted in the introduction to this chapter, dependent-marking is generally absent in Karitiana, as in other Tupí languages, as well as Amazonian languages more generally. Interestingly, though, the **-nā** suffix is not the only affix that serves to establish a class of adjectives in Karitiana. There is a suffix **-ra** that, unlike **-nā** (which attaches to nouns to form adjectives), attaches only to words within the class of adjectives. This suffix does not attach to all adjectives, in fact it attaches mainly

to the set of color adjectives. The suffix is used when a given adjective refers to a semantically plural head noun. (Recall that Karitiana nouns are not inflected for number.)

This is apparent in the following three examples:

- | | | | | | |
|-------|----|---------------------------------------|--------------|----|---|
| 13.37 | a. | epesap
leaf
'green leaf' | ket
green | b. | epesap kere-ra
leaf green-ADJ.PL
'green leaves' / 'money' |
| 13.38 | a. | õ:m sãm
image red
'red picture' | | b. | õ:m sãmõ-ã
image red-ADJ.PL
'red pictures' |

As we see in these examples, the flap in the **-ra** suffix is nasalized when following nasal vowels (e.g. 13.38b). Also, as in the case of several other suffixes so far discussed (though not in the case of the nasal-initial **-nã** suffix), when the root to which **-ra** is attached is consonant-final, the preceding vowel of the root is epenthesized root-finally prior to suffixation.

In conclusion, we have seen in this very concise description of Karitiana adjectives that this class of words is demarcated by four principal morphosyntactic criteria. These are: their ability to occur with the intransitive **i-** prefix in the copular construction (unlike nouns), their ability to occur after noun heads without any inflection or copula (unlike verbs and nouns), their derivability from nouns via a **-nã** suffix, and their suffixation with **-ra**, which is attached to certain adjectives.

§13.3 Common adverbs

There are many words that can be used to modify verbs in Karitiana. This fact was first observed in Landin's (1983) dictionary, in which several dozen words are classified as adverbs. In Karitiana, these words typically follow a modified verb. However, some of the words can also be used to modify adjectives and even nouns. This

is true of the class of degree words. Four of the most prevalent degree words, first mentioned in Landin (1978:8.1), are found in the following table:

Degree word	Gloss
pitat	very
pimbira	a little
pitapimbira	somewhat
harara	extremely

Table 13.6 Common degree words in Karitiana.

The word **pitat** is frequently used to modify adjectives and nouns. When modifying nouns, the alternant **pita** is used, as in the following example:

- 13.39 taso pita
 man very
 “Real man.” (“A lot of man.”)¹⁰⁰

The word **pitat** is also used to modify adjectives. For instance, it often follows the adjective **seʔa** (‘good’), resulting in a collocate (**seʔa pitat**) that means “very good” and is used in a wide variety of contexts. For instance, in Karitiana religious services¹⁰¹, the pastors often use this phrase when speaking, as a sort of oratory tool akin to the way in which “Amen” is employed in local Brazilian evangelical services.

§13.4 Deictics/Demonstratives

There are at least six demonstrative pronouns in Karitiana. Three of these are exemplified in the following questions:

- 13.40 mōʔāmōn ka
 WH+ DEM.MAN
 “What is this?” (something in hand)

¹⁰⁰ To one of my Karitiana language resource persons, this phrase can signify “many men.” As I noted in the discussion of nominal morphology, Karitiana nouns do not inflect for number. In order to establish the plurality of a given nominal referent, the word **ako** is typically used, as in **taso ako**, “many men.” Cardinal numerals may also be employed, as well as the word **kandat**, meaning “many.”

¹⁰¹ The majority of Karitiana are now Christians. This is due in part to the work of missionaries such as Rachel and David Landin, and in part to the influence of local Brazilians. There are three churches in the Karitiana village (see map in appendix), differing according to denomination. Each is affiliated with one of the three most prominent evangelical denominations found in Porto Velho—Baptist, Assembly of God, and Presbyterian.

13.41 mōfāmōn ho
 WH+ DEM.PROX
 “What is that?” (something close)

13.42 mōfāmōn onĩ
 WH+ DEM.DIST
 “What is that (over there)?”

The three remaining demonstrative pronouns in my data are **nã**, which refers to an object that is close and seated, **hip**, which refers to an object that is close and supine, and **hori**, which refers to something out of sight.

These demonstratives are not restricted to questions, and occur in declarative clauses as demonstrative pronouns. They serve as pronouns, and cannot serve as articles as we see in the following examples:

13.43 ĩn na-oki-t irip onĩ
 1S TRANS-kill-NFUT tapir DEM.DIST
 * “I killed that tapir.” (Can mean, however, “I killed the tapir over there.”)

13.44 boroti ho i-pikina-t
 paca DEM.PROX INT-run-NFUT
 * “This paca ran.” (Can mean “The paca ran here.”)

13.45 hori naka-atika-t pikom ep okip
 DEM.NONSEEN NSAP-be.at-NFUT woolly.monkey tree on
 “There is a woolly monkey in some tree over there.” (Not sure which tree.)

Clauses 13.43 and 13.44 remain ungrammatical if the relevant demonstratives precede, rather than follow, the modified nominal. However, the demonstrative pronouns of Karitiana can serve in conjunction with the definite article **aka**, as in the following version of 13.43:

13.46 ĩn na-oki-t onĩ irip aka
 1S TRANS-kill-NFUT DEM.DIST tapir DEF
 “I killed that tapir.”

In such cases the definite article follows the noun, which in turn must be preceded by one of the demonstrative pronouns of Karitiana. (This distribution is also noted in Storto [2003:417].)

§13.5 Cardinal Numerals

Aside from general quantifiers such as **kandat** ('many'), **jakatām** ('all'), and **siʔit** ('few'), Karitiana employs a set of numerals. These numerals may be employed as cardinal numerals, modifying a noun, as in the following examples:

13.47 mājīp pieji-pa
three write-NOM
"Three notebooks."

13.48 si:pōm taso
two man
"Two men."

However, they can also be employed without adjacent nouns, serving as nominals in question responses such as the following:

13.49 mājīp ø-na-oki-t
three 3-SAP-kill-NFUT
"He killed **three**."

In examples such as 13.48, the referent of the numeral 'three' is based on contextual cues. For instance, 13.48 would serve as a grammatical response to the question: "How many pigs did he kill?"

As many researchers have noted (Stampe 1976, Greenberg 1978c, Heine 1997, *inter alia*), cardinal numerals are often etymologically transparent to one extent or another. Furthermore, the etymology of such words frequently relates to the human body. More specifically, "The most common structure of numeral systems appears to be one in which '5' is derived from 'hand,' '10' from 'two hands,' and '20' from either something like 'hands and feet' or 'whole person.' (Heine 1997:21) This body-part model is

common to most of the world's languages to one extent or another. Though in some languages the diachronic sources of particular numerals are now completely opaque, in many of these cases the body-part origins of the numeral systems are evident in the fact that they are decimal-based.

In Karitiana, many of the numerals are transparently related to words for body parts. In the following table, I present a list of a few Karitiana numerals, along with their glosses and literal translations, which reveal their body-part sources.

Numeral	Gloss	Literal translation
mihĩn	one	?
si:põm	two	?
mĩjĩp	three	?
ota:dnamĩn	four	?
ij pĩt	five	"our hand"
mihĩn ij-pĩ ota ʔo:t one 1PL-hand other take	six	"take one and our other hand"
sipõm ij-pĩ ota ʔo:t two 1PL-hand other take	seven	"take two and our other hand"
mĩjĩp ij-pĩ ota ʔo:t three 1PL-hand other take	eight	"take three and our other hand"
ota:dnamĩn ij-pĩ ota ʔo:t four 1PL-hand other take	nine	"take four and our other hand"
sipõm ij-pĩ pi two 1PL-hand hand	ten	"take our two hands"
mihĩn ij-piopĩ ʔo:t one 1PL-toe take	eleven	"take our one toe"

Table 13.7 Some cardinal numerals in Karitiana.¹⁰²

Based on these examples alone, it is clear that the words for cardinal numerals in Karitiana are certainly not arbitrary, but are instead cognitively motivated, and are based upon the crosslinguistically ubiquitous association between counting and body parts.

¹⁰² Landin (1978:4.2) presents a similar list. Interestingly, however, the words for eleven and twenty vary between the two lists. In Landin's list, eleven is "one and our feet," and ten is "our other hand also." The number for ten found in Table 13.7 implies the use of multiplication, rather than addition.

The Karitiana numeral system can ostensibly be used to represent numbers up to at least one hundred. Nevertheless, the numeral system of Karitiana is one area of the language's lexicon that seems to be losing ground to Portuguese alternatives. While Karitiana numerals from one through five are still used frequently, many of the other words are falling into disuse and are only elicited with some difficulty from many speakers. This is perhaps not surprising since Portuguese is the language the Karitiana use when selling their artifacts to Brazilians, and the numbers for artifact prices are therefore set in Portuguese.

An overview of Karitiana syntax

§14.1 Introduction

The investigation of grammatical relations and voice phenomena in a language entails the analysis of many syntactically-oriented phenomena. In the case of Karitiana, many of these phenomena are evident in the discussions found in Chapters 15 and 16. In this chapter I present a skeletal outline of Karitiana syntax. The purpose of this outline is two-fold: to complement the descriptions of Karitiana morphology found in Chapters 12 and 13, and to serve as a background for the discussions on grammatical relations and voice phenomena in the remaining chapters.

The locus of attention in this chapter will be restricted to describing the basic clause types of Karitiana, as well as to describing the basic constituent-sequencing patterns in Karitiana. Short descriptions of the major clause types of Karitiana, including interrogatives and negative clauses, have already been provided in Landin (1984). There are some differences between my accounts and those in the literature, however—differences that are highlighted in the discussion below.

Constituent-sequencing in Karitiana has been explored in Storto (1999, 2003). However, the order of many basic clausal constituents has gone unmentioned in the literature, and these and other constituents are discussed in my description of constituent sequencing. Also, I re-examine the issue of basic word order in Karitiana, which Landin (1984) suggests is SVO and Storto describes as OSV (1999,2003).

§14.2 Basic clause types and their characteristic syntax

§14.2.1 Declarative clause syntax

The four basic types of Karitiana declarative clauses, which have been the focus of our attention to this point, are further exemplified in the following clauses, in which full NP's are generally used for the arguments of each clause:

- 14.1 ca:lijos na-aka-t taso-t
 Carlinhos NSAP-COP-NFUT man-COP.AGR
 "Carlinhos is a man."
 Copular construction, copula+noun sequence
- 14.2 ca:lijos na-aka-t i-ohit-ø
 Carlinhos NSAP-COP-NFUT INT-fish-COP.AGR
 "Carlinhos is fishing."
 Copular construction, copula+intransitive verb sequence
- 14.3 ca:lijos i-heit-ø
 Carlinhos INT-exit-NFUT
 "Carlinhos exited."
 Valence construction, semantically intransitive verb.
- 14.4 ca:lijos naka-ʔi-t asiriti
 Carlinhos NSAP-eat-NFUT banana
 "Carlinhos ate the banana."
 Speech act participant construction, non-SAP absolutive, semantically transitive verb
- 14.5 i:tʃa a-taka-mĩ-t
 1PL 2S.ABS-SAP-hit-NFUT
 "We hit you."
 Speech act participant construction, SAP absolutive, semantically transitive verb
- 14.6 a. ij-ta-tarika-t (i:tʃa)
 1PL.ABS-SAP-walk-NFUT 1PL
 "We walked."
 Speech act participant construction, SAP absolutive, semantically intransitive verb
- b. ta-tarika-t i:tʃa
 SAP-go/walk-NFUT 1PL
 "We walked."
 Speech act participant construction, SAP absolutive, semantically intransitive verb
- 14.7 piri-pop-ĩn ca:lijos
 VB.FOC-die-NFUT Carlinhos
 "Carlinhos died."
 Verb-focus construction, semantically intransitive verb.

- 14.8 pi-pajop-ĩn ngok
 1S.ABS-VB.FOC-hit-NFUT manioc
 "The manioc was grated." (Literally: "Grated, the manioc.")
Verb-focus construction, semantically transitive verb.

The semantic correlates of the SAP and Verb-focus constructions will be examined in Chapter 16 since, according to the definition of voice I will adopt, these constructions can be taken to represent different voices. The valence construction, which entails *i*-prefixation to a semantically intransitive verb, does not entail a focus on either the predicate or the speech act status of a clause's argument. In elicited contexts, the verb is always preceded by the argument. However, in discourse the verb may also occur clause-initially.¹⁰³ When a verbal predicate follows the copula in the copular construction, the S nominal almost always precedes the predicate, in both elicited and non-elicited contexts.¹⁰⁴ In the SAP construction, if there are two full NP's the A nominal generally precedes the verb, and the O nominal follows the verb (cf. 14.4). If the O nominal is a speech act participant, it is cross-referenced on the verb (cf. 14.5). If a semantically intransitive verb is used with an S pronoun in the SAP construction, the S is *usually* prefixed to the verb as in 14.6a, though not in all cases as we see in 14.6b.¹⁰⁵ A full pronoun referring to the S may be used in conjunction with verb agreement, as in the second reading of 14.6a¹⁰⁶, or instead of verb agreement, as in 14.6b.

¹⁰³ For instance, in one transcribed segment of unelicited monologue in which a Karitiana woman speaks about her life, there are approximately 100 clauses. There are 7 cases of matrix declarative clauses with *i*-prefixed verbs. In three of those cases, the S referent follows the verb. In the remainder, the S referent precedes the verb as in elicited contexts.

¹⁰⁴ In the same transcribed segment of approximately 100 clauses, there are 9 matrix copular clauses. In all cases, the copula is preceded by an S referent.

¹⁰⁵ In the same segment of 100 clauses, there are 13 cases of *ta*-prefixed intransitive verbs occurring with S-referencing prefixes, as in 14.6a. There are 4 cases in which the S-referencing prefix is absent, as in 14.6b.

¹⁰⁶ This occurs in 7 of the 13 cases of *ta*-prefixation mentioned in the previous footnote.

Based on these observations, we can say that S and A referents usually precede the predicate in Karitiana declarative clauses, while full-NP O referents follow the verb, unless the verb is marked with object-focus morphology (cf. §14.2.2.3). In other words, in declarative clauses with two non-pronominal NP arguments, e.g. 14.4, the agentive-type nominal generally precedes the verb, while the patient-type follows the verb.

In the Verb-focus construction, however, the situation is somewhat different. In such clauses the predicate occurs prior to an S nominal, as in example 14.7. (There are no exceptions to this pattern in any transcribed discourse segments or transcribed elicited clauses.) This construction most frequently occurs with verbs that are classified by Karitiana grammar as semantically intransitive, as in 14.7. However, semantically multivalent verbs may occur in the construction, as in example 14.8. When a semantically multivalent verb occurs in this construction, the verb is often prefixed with an *a*-passivizing morpheme (see Chapter 16). Generally, when such verbs are used in the Verb-focus construction the A nominal is absent as in 14.8. However, in some cases the A nominal is overtly mentioned. When such an A nominal is present, it follows the verb and the pronominal O referent. Based on these patterns, which do not suffer exceptions in my transcriptions, we can state that, in the Verb-focus construction, the predicate occurs initially and is followed by an NP, usually an S or O referent.

Based on the above findings we can conclude that, in those cases where clausal arguments are referred to via full NP's, the syntax of declarative matrix clauses is generally characterized by AVO or SV ordering. This generalization does not accurately describe the Verb-focus construction, however, in which clauses are always verb-initial.

§14.2.2 Interrogative clauses

§14.2.2.1 Yes/no questions

In Karitiana questions, the verb is not inflected with any of the valence markings or other inflections associated with specific constructions in declarative clauses. The verb in such clauses does inflect for person, future tense, and, optionally, aspect. Consider the following examples of a polar question involving a semantically intransitive verb:

14.9 a-kisep (hĩ)
 2S.ABS-jump Q
 “Did you jump?”

14.10 a-kisew-i (hĩ)
 2S.ABS-jump-FUT Q
 “Are you going to jump?”

Note that in interrogatives, the verb does not inflect for nonfuture tense. This is evident in 14.9, as well as 14.11 below.

Polar questions involving semantically transitive verbs are formed in a similar manner, though in the case of such questions if the agent of the clause is anaphoric, it is represented with a free pronoun rather than an absolutive prefix (as in 14.9 and 14.10). Also, in such cases the verb is prefixed with an *i-* morpheme, rather than *a-*. Consider the following examples:

14.11 ãn i-i ŋgok-(o) (hĩ)
 2S IRR-eat manioc-Q.NOM Q
 “Did you eat the manioc?”

14.12 ãn i-mhip hĩm-(o) (hĩ)
 2S IRR-cook meat-Q.NOM Q
 “Did you cook the animal meat?”

The formation of polar questions is discussed in Landin (1984:241). It should be noted that while Landin also observes the presence of an *i-* marker preceding transitive verbs, he considers this to be a 3rd person marker. As I will suggest below, and as the above

glosses intimate, this prefix seems to serve as an *irrealis* marker in certain types of transitive clauses.

As the examples above demonstrate, the clause-final question particle **hĩ** can be grammatically omitted. In such cases, the interrogative nature of the clause is reflected in the fact that its verb is not inflected with one of the markers characterizing the various declarative constructions. Also, the interrogative status of the clause may be conveyed via the use of the suffix **-o**, which is optionally attached to the last noun in an interrogative clause. This is evident in examples such as the following, in which **-o** is attached to a free pronoun.

14.13	a-opiso	ãn-o
	2S-hear	2S-Q.NOM
	“Did you hear?”	

§14.2.2.2 Negative polar questions

Karitiana also has negative polar questions. These are formed in a similar manner as the polar questions found above, with the exception that **hĩ** is replaced with **kimĩĩ** (when referring to future events) or **mĩĩ** (otherwise), as in the following example:

14.14	a-kisew-i	kimĩĩ
	2S.ABS-jump	Q.NEG
	“Aren’t you going to jump?”	

§14.2.2.3 Content questions and the Object-focus construction

Content questions in Karitiana are generally formed according to a similar pattern as yes/no questions, with semantically intransitive verbs receiving only person and future tense/aspect marking, and transitive verbs being preceded by free pronouns (when there is a pronominal A) and an **i-** prefix. However, such clauses also contain content question

(WH+) words, and these occur clause-initially, a focus position.¹⁰⁷ Consider the following two examples of content questions, which are similar to questions 14.11 and 14.12 above, respectively:

14.15	mōfāsōŋ	ãn	i-i	ŋgok-(o)	(hĩ)
	why	2S	IRR-eat	manioc-Q.NOM	Q
	“Why did you eat the manioc?”				
14.16	mōfãpip	ãn	i-mhip	hĩm-(o)	(hĩ)
	when/where	2S	IRR-cook	meat-Q.NOM	Q
	“When did you cook the animal meat?”				

Other content questions words in Karitiana begin with the question morpheme **mōfã**.

These include **mōfãkidn** (‘which direction’) and **mōfãmõn** (‘what’ or ‘who’).

It is worth noting that the **hĩ** question particle and the **-o** question suffix can optionally be employed in such content questions. The discussion of Karitiana questions in the literature (Landin 1984:241-245) suggests that the **hĩ** form is a polar question marker, not a general question marker. It is possible that the question marker has been extended to other question types, since presently it can serve in some content questions also, though as we see in 14.15-14.16, it is not required.

Not all content questions require the elements exhibited in examples 14.15 and 14.16. Several of the more frequent question types can be expressed simply by the juxtaposition of a question word and a nominal (or nominals), as in the following two examples:

14.17	tikat	i	pipi
	How.many	3	bracelet
	“How many bracelets are there?” or “How much are the bracelets?”		

¹⁰⁷ As Storto (2003:418) notes, the clause-initial position (Spec, CP according to the framework she employs) is the “landing site of all focused arguments in wh-questions, answers to wh-questions, clefts, and object focus constructions.” These factors suggest that clause-initial positioning correlates with focus semantics. This could be considered to a pre-core slot, in the framework of RRG (cf. Van Valin 2005), preceding the position reserved for topical pre-nucleus core nominals.

- 14.18 taʔi sarita
 where Sarita
 "Where's Sarita?"

Nevertheless, the pattern demonstrated in examples 14.15 and 14.16 is quite productive.

One interesting variation of this pattern that should be noted occurs when the O nominal of a given transitive clause is the questioned element. Such a case is found in examples 14.19 and 14.20:

- 14.19 mōřāmōñ a-ti-okejñ hĩ
 what 2S.ABS-O.FOC-cut Q
 "What did you cut?"
- 14.20 mōřāmōñ a-ti-hĩřã
 what 2S.ABS-O.FOC-smell
 "What did you smell?"

Note that these sample clauses exhibit a morphosyntactic characteristic found in declarative clauses with semantically intransitive verbs. Specifically, the A referent in these cases is not represented via a free pronoun as we might expect, but is instead crossreferenced on the verb, much as the S nominal is in an SAP clause such as 14.6a. This intransitive-like morphology is characteristic of **mōřāmōñ** in the Object-focus construction in Karitiana, which involves the fronting of an O nominal and the inflection of a **ti-** prefix on the verb. However, as Landin first noted (1984:244-245), this sort of patterning is not characteristic of the O-focus construction in general, as is evident in non-questions of the sort found in 14.21 and 14.22:

- 14.21 epo:si:d ãn ti-hĩřã-t
 flower 1S O.FOC-smell-NFUT
 "A flower is what I smelled." or "It's a flower I smelled."
- 14.22 hothoroti ãn ti-okejñ-ø
 watermelon 2S O.FOC-cut-NFUT
 "A watermelon is what you cut." or "It's a watermelon you cut."

As we see in these examples, when the O-focus construction is used in non-questions, free pronouns must be employed, rather than the absolutive verbal prefixes found in questions such as 14.19 and 14.20.¹⁰⁸

§14.2.3 Imperative clauses

Like so many phenomena in Karitiana, the formation of imperatives is sensitive to the distinction between semantically monovalent and semantically multivalent verbs. Table 14.1 contains twenty imperatives I have elicited. The imperatives in the left-most column of the table all involve intransitive verbs (i.e. they are prefixed with *i-* when used in the valence construction) while those in the third column of the table involve transitive verbs (i.e. they cannot be prefixed with *i-* in declarative clauses).

As we see in the table, the imperative form of an intransitive verb is derived by prefixing an absolutive person prefix to the verb, and suffixing an *-a* imperative marker if the verb is consonant final.¹⁰⁹ The imperative form of a semantically multivalent verb is derived by prefixing an irrealis *i-* marker to the verb and suffixing an *-a* imperative marker when the verb is consonant final. However, there is a set of transitive imperatives that are formed simply by producing the non-finite form of the verb, followed by the particle *aʔa*. Some of these exceptional transitive imperatives are highlighted in Table 14.1.

Intransitive Imperative	Gloss	Transitive Imperative	Gloss
a-mbik-a	sit!	(ãñ) i-pĩdn-a	kick (it)!
a-tar-a	go!	(ãñ) i-mhiw-a	cook (it)!
a-ĩrĩr-a	come!	(ãñ) i-mʔa	make it!
a-mẽw-a	enter!	(ãñ) i-paka	clean (it)!
a-pĩtʔĩ	eat!	(ãñ) i-mĩ:	hit (it)!

¹⁰⁸ As we will see in section §15.3.1.1, the absolutive verbal prefixes of 14.19 and 14.20 may also be replaced by pronouns in some cases.

¹⁰⁹ This suffixation only occurs in the case of 2nd person imperatives, not the 1st person plural hortative use.

a-hadnã	Speak!	(ãn) i-opĩ	cut (it)!
a-opihok-a	listen!	kip aʔa	cut it!
a-aŋgar-a	stand up!	ket aʔa	pick it up!
a-tarika	walk!	tik aʔa	take it!
a-oti	take a bath	somõr aʔa	look at it!

Table 14.1 Imperatives in Karitiana.

The *i-* prefix of semantically transitive imperatives may seem to serve as a 3rd person agreement marker, given that the *a-* prefix in intransitive imperatives is a 2nd person absolutive marker. However, the *a-* prefixing in semantically intransitive imperatives conforms to the pattern found in other constructions, for instance the Verb-focus and SAP constructions, in which 2nd person absolutives are prefixed to the verb. However, *i-* prefixation is not found in these constructions. (As we saw in the previous section, it is found in questions, however.) Furthermore it is not always clear, in examples such as those in Table 14.1, which referent the *i-* prefix would be agreeing with, since there is not necessarily an implied absolutive in some cases in which imperatives with semantically transitive verbs are uttered. The discussion of the *i-* prefix will be taken up again shortly, but only after relevant data from negative clauses in Karitiana is considered.

Before concluding this brief description of Karitiana imperatives, it is worth noting that there are also hortatives/imperatives involving 1st person plural referents. Such hortatives do not receive an *-a* suffix as the 2nd person imperatives in Table 14.1 do. Nevertheless, they are formed in a similar manner as the imperatives in Table 14.1, in that the verbs are not fully inflected and are preceded by pronominal forms. When the relevant verbs are semantically monovalent, they are prefixed with the first person plural agreement marker *ij-*. When the verbs are multivalent, they are prefixed with *i-* as we would expect, and are preceded by the first person plural pronoun *itʃa*. These facts are evident in the following two examples:

- 14.23 ij-angat
 1PL-stand.up
 "Let's stand up."
- 14.24 i:tʃa i-oki (pikōm)
 1PL IRR-kill (*macaco prego*)
 "Let's kill it." or "Let's kill the *macaco prego*."

Landin (1984:246) analyzes the *i-* marker as a free third person pronoun, which occurs pre-verbally rather than post-verbally as we might expect. However, the form may not be stressed and is frequently reduced to a glide-like vowel. This is consistent with a prefixal interpretation of the marker, since the *i* 3rd person pronoun, as a monosyllabic word, *is* stressed and unreduced. Another piece of evidence suggesting that *i-* is not a 3rd person free pronoun is that imperatives may optionally include 3rd person full NP referents, as in 14.24. If we interpret the *i* form in such clauses as a free pronoun, then it is unclear why it cannot be omitted in such cases. However, it is ungrammatical to do so, and this fact supports our analysis of *i-* as a prefix.

Imperative clauses are also characterized by prosodic changes, specifically increased pitch on the stressed vowel of the verb. This pitch alteration was discussed and exemplified in Chapter 7.

§14.2.4 Negative clauses

As Landin (1984:237) notes, Karitiana negative clauses are unusual typologically in that they may be morphologically unmarked in the case of some vowel-final verbs (those are semantically intransitive according to the approach adopted here). For instance, consider the following negative clause:

- 14.25 i-oti (īn)
 1S.ABS-bathe (1S)
 "I did not bathe."

However, consonant-final intransitive verbs in negative clauses are typically affixed with the marker **-i**, unless the final consonant is nasal, in which case the negative suffix is **-ĩ** as in the following case:

14.26 i-terektereq-ĩ (ĩn)
 1S.ABS-dance-NEG (1S)
 "I did not dance."

When the given intransitive verb is stressed initially, then the negated verb may be prefixed with **ri-**. This fact (along with **-i** suffixation) is illustrated in clause 14.27:

14.27 i-ri-mbik-i ĩn
 1S.ABS-sit 1S
 "I did not sit."

Negational semantics can also be achieved by the use of the word **padni**, which can (and typically does) follow the verb in negated clauses. See clause 14.29 for an example of this sort of clausal negation.

In the case of negated semantically multivalent verbs, the form of the verb is similar to that in imperative clauses and interrogative clauses with semantically multivalent verbs, in that the verb is prefixed with an **i-** marker:

14.28 i-ator-i ĩn bĩpān
 IRR-take-FUT 1S arrow-OBL
 "I will not take the arrow."

14.29 ĩn i-soki padni eppa
 1S IRR-break NEG oar
 "I did not break the oar."

The distribution of the **i-** marker is somewhat perplexing, and the gloss I have chosen should be explained in greater detail. As I mentioned above, previous accounts (Landin 1984, Storto 1999,2003) of the language suggest that the **i-** prefix be considered a third person marker in transitive clauses, in which it is said to refer to the O nominal. This

analysis is initially appealing, given that the 3rd person free pronoun is *i*. However, when the third person pronoun serves as an O, it follows the verb, as in the following clause:

14.30	<i>ĩn</i>	<i>ga-pi:-t</i>	<i>i</i>
	1S	NSAP-take.PL-NFUT	3
	"I took them."		

The previous analyses of the *i-* prefix are also appealing since person agreement marking is common in Karitiana. For instance, as we have demonstrated repeatedly above, absolutive prefixes are attached to intransitive imperatives, intransitive negatives, and intransitive interrogatives. However, while absolutive prefixes are generally prefixed to intransitive verbs in Karitiana, in declarative constructions (for instance the SAP construction) such verbs do not exhibit overt verbal agreement prefixes when the absolutive referent is a third person referent. In declarative constructions, then, it is normal to have 1st and 2nd person verb prefixes, but overt 3rd person prefixes do not exist. So it is unclear, if in fact the *i-* prefix in the relevant clause types (transitive imperatives, transitive negatives, and transitive interrogatives) is a third person marker, why it is prefixed to the verb in these constructions and not in declarative constructions in Karitiana.

As I noted in Chapter 12, Hopper and Thompson (1980) suggest that there is frequently an association between the morphosyntax of negated clauses and intransitive clauses in a language. I suggested at that point that Karitiana exemplified this association well, since semantically intransitive verbs in the Karitiana valence construction are prefixed with *i-*. As we have noted, semantically transitive verbs in declarative clauses in Karitiana do not inflect with *i-* even when there is a third person O referent. So the question that must be raised is, "Why does the *i-* prefix only occur in negative, imperative, and interrogative clauses with semantically transitive verbs, as well as

declarative clauses with semantically intransitive verbs?" One plausible answer is that these clauses share a particular semantic domain.

At the time they are spoken, imperative clauses refer to actions that have yet to take place. Negative clauses refer to actions that have not taken place or which will not take place. Interrogative clauses reflect an inherent uncertainty regarding whether or not a given action has taken place or will take place. The semantic thread tying these clause types together can be fairly easily grasped then. It relates to uncertainty regarding the actuality of a given event's past, present, or future denouement. Linguists have noted the presence of this semantic unity in other languages as well, and in general with respect to irrealis marking. To cite just one example, Payne (1997), in his crosslinguistic survey of morphology, notes in his discussion of irrealis marking that, "Interrogative and imperative clauses are likely to be irrealis" if such a mood is present in a given language. He goes on to note that "some languages, however, treat all negative clauses as irrealis." (1997:245) The fact that these three categories of clauses are often associated with irrealis marking is consistent with the suggestions being made here. The suggestions are also consistent with the affiliation between this transitive irrealis prefix *i-* and the intransitive *i-* prefix found in the valence construction. According to my analysis, both irrealis marking in transitive clauses, as well as intransitive marking in the valence construction, are used to highlight the fact that the action of a given verb is "deflected and less direct." (Hopper and Thompson 1980:276) *In conclusion, we can state that the i- verbal prefix of Karitiana is generally used to convey the notion of indirectedness, i.e. the lack of a transfer of energy from a prototypical agent to a prototypical patient. This i- marker is used to make salient the irrealis nature of a transitive verb in imperatives,*

interrogatives, and negatives. It is also used to mark semantic intransitivity, when contrasted to inherently more direct transitive actions in the valence construction.

One final piece of evidence that should be mentioned before leaving this subject is that the *i-* prefix is not restricted to clauses with 3rd person O referents, as we see in the following example.

14.31	ĩn	i-mĩ:	padni	ãn
	1S	IRR-hit	NEG	2S
	“I will not hit you.”			

It seems impossible to reconcile the presence of *i-* in such clauses with an account that considers the prefix a 3rd person agreement marker. However, such data are consistent with the irrealis gloss I have suggested.

§14.3 Constituent sequencing and word order

As is evident in the examples at the beginning of this chapter, the order of elements in Karitiana clauses varies somewhat according to the type of construction employed. In general, matrix declarative clauses with non-anaphoric NP's are often characterized by SV or AVO sequencing. However, this is not the case when clauses involve Verb-focus morphology. As I noted, in such clauses the ordering can generally be described as VS or VO. However, most linguists accept the notion that a language's basic word order (if such a concept can be ascribed to a language) can be ascertained by examining pragmatically unmarked declarative clauses with non-anaphoric arguments. Matrix clauses of this sort in Karitiana are typically characterized by SV or AVO ordering, as in the following example with two non-anaphoric NP's:

14.32	fernando	ga-atip-ø	pastor
	Fernando	NSAP-meet-NFUT	pastor
	“Fernando met the pastor.”		

R. Landin (1982) suggests that the most frequent and pragmatically neutral word order in Karitiana is SVO. Landin (1984:248) notes that Karitiana has “the word order characteristics of SVO Po GN NA.” He also notes that this pattern is attested in languages cited in Greenberg (1963). These include Mandingo, Voltaic languages, Kru, Twi, Gã, Guang, Ewe, Nupe, Songhai, Tonkawa, and, significantly, Guaraní.

Lehmann (1973) suggests that the crucial factor in determining constituent sequences in a given language is the position of the object relative to the verb. This so-called OV:VO typology of languages has been influential in the study of word order, though as Comrie points out (1981:90) the terminology associated with such an approach can be ambiguous. For example, in using such an approach occasionally linguists refer to OV languages whose overall characteristics are consistent with most OV languages, though verbs typically precede objects in the language in question. Vennemann’s (1974) operand-operator terminology is preferable in that it avoids such terminological quagmires.¹¹⁰ For that reason I will employ it here. As Comrie notes (1981:91), the term operator corresponds to the traditional structuralist term “adjunct,” while the operand corresponds to the traditional term “head.” Therefore, in a given verb phrase, the verb is the operand while the object is the operator. In noun phrases, nouns serve as operands (or heads), while modifiers such as adjectives, genitives, and relative clauses serve as operators. In adpositional phrases, the adposition serves as a head, while the noun phrase serves as an operator.¹¹¹

¹¹⁰ Of course, this is not the only alternative approach to constituent typology. For instance, see Nichols (1992) for an approach that does not group languages into the two opposing categories of operator-operand and operand-operator languages. According to the approach in Dryer (1992), operators are noun-patterners. Operand-operator languages like Karitiana are considered “right branching.”

¹¹¹ Comrie (1981:92) makes the following relevant comments:

The evidence suggests that most operators in Karitiana follow operands, in a manner that is consistent with the suggestion that the default word order in the language is VO and therefore, given the evidence so far considered, SVO. In the following examples, I exemplify the operand-operator sequencing typical of Karitiana. (Only the relevant constituents, rather than entire clauses, are represented.)

- 14.33 kinda sōm
 thing red
 “red thing”
 N-Adj
 Operand-Operator
- 14.34 seʔa pitat
 good much
 “very good”
 Adj-Adv
 Operand-Operator
- 14.35 pikinā minda / minda pikinā
 run slow slow run
 “run slowly”
 V-Mod or Mod-V
 Operand-Operator or Operator-Operand
- 14.36 onĩ kinda aka
 DEM.DIST thing DET
 “That thing over there.”
 N-det
 Operand-Operator
- 14.37 a-pitʔi padni
 eat NEG
 “don’t eat”
 V-Neg
 Operand-Operator
- 14.38 na-pet̄tet-ø ŋga
 NSAP-burn field
 “burned the field”
 V-O
 Operand-Operator

The assignment of operator (adjunct) and operand (head) is in most instances uncontroversial, though some linguists have been less comfortable with declaring the head of an adpositional phrase to be the adposition, rather than the noun (phrase). However, this assignment can be justified, for many languages, by the usual structuralist syntactic test of substitution: in English, for instance, the prepositional phrase of *John is in the house* can be substituted by *in* but not *the house*, cf. *John is in*, but not, as a similar construction **John is the house*, and the traditional term prepositional phrase attests to the view that the preposition is the head...

- 14.39 i naka-mī:-t taso pitʔi
 3 SAP-hit-NFUT man eating
 “She hit the man that was eating.”
 N-Rel Clause
 Operand-Operator
- 14.40 i-sa:t na-aka-t pairiṅã-t
 3-name NSAP-COP-NFUT pairiṅã-COP.AGR
 “Her name is pairiṅã.”
 Cop-Pred
 Operand-Operator
- 14.41 i-ohiṯīm naka-a-tika-t pidzewidnat
 taller NSAP-do-PROG-NFUT pidzewidnat
 “is taller than pidzewidnat”
 Adj-Standard
 Operand-Operator

There are three constituents that are not characterized by such sequencing, however.

These are exemplified in the following examples:

- 14.42 pitʔi-pā okip
 eat-NOM on
 “On the table.”
 N-Postposition
 Operator-Operand
- 14.43 o pok akan
 head white village
 “White man’s village.” (“City”)
 Genitive-N
 Operator-Operand
- 14.44 ota:dnamin opikiṅō
 four horn
 “four horns”
 Num-N
 Operator-Operand

In nine of the twelve constituents considered, the ordering is consistent with operand-operator sequencing, which is putatively the expected ordering of SVO languages. However, there has been some debate in the literature as to whether SVO

(AVO in the terminology used for much of this work) is actually consistent with operand-operator sequencing typologically. As Comrie (1981:90) notes:

... the existence of SVO word order does not seem to correlate particularly well with any other parameter. Knowing that a language is VSO or VOS, we can predict its values for other word order parameters; knowing that a language is SOV, we can with considerable reliability predict its other word order parameter values; knowing that a language is SVO, we can predict virtually nothing else.

This, however, seems to be an overstatement. Dryer (1991) considers an impressive array of 603 languages, representing many genetically unaffiliated families, and demonstrates that in fact SVO languages generally adhere to the OV:VO typology. Put simply, in SVO languages operands *do* typically precede operators. In Dryer's words:

SVO languages exhibit properties that are consistent with the typology of Lehmann and Vennemann in which the basic dichotomy is between OV and VO languages, and there is no reason to believe that there are fewer exceptionless generalizations to be made about SVO languages than there are about V-initial and V-final languages. (1991:475-476)

However, one of the crucial points made by Dryer is that, while SVO languages are consistent with operand-operator sequencing with respect to most constituents, in the case of three constituent types, SVO languages demonstrate mixed patterning. For instance, the order of genitives relative to nouns in SVO languages generally exhibits mixed patterning, occurring prior to the noun in many language genera and following the noun in a significant amount of language genera as well. For this reason, it would be improper to place expectations on the order of genitive-noun sequences in a putative SVO (AVO) language such as Karitiana. In other words, if a language is characterized by SVO (AVO) sequencing, neither G-N nor N-G sequencing is inconsistent with this word order type, based on the typological data surveyed in Dryer (1991, see also 1988). Similarly, according to Dryer the positions of polar question particles (which as we saw in the previous section are clause-final in Karitiana) and content question words (which as we saw are clause-initial in Karitiana) do not pattern in any consistent manner, i.e. are not

predictably clause-initial or clause-final, in SVO languages. In other words, if a language is characterized by SVO(AVO) word order, no attested pattern of genitives, question words, and question particles is inconsistent (or consistent) with this word order.

While these three constituent types do not adhere to the operand-operator sequencing that we would otherwise expect in SVO languages, the typological data suggest that three other constituent types do not adhere to any predictable sequencing pattern for *all* basic word order types. These constituents are noun phrases with adjective modifiers, noun phrases with demonstratives/determiners, and noun phrases with cardinal numerals. In the case of each of these constituent types, Dryer demonstrates that they do not generally pattern in a statistically significant manner with any of the basic word orders. So, given a language's basic word order, we can predict little about the sequencing characterizing such NP's.¹¹²

The particulars of Dryer's analyses are not crucial here. What is important is that, when deciding which constituents are consistent with the suggested basic AVO/SVO word order in Karitiana, we ignore those constituents that have been demonstrated conclusively to not pattern consistently in other SVO languages, or in languages more generally. With that in mind, consider Table 14.2, which lists the basic constituent sequences of Karitiana, according to whether or not they are consistent with SVO word order (and operand/operator sequencing).

¹¹² In a previous paper based on Langacker (1987, 1991), I suggested some plausible cognitive motivations for the behavior of numerals, which relates to their functioning as heads or trajectors in some cases. (Everett 2003) This is consistent with work such as Babby (1987), who suggests that numerals function as heads in Russian.

Consistent with SVO languages and operand-operator sequencing	Adj-adv, V-mod, V-neg, N-Rel Clause, Cop-Pred, Adj-Standard, V-O
Inconsistent with SVO languages and operand-operator sequencing	N-Postposition
Neither consistent nor inconsistent with SVO ordering	G-N, clause-final Q particle, clause-initial Q words
Neither consistent nor inconsistent with SVO or any basic word order	Num-N, N-Adj, N-Det

Table 14.2 Constituent sequences in Karitiana.

What this table suggests is that, with respect to the constituents that have been shown to pattern with SVO languages crosslinguistically, Karitiana is generally consistent. In fact, of the eight relevant constituents (those in the two first rows of Table 14.2) evinced above, Karitiana is consistent with respect to seven. The ordering of adpositions with respect to nouns is the only truly inconsistent sequencing evident.¹¹³ The patterning of constituent sequences in Karitiana generally buttresses our claim (and Landin's) that the basic transitive word order in the language is SVO/AVO.

In her discussion of Karitiana word order Storto (1999:119) notes that the word order in matrix clauses differs from that in embedded clauses. She states that "The former are either verb-initial (VOS, VSO) or verb-second (SVO, OVS), whereas the latter are invariably verb-final (OSV,SOV)." As we noted above, there are in fact many verb-initial declarative matrix clauses in Karitiana, particularly in the morphosyntactically distinct Verb-focus construction. There are also object initial clauses, however these typically are marked with the **ti-** verbal prefix, as illustrated above. So, while various

¹¹³ In Dryer's database there are only "six genera with postpositions among 48 genera containing SVO languages." So, while not common, SVO-postpositional languages do surface. In fact, in Greenberg's (1963) appendix, there are 19 SVO and postpositional languages or groups and 33 SVO and prepositional languages or groups. However, Dryer (1991:476) suggests that the high incidence of SVO and postpositional languages in Greenberg's data is due in part to faulty sampling.

orders for Karitiana declarative matrix clauses are possible, verb-initial and object-initial clauses are often marked morphologically. SVO/AVO clauses, on the other hand, are unmarked pragmatically and receive no extra verbal marking. AVO also represents the order of matrix declarative clauses with full non-anaphoric NP's, and the ordering in such clauses is, after all, the main criterion employed by many linguists in establishing word order. As Storto notes, in accordance with Landin, AVO also represents the most frequent order in conversational data. This observation is also made in R. Landin (1982).

Storto's observation that word-order in embedded clauses is verb-final is an important one. It is supported by clauses such as the following from my data:

- 14.45 [taso jōnso mī:] naka-mī:-t owā
 man woman hit NSAP-hit-NFUT child
 [A O V]
 A V O
 "The man who hit the woman hit the child."
- 14.46 i naka-mī:-t [taso jōnso mī:]
 3 NSAP-hit-NFUT man woman hit
 [A O V]
 A V O
 "He hit the man that hit the woman."

Storto (1999:126) suggests that "The word order in Karitiana dependent clauses is SOV in mythical narratives, and OSV otherwise." However, utterances such as 14.45 and 14.46, in which embedded clauses display SOV ordering, are not taken from mythical narratives. In fact, in elicited clauses the default ordering of embedded clauses is SOV/AOV.

Storto suggests that OSV is the basic word order of Karitiana, and accounts for the SVO sequencing in matrix clauses, by positing a movement rule which moves the subject to the focused Spec, CP position (clause-initial) in matrix clauses, from an underlying clause-medial position. I refer the reader to Storto (1999) and Storto (2003)

for the details of her account. The account here adopts a different framework, so it is perhaps not surprising that our conclusions differ. Nevertheless, it is worth stressing why the data suggest to me that SVO/AVO, rather than OSV/OAV, represents the basic word order of Karitiana declarative clauses. First, as Storto notes, OSV/OAV ordering is only present in embedded clauses, and in fact it is one of two orders available for embedded clauses, which are generally AOV/SOV in my data. Second, as we demonstrated above, constituent sequencing in Karitiana is generally consistent with SVO/AVO or operand-operator sequencing, excepting the behavior of adpositions. It is generally *inconsistent* with verb-final or operator-operand sequencing. Finally, OSV word order is much more unusual typologically than the SVO/AVO word order I am suggesting.¹¹⁴

A more comprehensive account of the differing word orders in Karitana embedded clauses and matrix clauses would incorporate diachronic evidence. Of course, since the Karitiana orthography was only recently developed, there are no written records that might assist in such an analysis. Nevertheless, some tentative diachronically-oriented observations can be made, and these suggest that verb-final ordering in Karitiana embedded clauses may very well be a vestige of an earlier basic word order.

The first relevant piece of evidence is that proto-Tupí appears to have had AOV word ordering. As Rodrigues (1999:114) notes in speaking of the Tupí family, “In most languages the predominant order of core clausal constituents is AOV, SV.” This fact suggests that proto-Tupí was characterized by AOV/SOV ordering. The second piece of evidence is Storto’s important observation that SOV is the most common order in embedded clauses in “mythical narratives.” Such narratives, which have been passed

¹¹⁴ Of course, there are attested cases of OSV word order, and some of these cases are found in Brazilian indigenous languages, e.g. Xavante (Central Jê), Jamamadi (Arawá), and Nadeb (Makú).

down in part via memorization, might be expected to demonstrate some archaic morphosyntactic elements, and this fact generally supports the suggestion that verb-final sequencing in embedded clauses is a vestige of a time when Karitiana's (or its predecessor's) basic word order could be described as AOV. Of course, given the lack of written records, the suggestion of AOV ordering in proto-Tupí can only be based upon the distributional evidence in contemporary Tupí languages. There is no clear reconstruction of a shift from AOV ordering in proto-Tupí to AVO ordering in Karitiana. Nevertheless, this word order change seems to be the most consistent account of the synchronic cross-Tupí and Karitiana data.

The suggestion that certain morphosyntactic phenomena may be maintained in embedded clauses but not matrix clauses is not novel of course. Similar claims have even been made regarding at least one other Tupí language family. Jensen (1990,1999) provides data demonstrating that in Tupí-Guaraní the once strong absolutive system is now only apparent in nominalizations, reduplication, serial verbs, and subordinate clauses. In general, however, matrix clauses in Tupí-Guaraní languages now tend to exhibit a split-S crossreferencing system. In other words, subordinate clauses in these languages maintain vestiges of proto-Tupí-Guaraní morphosyntax, while matrix clauses exhibit fewer similarities to proto-Tupí-Guaraní. This is similar to the suggestion being made here for Karitiana.¹¹⁵

It is worth noting that the suggestions being made here are generally consonant with data on word order shifts in other languages. That is, there are many attested cases in which the basic word order of a language has shifted from SOV to SVO. As Kiparsky

¹¹⁵ Differing word orders in matrix and embedded clauses are also found in the Carib language Hixkaryana (cf. Derbyshire 1981, 1999).

(2005:1 notes), “An interesting asymmetry in syntactic change is that OV base order is commonly replaced by VO, whereas the reverse development is quite rare in languages.”¹¹⁶ This is true in the case of various Indo-European languages, including English (cf. Stockwell and Minkova 1991, Lightfoot 1991). In other words, the suggestion being made here, specifically that the word order in Karitiana has likely shifted from SOV to SVO, clearly has precedent. So does the suggestion that morphosyntactic changes in Karitiana occurred at different rates in matrix clauses, when contrasted with embedded clauses. In fact, this suggestion has precedent in other Tupí languages. Nevertheless, the hypothesis propounded here for Karitiana is admittedly tentative and requires future exploration.

Based on the evidence presented in this chapter, two central claims regarding basic Karitiana word order appear to be that **1.** AVO and SV are the basic unmarked word orders of the language and that **2.** V-final syntax in embedded clauses is quite possibly a reflection of a previous basic word order.

¹¹⁶ In a 1994 posting to the ListServ, Matthew Dryer suggests that word order changes to SVO seem more common than word order changes to SOV, crosslinguistically. He speculates that this is the case because: ...among the four most common orders SOV, SVO, VSO and VOS, the order SVO is the most natural result of change, since all three other orders can easily change to SVO (changes from VSO or VOS to SOV or vice versa being more dramatic changes).

Grammatical Relations

§15.1 Introduction

The grammatical relations (henceforth GRs) of Karitiana exhibit various groupings of argument types. In this chapter I will focus principally on the GRs associated with the core arguments of syntactically intransitive and syntactically transitive clauses. The two arguments of a syntactically transitive clause can be classified as one of two macroroles, as suggested in Chapter 12. One of these macroroles, the actor, can generally be understood to be the more agentive of two arguments in a syntactically transitive clause. I will refer to actor-macrorole arguments in transitive clauses as A arguments. The other macrorole of a syntactically transitive clause, the undergoer, can generally be understood to be the more patientive argument of a syntactically transitive clause. As Van Valin (2005:61) suggests, the undergoer generally “represents the non-instigating, affected participant in a state of affairs” (cf. §12.2). I will refer to undergoer-macrorole arguments in transitive clauses as O arguments. The solitary argument of a syntactically intransitive clause in Karitiana, which I will refer to as S, is treated, according to some morphosyntactic phenomena, like the actor of a transitive clause. According to other phenomena, the S argument is treated similarly to the undergoer of a transitive clause. In general, I will seek to highlight the multifarious assortment of patterns that group S with O, as well as those patterns that group S with A. In keeping with the literature, I will refer to the former sorts of patterns as absolutive, and the latter sort as nominative.

Landin (1984:224) was the first to observe that Karitiana morphosyntax is often oriented according to the absolutive-ergative pattern of GRs. He states that “All the evidence argues that Karitiana should be classified as an ‘ergative language.’” While Landin is correct in noting that there are many ergative-type phenomena in the language, it should be noted from the outset of this discussion that many phenomena in the language appeal to the nominative category of nominals. This is not surprising since, as many researchers have noted (cf. Comrie 1978 and Givón 2001, *inter alia*), languages with absolutive-ergative phenomena always exhibit some nominative-type patterns as well, though such patterns may be more subtle and more syntactically oriented than some of the overt ergative patterns, e.g. case marking or verb agreement.

As we have seen in the preceding chapters, semantic transitivity plays a major role in the classification of Karitiana verbs. Specifically, verbs that are expected to occur with two macroroles are grouped together, while those that are expected to occur with one macrorole are grouped together. This basic verb categorization system plays a prominent role in various morphosyntactic phenomena. Given the importance of this transitive/intransitive dichotomy, it is perhaps not surprising, then, to find that Karitiana also ascribes significance to the ergative and absolutive categories of nominals. As various researchers have noted, the ergative/absolutive grouping of clausal arguments is based in large part on the distinction between transitive and intransitive clauses. After all, ergative nominals refer to a type of nominal in transitive clauses, and cannot be defined without appealing to the notion of transitivity. As Givón notes:

The ergative-absolutive case-marking system is governed by the principal of transitivity. It is, first and foremost, a system where case-marking codes the syntactic distinction between transitive and intransitive clauses. However, given the strong correlation between semantic and syntactic transitivity, factors that are to begin with semantic...turn out to have strong clause-level syntactic consequences in ergative languages. (Givón 2001:208).

The presence of nominative and accusative categories in languages such as Karitiana is generally attributed to the fact that these categories are oriented according to the pragmatic status of arguments, rather than to transitivity like the ergative and absolutive categories. The presence of nominative and ergative categories can also be explained according to primarily semantic factors in the case of many languages, particularly so-called active-stative or split-S languages (cf. Dixon 1979, 1994), of which several Tupí languages are said to be examples. Probably the best-documented case of an active-stative Tupí language is Kamaiurá (Seki 1990, 2000), a Tupí-Guarani language.¹¹⁷ Generally speaking, in such languages, the S arguments of some intransitive verbs are classified as nominatives, while the S arguments of other intransitive verbs are classified as absolutives. In fluid-S systems the categorization of arguments in intransitive clauses varies according to particular usages rather than according to the semantic classification of verbs. The GRs of Karitiana are not generally suggestive of either a split-S or a fluid-S system. They are suggestive instead of a system in which syntactic phenomena often exhibit nominative-accusative patterns, while morphological phenomena often exhibit absolutive-ergative patterns. These are only tendencies, however, since both sorts of phenomena appeal, to one extent or another, to both types of patterns.

The crosslinguistic patterning of GRs has played a prominent role in the development of various theoretical approaches to syntax. Of course the foci of these approaches vary significantly. Some approaches are concerned primarily with the derivation of surface GRs from basic underlying patterns, e.g. Relational Grammar

¹¹⁷ Other Amazonian languages are also said to classify verbs as either active or stative. This includes some Carib languages. In some cases, however, the semantic distinction between so-called active verbs and so-called stative verbs is less clear cut than in other well-known active-stative languages, e.g. those of North America, for instance members of the Muskogean, Siouan, and Panoan families.

(Perlmutter 1983, Perlmutter and Rosen 1984, *inter alia*), others are concerned with the interaction of verb meanings and GRs, e.g. Role and Reference Grammar (Foley and Van Valin 1984, Van Valin 2005, *inter alia*), others are concerned primarily with the configurational properties or constituent structures of GR categories (Chomsky 1965, 1981, 1995, *inter alia*), while others are concerned primarily with the cognitive bases of various GR categories, e.g. Cognitive Grammar (Langacker 1987, 1991, 2002, *inter alia*). All of these schools attempt to demonstrate how basic GR categories and phenomena fall out naturally from their approaches to morphosyntax. The most basic GR categories that need to be accounted for are the nominative, accusative, ergative, and absolutive categories. I should stress that these terms are used in this work to refer to categories that are instantiated via a host of morphosyntactic phenomena, and do not refer simply to cases. (In fact, case-marking is not used to distinguish between core argument types in Karitiana.) These categories are reified by morphosyntactic patterns that in some cases treat the S nominal of intransitive clauses as an actor macrorole (creating a nominative-accusative alignment), and that in other cases treat the S nominals like an undergoer macrorole (creating an absolutive-ergative alignment).¹¹⁸

Naturally, the types of patterns used to reify GR categories vary somewhat from language to language. Typological surveys such as Givón (2001:189) and Farrell (2005) provide crosslinguistic examples of many of the basic types of syntactic patterns used in instantiating GRs. The types of phenomena associated with GRs typically include promotion or raising phenomena, controller-pivot phenomena, cleft-focus phenomena, availability of nominal types for passivization, and quantifier float, among others. A

¹¹⁸ In other words, the split-GRs of Karitiana are based on a split among morphosyntactic pattern types. As we will see in subsequent sections, the split is not based on the argument structure or case frames associated with particular verb types. This is the case in many languages, of course.

given language is only expected to use a certain sub-grouping of such phenomena for the sake of establishing GRs, and this is the case in Karitiana. We will restrict our focus, of course, to those GR phenomena that surface in Karitiana.

There are two primary sorts of phenomena that will be examined in this chapter, morphological phenomena and syntactic phenomena. First I will consider the basic morphological instantiation of GRs, and then consider some of the syntactic patterns that reflect the basic GRs of Karitiana. I should note that many of these syntactic patterns involve voice alternations, particularly the passive voice. This is not surprising given the interrelation between grammatical relations and voice phenomena. These two sorts of phenomena are inextricable in many ways, and it is in part for this reason that this chapter is followed by a chapter on patterns of voice alternations in Karitiana. (The relationship between voice and GR patterns is discussed further in the introduction to Chapter 16.)

§15.2 GRs and morphology

As we saw in Chapter 12, Karitiana is a head-marking language with agglutinating verbal morphology, as are most Amazonian languages (Cf. Rodrigues 1999, Payne 1990). Given that this is the case, we might expect that the morphological instantiations of grammatical categories be evinced primarily in verb inflections. This expectation is generally borne out, though as we will see pronominal forms are sensitive in subtle ways to GRs. However, case-marking of non-pronominal arguments in Karitiana is generally absent. Nevertheless, as we will see in §15.5, the set of postpositions and suffixes in the language can be used to distinguish secondary objects from primary objects (in the sense of Dryer 1986), as well as indirect objects from direct objects. In this and the following two sections, however, we restrict our attention to the

grouping patterns associated with S, A, and O arguments, paying attention to the categorization of S with A and S with O. We will begin by examining the grammatical grouping of core arguments exhibited by the actual verbal morphology. Then we will turn our attention to the grammatical grouping of core arguments evident in the distribution of nominal forms, specifically free pronouns and pronominal prefixes.

§15.2.1 Verbal morphology and GRs

Verbs in Karitiana do not generally exhibit number agreement with core arguments, so superficially it appears that this sort of agreement does not function to categorize S, A, and O. However, closer inspection of Karitiana utterances suggests that number agreement does occasionally surface in verb forms. Such agreement is evident in two sorts of inflections—aspectual suffixes and irregular suppletive forms. In general, the relevant number markers agree with absolutive nominals. This is not altogether surprising, given that, as Durie (1986) notes, nearly all cases of such number “agreement” attested in the literature index absolutive nominals. Durie also suggests other ways in which this sort of agreement differs from typical agreement phenomena. The crucial motivation for this differentiation appears to be that such “agreement” can be seen as epiphenomenal, in that the construed plurality of a particular clausal argument may simply be the result of a serial-type interpretation of the relevant action. With this caveat in mind, it is worth outlining in detail the relevant data on number agreement in Karitiana, noting how it in fact indexes S and O nominals, rather than the simple plurality of the action itself.

The interaction between number and aspect was mentioned briefly in Chapter 12, and was exemplified in 12.75 and 12.76. 15.1 and 15.2 are similar examples:

- 15.1 nde: na-aka-t i-pitʔi-tisip-ø
 deer NSAP-COP-NFUT INT-eat-PROG.PL-COP.AGR
 “The deer are eating.”¹¹⁹
- 15.2 nde: na-aka-t i-pitʔi-ŋgi-t
 deer NSAP-COP-NFUT INT-eat-PROG.PL-COP.AGR
 “The deer are eating.”

As we see in these examples, the choice of either **tisip** or **ŋgi** as progressive markers indicates that the S of a given clause is plural, though there is no indication of this plurality in the form of the S nominal itself. The use of aspect markers for number marking is highlighted by the following example, in which only the aspect marking varies and a singular interpretation of the S nominal **nde:** results.

- 15.3 nde: na-aka-t i-pitʔi-tika-t
 deer NSAP-COP-NFUT INT-eat-PROG.SG-COP.AGR
 “The deer is eating.”¹²⁰

There is only one nominal argument in 15.3, and for that reason I refer to it as an S nominal. The variation in aspectual inflections for the number of an S is found in non-copular clause types also, as evident in the following clause pairs:

- 15.4a. ān i-oki-tika-t
 2S INT-hurt/kill-PROG-NFUT
 “You are hurting.”
- b. onĩ taso aka i-oki-tisip-ø
 DEM.DIST man DET INT-hurt/kill-PROG.PL-NFUT
 “Those men are hurting.”

¹¹⁹ As many of the glosses in this work suggest, the default construal of most nominals, such as “deer” in this example, is definite. While it is possible that such nouns represent indefinite nouns, Karitiana speakers understand the nouns to be definite. For instance, when a bilingual Karitiana speaker is presented with a clause such as 15.3 in isolate, and asked to provide a translation into a meta-language (Portuguese), this translation in all cases (in my data) involves a definite noun, though an indefinite noun could in principle have been provided. There are no indefinite markers in Karitiana, but in a case of clear indefiniteness generic nouns are often used. For instance, the noun **itʃa**, meaning “person/people” (homophonous with the 1st person plural pronoun) may be used. In such indefinite cases this noun could be glossed as “someone” or “some people.”

¹²⁰ Note that similarity between aspect agreement with S nominals in Karitiana and English. In 15.1-15.3, the suppletive markers **is/are** in the English glosses reflect the number of S, much as the aspect suffixes in Karitiana do. However, in transitive clauses, number agreement in English is of course with A nominals, but is with O nominals in Karitiana.

- 15.5a. i-ta-oti-tika-t
 1S.ABS-SAP-bathe-PROG-NFUT
 "I am bathing."
- b. ij-ta-oti-ngi-t
 1PL.ABS-SAP-bathe-PROG.PL-NFUT
 "We are bathing."
- 15.6 a. naka-põn-tika-t taso oʔit
 NSAP-hunt-PROG-NFUT man young
 "The young man is hunting."
- b. naka-põn-gi-t taso oʔit
 NSAP-hunt-PROG.PL-NFUT man young
 "The young men are hunting."

As we see in the above examples, the plural progressive markers are chosen when referring to an S that refers to more than one entity. When we consider transitive clauses with A and O core arguments, we find that the plural progressive markers are employed when the O of a given clause refers to a plural nominal. Consider the following examples:

- 15.7 ãn na-oki-ngi-t jã taso aka
 2S NSAP-hurt/kill-PROG.PL-NFUT DEM.PROX man DET
 "You are hurting/killing those men."
- 15.8 ãn naka-mĩ:-gi-t i
 2PL NSAP-hit-PROG-NFUT 3
 "You are are hitting him/her."
- 15.9a. õwã sopipok naka-mĩ:-gi-t i
 child clever NSAP-hit-PROG.PL-NFUT 3
 "The clever child is hitting them."
- b. i naka-mĩ:-gi-t õwã sopipok
 3 NSAP-hit-PROG.PL-NFUT child clever
 "S/he is hitting the clever children."

As we see in example 15.7, when the plural progressive is utilized, a given transitive clause is construed as referring to a situation in which an A nominal acts upon a plural O nominal. It is worth stressing that this construal is not the by-product of the plurality of the action itself. In fact, 15.7 refers to *one* event involving hurting or killing. (In other

words, 15.7 could be grammatically uttered if, for example, one man hit several others with a long stick, with one motion.)

Examples 15.8, 15.9a, and 15.9b provide further evidence still of the interaction between aspect marking and O number. In example 15.9a, we see that when a given nominal, otherwise ambiguous for number, occurs post-verbally in the default O position, it is understood to be plural when the plural progressive marker is used. We see in 15.9b that when the same number-ambiguous nominal (the 3rd person pronoun) occurs pre-verbally in the default A position, it is understood to be singular even when the progressive plural marker is employed. However, the post-verbal O of 15.9b, which is understood to be singular as the A of 15.9a, is understood to be plural in 15.9b. Clearly, then, progressive marking in Karitiana typically¹²¹ agrees in number with the O nominal in transitive clauses, much as it does with the S nominal of intransitive clauses. In other words, number agreement between aspect markers and clausal arguments demonstrates absolutive patterning in Karitiana.

It is worth stressing again that the plurality associated with the irregular verbs and aspect markers in the preceding examples does not simply reflect a plurality of the relevant actions/events. Much like clause 15.7, clauses like 15.9a and 15.9b do not refer to serial events of hitting. This suggests that the aspect markers do in fact agree with the absolutive nominals (as the above glosses suggest), and that this apparent agreement is not the epiphenomenal result of a serial interpretation of verbs inflected in this manner.

¹²¹ In the case of one speaker with whom these data were checked, the plural progressive markers could in one case be used if the A of a given clause were plural, and the O was singular. The example he gave was of an event in which the singularity of the O nominal was obvious, i.e. could be seen by speaker and hearer, while the plurality of the A was also visible to both interlocutors. In other words, if one heard the plural agreement marker, and could see that the A in question was plural while the O was singular, the A would be understood as representing a plural nominal, for lack of a clear alternative.

Similar reasoning applies to the number agreement associated with some irregular verbs, as we will see momentarily.

While such a conflation between aspect marking and number inflection may seem unusual, at least one similar case is evident in the literature on Tupí languages. In proto-Tupí-Guaraní, there appears to have existed a conflation between completive aspect and the number of S and O nominals. Consider the following reconstructed examples (which should of course be treated with circumspection) from Jensen (1990:128):

- 15.10 *o-có-pab
 3-go-COMPL
 “he already went; they all went”
- 15.11 *o-‘ú-pab
 3-eat-COMP
 “he ate it all”

In 15.10 we see that the **-pab** suffix was used to refer to the completive aspect and also used to refer to the plurality of an S nominal in some cases. In 15.11, we see that when the aspect marker is affixed to a semantically transitive verb, it refers to the number of the O nominal. So in proto-Tupí-Guaraní aspect marking *appears* to have been used, at least in this case of this suffix, to refer to the number of O and S nominals, thereby reflecting an absolutive category.¹²² (It is unclear whether this agreement might have been due to the plural interpretation of the relevant actions.)

The use of number agreement to group S and O nominals is found elsewhere in Karitiana verbal morphology, outside the scope of aspect inflection. Specifically, number inflection surfaces in several common irregular verbs that demonstrate suppletive

¹²² Jensen (1990) does not provide the Tupí-Guaraní cognates on which this reconstructed example is based, and I have not found similar forms in my perusal of the literature. Ideally examples such as 15.10 and 15.11 would be taken from synchronic data. Nevertheless, this example is certainly suggestive of the presence of similar aspect/number agreement phenomena in other Tupí languages. The more general phenomenon of number agreement with absolutives is certainly attested in other synchronic Tupí data, as we will see shortly. The existence of an absolutive category in many of these languages is also definitely well-attested, and is evident in various other facets of proto-Tupí-Guaraní, cf. Jensen (1990:120-129).

inflection according to the plurality of co-occurring nominals. Consider the following sample clauses with irregular intransitive verbs that vary based on the number of the co-occurring S's:

- 15.12 nōnso naka-tat-ø o:pok akan pip
 woman NSAP-go-NFUT white.people village ALL
 "The woman went to the city."
- 15.13 nōnso naka-hot-ø o:pok akan pip
 woman NSAP-go.PL-NFUT white.people village ALL
 "The women went to the city."
- 15.14 ōwā ĩnā i-pikin-ø hirinā
 child small/short INT-run-NFUT fast
 "The short child ran fast."
- 15.15 ōwā ĩnā i-pi?orot-ø hirinā
 child short INT-run.PL-NFUT fast
 "The short children ran fast."

Once again, we see in the above examples that non-anaphoric NP's themselves do not inflect for number. Nevertheless, in the case of the actions represented in clauses 15.12-15.15, plural S's can be represented by Karitiana grammar via the use of suppletive inflectional forms. These irregular forms are also be used when the number of an S is represented in the actual NP via one of the pronominal forms inflecting for singularity or plurality. This is apparent in clause pairs 15.16 and 15.17 below:

- 15.16 a. i-ta-irit-ø ĩn
 1S.ABS-SAP-come-NFUT 1S
 "I came."
- b. ij-ta-mbikit-ø itʃa
 1PL.ABS-SAP-come.PL-NFUT 1PL
 "We came."
- 15.17 a. a-ta-irit-ø ān
 2S.ABS-SAP-come-NFUT 2S
 "You came."
- b. aj-ta-mbikit-ø a:tʃa
 2PL.ABS-SAP-come.PL-NFUT 2S
 "You guys came."

In all of the preceding examples, the irregular forms agree in number with the S of an intransitive clause. However, there is at least one semantically transitive irregular verb pair that agrees in number with a core argument. Significantly, in this case the verb agrees with the number of the O nominal of a transitive clause, as we see in the following clauses:

- 15.18 taso si:kirip ga-o:t- \emptyset epesap ket
 man foolish NSAP-take-NFUT leaf green
 "The foolish man took the green leaf."
- 15.19 taso si:kirip ga-pit- \emptyset epesap ker-era
 man foolish NSAP-take.PL-NFUT leaf green-PL.ADJ
 "The foolish man took the green leaves (money)."
- 15.20 ʔn naka-o:t- \emptyset asiriti
 1S NSAP-take-NFUT banana
 "I took the banana."
- 15.21 ʔn naka-pit- \emptyset asiriti
 1S NSAP-take.PL-NFUT banana
 "I took the bananas."
- 15.22 itʃa naka-pit- \emptyset asiriti
 1S NSAP-take.PL banana
 "We took the bananas."
 *"We took the banana."

The verb for 'take' clearly inflects for the number of the co-occurring O nominal, rather than the A nominal. This is true whether or not the number of the co-occurring O nominal is reflected via some other means, as we see in example 15.19. Examples 15.20 and 15.21 demonstrate that, even when all the remaining components of a transitive clause remain unaltered, the choice of the transitive verb for "take" alters the construal of the O's number. Clause 15.22 demonstrates unequivocally that the plural form for the verb "take" does not agree with A, even if A is clearly a plural NP. In fact, the plural form of the verb is restricted to those cases in which the given O is plural. The number of the co-occurring A is irrelevant.

In the discussion of aspect number agreement, it was stressed that the relevant number agreement with absolutive nominals was not epiphenomenal, that is, due to an implication of a plural or serial action. The same point should be stressed in the case of these examples. For instance, examples 15.21-15.22 cannot be understood to represent serial events, in which the taker of the bananas repeatedly took bananas. According to the Karitiana, the default interpretation of these clauses is that a person took several bananas at once. Once again, this suggests that the number agreement in question does in fact index the number of the absolutive nominals, and does not index the plural or serial nature of the relevant action.

Based on examples 15.18-15.22, as well as the preceding examples in which semantically intransitive irregular forms agree in number with co-occurring S nominals, we can state that irregular verb forms in Karitiana agree in number with either the S or the O of the clause they occur in. As in the case of number inflection evinced by progressive aspect marking, then, this morphological phenomenon evinces an absolutive grouping of core nominals.

Karitiana is not the only Tupí language in which verbs inflect for the number of an absolutive nominal. In Gavião, a Tupí-Mondé language spoken in Rondonia, some irregular verbs also inflect for the number of co-occurring S and O nominals. As Rodrigues (1999:119) notes, a “few verbs have suppletive forms, e.g. *kaà* ‘go (singular S)’ and *màlã* ‘go (plural S)’. Moore (1984:158) notes that “A small minority of elementary transitive verb stems are inherently marked for singular or plural *object*.” (Emphasis added.) These observations suggest that in Gavião, as in Karitiana, there are verb forms that vary according to the number of co-occurring absolutive nominals.

There are other ways in which Karitiana verbs appear to be sensitive to the absolutive grouping of nominals. For instance, the **na(ka)-/ta(ka)-** prefix generally varies according to whether the absolutive nominal in a given clause is a speech act participant or a non-speech act participant. This prefix choice reflects two of the primary voices of Karitiana, which are similar in some ways to the direct and inverse voices of many languages. The morphosyntactic correlates of the **na(ka)-/ta(ka)-** construction were outlined in Chapter 12 and the semantic/cognitive correlates are considered more fully in Chapter 16.

As many of the preceding examples suggest, Karitiana verbs also exhibit pronominal prefixation that crossreferences the absolutive nominal of a given clause. This prefixation is discussed, along with the free pronouns of Karitiana, in the following section.

Before concluding this section, it is worth noting that there is one sort of verb inflection that agrees in some sense with the nominative category, that is S and A nominals. This is the desiderative **-wak** suffix. Consider the following two examples:

15.23 ĩn i-tat-awak akan pip
 1S INT-go-DES village ALL
 "I want to go to the village."

15.24 ɲõnso i-soʔort-owak taso
 woman INT-see-DES man
 "The woman wants to see the man."
 *"The woman will see the man (who wants to be taken)."

In clause 15.23, the suffix **-wak** reflects a characteristic of the S nominal, while in 15.24 it reflects a characteristic of the A nominal. Of course, this sort of alignment between the suffix and the S and A nominals is not, strictly speaking, a form of agreement. Also, it is hard to fathom a state of affairs in which a desiderative suffix did not reflect a characteristic of the more agentive nominal in a clause. Nevertheless, it is worth noting

this distribution, since there is no reason a priori that an S/O grouping by the **-wak** suffix is prohibited. (In such a hypothetical state of affairs, the second interpretation of 15.24, not the first, would be permitted.)

§15.2.2 Nominal morphology and GRs

GRs are also evident in the distribution of pronouns and pronominal affixes in Karitiana. The basic distribution of pronominal forms was examined in §13.1.3, where the following table of Karitiana pronominal forms was first introduced:

	Free pronouns	Absolute verbal agreement prefixes, only in Verb-focus and SAP/NSAP construction
1S	ĩn	i-
1PL.INC	itʃa	ij-
1PL.EX	ita	ita- ¹²³
2S	ãn	a-
2PL	a:tʃa	aj-
3	i	ø-

Table 15.1 (Table 13.3)

To better understand the GRs demonstrated by these pronominal forms, let us consider their normal distributions in the four basic declarative constructions of Karitiana, which were outlined in Chapter 12. These are the copular construction, the Verb-focus construction, the SAP construction, and the valence construction.

In the copular construction, a pronominal form may occur in the pre-copula position as in the following cases. As we see in these examples, the pronominal form in each case is represented by a free pronoun from Table 15.1, and cannot be represented by one of the verb-agreement prefix forms found in that table.

15.25 ĩn na-aka-t taso-t
 1S NSAP-COP-NFUT man-COP.AGR
 “I am a man.”

¹²³ This form does not occur in the SAP construction.

15.26	ĩn	na-aka-t	i-taktãŋ-ø
	1S	NSAP-COP-NFUT	INT-swim-COP.AGR
	“I swam.”		
15.27	irtʃa	na-aka-t	i-kisep-ø
	1PL	NSAP-COP-NFUT	INT-jump-COP.AGR
	“We jumped.”		
15.28	ita	na-aka-t	i-terektereŋ-ø
	1PLEXC	NSAP-COP-NFUT	INT-dance-COP.AGR
	“We (not you) danced.”		
15.29	artʃa	na-aka-t	i-põn-ø
	2PL	NSAP-COP-NFUT	INT-hunt-COP.AGR
	“You guys hunted.”		
15.30	i	na-aka-t	i-pekera-t
	3	NSAP-COP-NFUT	INT-float/drown-COP.AGR
	“He floated/drowned.”		

As was mentioned in the discussion of the copula construction in Chapter 12, only verbs that can appear with the *i-* intransitive prefix in the valence construction can follow the copula. In other words, the predicate following a copula is either adjectival or nominal, as in 15.25, or an intransitive verb, as in 15.26-15.30.

In the SAP/NSAP construction, that is, clauses with **ta(ka)-/na(ka)-** verbal morphology¹²⁴ (Cf. §12.8 and §16.2), referred to as affirmative (Landin 1984) and declarative (Storto 1999) morphology in the literature, the set of free pronouns is often used to represent the agentive nominal of a bivalent (two-argument) clause. This is evident in many of the examples adduced above, and in the following examples:

15.31	ĩn	naka-mĩ:t	ep-pi:so
	1S	NSAP-hit-NFUT	tree-heel
	“I hit the tree trunk.”		
15.32	irtʃa	na-okẽ:jn-ø	ereri
	1PL	NSAP-cut-NFUT	cotton
	“We cut the cotton.”		

¹²⁴ As was discussed in §12.3, clauses with the copular auxiliary clearly represent a separate declarative construction, despite the presence of the NSAP prefix attached to the copula.

15.33	ita	naka-ki:p-ø	hīm
	1PL.EXC	NSAP-split-NFUT	meat
	“We (not you) split the meat.”		
15.34	ãn	na-ampiŋ-ø	pa:si
	2S	NSAP-pierce-NFUT	pumpkin
	“You pierced the pumpkin.”		
15.35	artʃa	na-asika-t	nde: ti
	2PL	NSAP-shoot-NFUT	deer large
	“You guys shot the horse.”		
15.36	i	na-apĩŋgi:ri-t	õwã pikip
	3	NSAP-scratch-NFUT	child skin
	“S/he or they scratched the child’s skin.”		

As we see in examples 15.31-15.36, all of the free pronouns can be used pre-verbally (the expected A position) in the SAP/NSAP construction. The free pronouns can also occur optionally in a post-verbal position. However, there are restrictions on this post-verbal placement, which is discussed below. In clauses 15.31-15.36, the relevant pronouns are not optional for the given interpretations of the clauses to hold. In other words, when a pronominal referent represents an A nominal in a transitive clause, it must take the form of one of the free pronouns from Table 15.1. However, when a pronominal referent refers to an O or and S nominal, it is typically represented by one of the pronominal affixes from Table 15.1. Consider the following clauses, which are similar to clauses 15.31-15.36, but differ in that their O arguments are pronominal:

15.37	ĩn	a-taka-mĩ:t	
	1S	2S.ABS-SAP-hit-NFUT	
	“I hit you.”		
15.38	itʃa	aj-taka-mĩ:t	
	1PL	2PL.ABS-SAP-hit-NFUT	
	“We hit you guys.”		
15.39	ita	naka-ki:p-ø	i
	1PL.EXC	NSAP-split/cut-NFUT	3
	“We (not you) cut him/her.”		

similarly, evincing a morphologically-oriented absolutive category. Consider the following intransitive clauses that evince similar verbal prefixation when contrasted to examples 15.37, 15.38, 15.40, 15.41, 15.43, 15.44:

- | | | |
|-------|---|--------|
| 15.45 | i-taka-tām-ø
1S.ABS-SAP-fly-NFUT
“I flew.” | (in) |
| 15.46 | ij-taka-ʔot-ø
1PL.ABS-SAP-fall-NFUT
“We fell.” | (itʃa) |
| 15.47 | aj-taka-karĩnã-t
2PL.ABS-turn-NFUT
“You guys turned.” | (atʃa) |

Clearly, the form of the pronominal prefixes does not change for 1st and 2nd person referents, regardless of whether the prefix represents an O or S referent. Examples 15.45-15.47 also demonstrate that the S referents may be optionally represented via the free pronouns of Karitiana. However, when such pronouns are used to represent S referents, they must occur post-verbally, as when they are used to represent O referents (cf. 15.43, 15.44).

The set of absolutive prefixes also surfaces in the Verb-focus construction, which is characterized morphologically by the prefixation of **piri-** or one of its allomorphs (cf. §12.9). In this construction, however, unlike the SAP construction, free pronouns do not occur pre-verbally, since A nominals are absent. The free pronouns may occur post-verbally, however in such cases they refer to the same absolutive nominal cross-referenced by the verb prefix. In this way the distribution of the free pronouns is similar to the distribution of the free pronouns in the SAP construction: they may optionally occur post-verbally when referring to an absolutive referent. Consider the following

examples in which the of **piri-** prefix occurs with an intransitive verb, that is a verb that is prefixed with **i-** when found in the valence construction (cf. §12.2):

15.48	a-pir-otām-ĩn	(ãn)
	2S.ABS-VB.FOC-arrive-NFUT	2S
	“You arrived.”	
15.49	ij-piri-po:mã-n	(i:tʃa)
	1PL.ABS-VB.FOC-play-NFUT	1PL
	“We played.”	
15.50	i-pi-pitĩmadnã-n	(ĩn)
	1S.ABS-VB.FOC-work-NFUT	1S
	“I worked.”	
15.51	pi-pitĩmadnã-n	(i)
	VB.FOC-work-NFUT	3
	“S/he worked.”	

Clauses such as these demonstrate that pre-verbal affixation in this construction always agrees with the S of an intransitive clause.

As was noted in section §12.2, most of the verbs classified as intransitive by the Karitiana valence construction require only one participant, e.g. those in examples 15.48-15.51. However, there are a few exceptions to this trend--verbs that seem to typically require two participants, but are nevertheless classified as semantically intransitive by Karitiana. Consider the following clause pairs containing two such verbs, embedded in both the valence and Verb-focus constructions:

15.52	a.	ĩn	i-pitãŋã-t
		1S	INT-steal-NFUT
			“I stole (something).”
	b.	i-pi-pitãŋã-n	
		1S.ABS-VB.FOC-steal-NFUT	
			“I stole (something).”
15.53	a.	ãn	i-pike:t-ø
		2S	INT-get-NFUT
			“You got (something).”

- 15.55 aj-pi-pipop-ĩn (a:ɬfa)
 1S.ABS-VB.FOC-burn-NFUT 2S
 "You guys were burned."
- 15.56 a-pi-pajop-ĩn (ãn)
 1S.ABS-VB.FOC-scrape/grate-NFUT 1S
 "You were scraped."

While the Verb-focus construction differs from the SAP/NSAP construction in that the agent is typically omitted, it demonstrates the same pattern of pronominal prefixation. That is, the same set of pronominal prefixes is employed to cross-reference the S or O arguments of a given verb. In other words, when the pronominal prefixes of Table 15.1 are attached to a verb, they always refer to an absolutive nominal.

The GRs evident in free pronouns are not as straightforward as the absolutive patterning of pronominal prefixes. As we saw in examples such as 15.37-15.41, when 1st and 2nd person pronouns occur pre-verbally in the SAP/NSAP construction, they must refer to an A or ergative referent. However, these pronouns can also be used to refer to a non-ergative referents in many cases, for instance when they occur post-verbally in the SAP and Verb-focus constructions (see 15.45-15.50). These pronouns also exhibit non-ergative behavior in the clauses in which the verb is inflected for valence. In such cases, the free pronouns occur pre-verbally, but refer to an S, rather than an A, nominal. The following examples can be fruitfully contrasted with clauses 15.48-15.51, which contain the same verb stems, and in which S nominals in the Verb-focus construction are represented via absolutive prefixes.

- 15.57 ãn i-otãm-ø
 2S INT -arrive-NFUT
 "You arrived."
- 15.58 i:ɬfa i-pomã-t
 1PL INT-play-NFUT
 "We played."

15.59 ĩn i-pitĩmadnã-t
 1S INT-work-NFUT
 "I worked."

As examples 15.57-15.59 suggest, free pronouns represent S nominals when preceding *i*-prefixed declarative verbs. Given this fact, as well as the non-ergative distribution evident in examples such as 15.45-15.51, I do not consider the free pronouns in Karitiana to be ergative.¹²⁷ However, the 1st and 2nd person pronouns do exhibit ergative tendencies in the SAP construction, as I noted above. This point will be returned to momentarily.

As has already been mentioned, Karitiana free pronouns may optionally occur post-verbally in many declarative clauses. This optional occurrence is evident in some clauses with SAP morphology, e.g. 15.45-15.47, as well as some clauses with Verb-focus morphology, e.g. 15.48-15.51. In such clauses, the person pronouns may occur after the verb even though they are also cross-referenced on the verb (excepting the third person pronoun which is not crossreferenced).¹²⁸ The following examples further illustrate the phenomenon of optional post-verbal pronoun placement, referred to as "ambi-fixing" in Landin (1984):

15.60 a-ta-ʔot-ø (ãn)
 2S.ABS-SAP-fall-NFUT 2S
 "You fell."

15.61 i-ta-pikĩŋkĩnã-t (ĩn)
 1S.ABS-SAP-slip-NFUT 1S
 "I slipped."

15.62 ij-ta-kisep-ø (i:tʃa)
 1PL.ABS-SAP-jump-NFUT 1PL
 "We jumped."

¹²⁷ Everett (1994) presents an interesting analysis of case spreading in Karitiana. However, this analysis is based on the assumption, taken from Landin (1984), that free pronouns are ergative. It is unclear how his analysis would be affected by the data provided in this work.

¹²⁸ The Karitiana insist that insertion of post-verbal pronouns does not affect the semantics of the relevant clauses, though it seems likely that the post-verbal pronouns are used to emphasize the absolutive nominal in such clauses.

- 15.63 aj-taka-he:j-t (a:tʃa)
2PL.ABS-SAP-hide-NFUT 2PL
"You guys hid."
- 15.64 a. i-ta-pitʔi-j kojpa-ti (i:n)
1S.ABS-SAP-eat-NFUT pineapple-OBL 1S
"I will eat the pineapple."
- b. i-ta-pitʔi-j (i:n) kojpa-ti
1S.ABS-SAP-eat-NFUT 1S pineapple-OBL
"I will eat the pineapple."
- 15.65 a. naka-ʔoʔ-ø (i)
NSAP-fell-NFUT 3
"He fell."
- b. i i-taka-pi:dn-ø (i:n-o)
3 1S.ABS-SAP-kick-NFUT 1S-EMP
"He kicked me."

In all of the above examples, the pronoun occurring after the verb is optional and represents an absolutive referent. When an oblique nominal follows a given verb, the pronoun may occur after the oblique as in 15.64a, or before the oblique as in 15.64b.

Examples like 15.60-15.65, as well as 15.45-15.47, suggest that any pronoun can occur after a verb with SAP morphology, if the pronoun refers to S or O. There is no restriction on the person or number of such pronouns. Interestingly, in some cases post-verbal pronouns can also refer to the A nominal of a **na(ka)**-inflected verb, and in such cases we find that there *are* restrictions on the person and number of the relevant pronouns. Specifically, only 1st and 2nd person pronouns may occur after such a verb, when referring to an A nominal already mentioned in the same clause. For instance, clauses 15.66a-15.69b are grammatical since they contain post-verbal 1st and 2nd person pronouns that refer to an A nominal. Clauses 15.70a and 15.70b, however, are ungrammatical since they contain a 3rd person pronoun that refers to an A nominal while following a **na(ka)**-inflected verb.

- 15.66 a. $\dot{\text{i}}\text{n}$ naka- ?i-j kojpa $\dot{\text{i}}\text{n}$
 1S NSAP-eat-FUT pineapple 1S
 “I will eat the pineapple.”
- b. $\dot{\text{i}}\text{n}$ naka- ?i-j $\dot{\text{i}}\text{n}$ kojpa
 1S NSAP-eat-FUT 1S pineapple
 “I will eat the pineapple.”
- 15.67 a. $\ddot{\text{a}}\text{n}$ naka- ?i-j kojpa $\ddot{\text{a}}\text{n}$
 2S NSAP-eat-FUT pineapple 2S
 “You will eat the pineapple.”
- b. $\ddot{\text{a}}\text{n}$ naka- ?i-j $\ddot{\text{a}}\text{n}$ kojpa
 2S NSAP-eat-FUT 2S pineapple
 “You will eat the pineapple.”
- 15.68 a. i:tfa naka- ?i-j i:tfa kojpa
 1PL NSAP-eat-FUT 1PL pineapple
 “We will eat the pineapple.”
- b. i:tfa naka- ?i-j kojpa i:tfa
 1PL NSAP-eat-FUT pineapple 1PL
 “We will eat the pineapple.”
- 15.69 a. a:tfa naka- ?i-j a:tfa kojpa
 2PL NSAP-eat-FUT 2PL pineapple
 “You will eat the pineapple.”
- b. a:tfa naka- ?i-j kojpa a:tfa
 2PL NSAP-eat-FUT pineapple 2PL
 “You will eat the pineapple.”
- 15.70 a. *i naka- ?i-j i kojpa
 3 NSAP-eat-FUT 3 pineapple
 “S/he will eat the pineapple.”
- b. *i naka- ?i-j kojpa i
 3 NSAP-eat-FUT pineapple 3
 “S/he will eat the pineapple.”

As clauses 15.70a and 15.70b demonstrate, 3rd person pronouns cannot appear after a **na(ka)-** inflected verb if they are understood to refer to the A nominal rather than to an absolutive referent. No such restrictions hold for the 1st and 2nd person pronouns, however. As we see in examples 15.66a-15.69b, these pronouns may occur felicitously after a **na(ka)-** inflected verb, even when referring to an A referent also represented by a

pre-verbal pronoun. In such cases, the pronouns can even occur after the clause's O, as in 15.66a, 15.67a, 15.68b, and 15.69b.

Based on the distributional evidence considered above, we can conclude that *pre-verbal* pronouns in the SAP construction (that is, with **na[ka]-/ta[ka]-** prefixed verbs) always refer to an A/ergative referent. When the same pronouns occur post-verbally, however, they usually refer to the S or O nominal. However, post-verbal pronouns may also refer back to the A in the SAP construction, but only if they are 1st or 2nd person pronouns. This distribution represents a subtle instantiation of the crosslinguistic phenomenon noted in the literature in which 1st and 2nd person pronouns tend to exhibit more nominative-like behavior with respect to certain phenomena, when contrasted to 3rd person referents. Dyirbal represents one oft-cited case of a language in which this phenomenon surfaces. There are various explanations for this phenomenon proffered in the literature, among them is the straightforward suggestion that 1st and 2nd person referents, being speech act participants, are more naturally construed by speakers as agents (cf. Dixon 1979:85). The more-nominative-like nature of post-verbal 1st and 2nd person pronouns in Karitiana is consistent with other typologically-oriented findings as well, e.g. the participant hierarchy discussed in Silverstein (1976).

We have seen that, while the status of free pronouns occurring after the verb is often absolutive but not rigidly so, the status of pre-verbal free pronouns in the SAP/NSAP construction is unambiguously ergative. Pronominal prefixes are unambiguously absolutive. Recall also that the number agreement apparent in irregular verbs and in aspect suffixation is also oriented according to the absolutive category. With these facts in mind, we conclude this section on the morphological reification of GR

categories in Karitiana by noting that the GRs evident in Karitiana morphology are *generally* oriented according to the ergative/absolute distinction. As we will see in the following section, syntactic phenomena in Karitiana are *generally* oriented according to the nominative grouping of S and A. Based on the data in this and the following section, it seems clear that Karitiana exhibits a split GR system. The split in this case is not generally oriented according to verbal semantics, or nominal semantics, or tense/aspect, as most split systems are (cf. Dixon 1979:79-98). Instead, the split system in Karitiana is best understood as a “meta-split” (Dixon 1979:92), since the different groupings of S, A, and O are oriented primarily according to the morphosyntactic means through which they are realized.

§15.3 Basic GRs evident in syntax

In this section I examine the GRs evident in a group of syntactic phenomena in Karitiana. I begin by considering the role of GRs in imperative and interrogative clauses, then consider the evidence for GRs in coreferentiality phenomena in various clause combination types. Next, I examine the GRs evident in the basic word order of Karitiana. I conclude the syntactic analysis of GRs relevant to S, A, and O grouping by discussing the evidence from quantifier float and verb serialization in Karitiana.

§15.3.1 GRs and non-declarative clause types

§15.3.1.1 Imperatives

It is generally acknowledged that, crosslinguistically, imperative clauses exhibit a grouping of S and A since in such clauses 2nd person referents are generally the explicit or implicit S or A referents. Due to the putative universality of the nominative grouping in imperative clauses, one might assume that imperative clauses reflect a universal “subject” category, in accordance with researchers such as Dixon (1979:112). As we saw

in §14.2.3, Karitiana imperatives, like imperatives in all languages, do group 2nd person A's and S's in that the 2nd person referent of imperative verbs¹²⁹ is always an S or an A. To the extent that 2nd person referents of imperative clauses are always an S or A and never the O of a transitive clause, Karitiana does exhibit the universal "subject" category in such clauses. However, such clauses also maintain the ergative/absolutive distinction otherwise evident in the morphology of Karitiana. Specifically, the S of semantically intransitive imperative verbs is typically represented via the absolutive pronominal prefix **a-**, while the A of semantically transitive imperative verbs is typically represented via the optional pronoun **ãn**. Consider the following examples of imperative clauses:

- 15.71 a-otir-a
2S.ABS-return-IMP
"Come back."
- 15.72 a-hĩĩĩnã
2S.ABS-sing-IMP
"Sing!"
- 15.73 (ãn) i-okẽj-a
2S IRR-cut-IMP
"Cut it!"
- 15.74 (ãn) i-pajop-a
2S IRR-grate-IMP
"Grate it!"

As we see in these examples (as well as the examples in section §14.2.3), the S and A referents of Karitiana imperatives are actually treated quite differently, with the former being indexed with a prefix from the absolutive set of verbal prefixes, and the latter being represented with a free pronoun. Nevertheless, there is some expected S/A affinity in Karitiana imperative clauses, since addressees of imperatives are never O nominals of semantically transitive clauses. If this were the case, clauses such as 15.73 and 15.74 might be glossed as "Get cut!" or "Get grated!", for instance.

¹²⁹ As we noted in §14.2.3, imperatives are quite similar in form to hortatives.

It is worth stressing as well that the addressees in imperatives are either S's or A's, but do not represent a general semantic category of agentive nominals. This is evident in examples such as the following, in which non-agentive S's are represented in imperatives:

- 15.75 a-pikĩŋkĩnã-ø
2S-slip-IMP
"Slip!"
- 15.76 a-ke:r-a
2S-live-IMP
"Live!"

Clearly, the addressees in imperatives may be either S's or A's, regardless of the agentivity of the S's in question. In this manner, imperatives in Karitiana are suggestive of a broad grammatical category unifying S and A (nominative/subject), rather than of a broad semantic category of agent. Nevertheless, as we have seen the S addressees of imperatives are marked differently than the A addressees of imperatives.

§15.3.1.2 Interrogatives

In interrogative clauses, the grouping of absolutive referents is generally maintained. This was evident in the examples found in section §14.2.2 above. Consider further the following examples of polar questions and content questions:

- 15.77 a-ohir-i (an-o) hĩ
2S.ABS-fish-FUT 2S-Q.NOM Q
"Are you going to fish?"
- 15.78 ãn i-potpora-ø ese hĩ
2S IRR-cook-NFUT water Q
"Did you boil the water?"
- 15.79 mōfãsōŋ ã:tʃa i-amãŋã-t nōmbi hĩ
why 2PL IRR-plant-NFUT pupunha Q
"Why did you guys plant the pupunha?"

As we see in example 15.77, the S of an interrogative clause is represented by an absolutive prefix. In clauses 15.78 and 15.79, we see that the A of an interrogative clause, be it a polar interrogative or a content interrogative, is represented by a free pronoun. Examples such as these demonstrate that the absolutive/ergative distinction is maintained in clauses with interrogative syntax, since A's cannot be represented via absolutive prefixation.

As was noted in section §14.2.2 and originally in Landin (1984:244-245), when a content question relates to the O of a given clause, the semantically transitive verb is inflected with the **ti-** object focus marker, and the clause is often treated as intransitive as evident by the *absolutive* prefix attached to the verb. Consider the following examples:

- | | | | | |
|-------|---|--|--------------------|-------------------|
| 15.80 | mōfāmōn
what
“What did you stab?” | a-ti-pisok-ø
2S.ABS-O.FOC-pierce/stab-NFUT | (an-o)
2S-Q.NOM | (hī)
Q |
| 15.81 | mōfāmōn
what
“What are you making?” | a-ti-mʔa-tījā-t
2S.ABS-O.FOC-make-PROG-NFUT | (hī)
Q | (Landin 1984:244) |

In examples 15.80 and 15.81, we see that the absolutive prefix **a-** is attached to the verb, reflecting its lessened transitivity/ergativity. (After all, we would expect **ān**, rather than an absolutive prefix, to surface pre-verbally when referring to the 2nd singular A nominal of such semantically transitive verbs.¹³⁰) As was mentioned in section §14.2.2, this absolutive prefixation is not generally characteristic of the object focus construction, and is only apparent in clauses such as 15.80 and 15.81, in which the focused object is a questioned element. It should be stressed that such examples are not biclausal. If they

¹³⁰ This observation is also made in Everett (1985). In that work, Everett provides an analysis for the lessened ergativity in clauses such as 15.80 and 15.81. He suggests that an element such as the 2S referent in these clauses is marked as absolutive “when it is the intransitive subject or direct object or is immediately preceded by the direct object or intransitive subject in S” (1986:11) This analysis is consistent with Landin’s data, on which it is based. However, it is not consistent with all of the data in this work, e.g. 15.82 and 15.83. Clauses such as these were heretofore unavailable in the literature.

were biclausal, this would help explain the absolutive prefixation attached to the verbs in question. The fact that they are not biclausal is supported by their intonation, as well as examples such as 15.82 and 15.83, which are discussed next.

Interestingly, I have found that the situation is not entirely so straightforward in that, while examples such as 15.80 and 15.81 are grammatical, the same questions can also be expressed with non-absolutive free pronouns, as evident in the following variations of 15.80 and 15.81, respectively:

15.82	mōfāmōn	ān	ti-apisok-ø	(hī)
	what/who	2S	O.FOC-pierce/stab-NFUT	Q
	“What did you stab?”			
15.83	mōfāmōn	ān	ti-m?a-tīpā-t	(hī)
	what/who	2S	O.FOC-make-PROG-NFUT	Q
	“What are you making?”			

This variation is also evident upon careful scrutiny of the examples of content questions involving O-fronting found in Storto (1999). One of the relevant examples in that study contains absolutive verbal prefixation (cf. 1999:163), while others contain free pronouns instead of absolutive prefixation (cf. 1999:194,196). Interestingly, all of the relevant interrogatives in my data and in the literature are grammatical according to the Karitiana, regardless of whether the interrogatives occur with free pronouns or absolutive prefixation. The contrast between such forms, for instance between 15.80 and 15.82, is not found to be meaningful by the Karitiana speakers who produced them. The speakers simply suggest that either form is acceptable. It is unclear at this point what function is served by such variation. What is clear, however, is that in interrogative clauses in which the question word functions as a fronted object, the clause’s agentive nominal *may* be treated as an absolutive, in contradistinction to other clause types in the language. As we might expect, this is also how the patientive nominal of an interrogative is treated. For

instance, consider the following two examples, which can be fruitfully contrasted with 15.80 and 15.81:

15.84	mōřāmōn	a-ta-pisok-ø	(an-o)	(hĩ)
	what/who	2S.ABS-SAP-pierce/stab-NFUT	2S-Q.NOM	Q
	“Who stabbed you?”			
15.85	mōřāmōn	a-taka-m?a-t	(hĩ)	
	what/who	2S.ABS-O.FOC-weave-NFUT	Q	
	“Who made you?”			

As we see in 15.84 and 15.85, the O nominal (1st or 2nd person) of a non-polar question is indexed via absolutive prefixation, much as the A nominal of non-polar questions *may* be indexed.

§15.3.2 Reduction phenomena

§15.3.2.1 Conjunction reduction

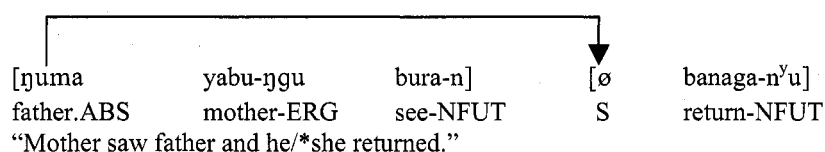
It is well known that many morphologically absolutive/ergative languages demonstrate largely nominative syntax. One commonly-cited example of such a language is Basque (Ortiz de Urbina 1989). Others include Warlpiri (Bittner and Hale 1996b), Khinalug (Comrie 1978), and Abkhazian (Anderson 1976). In such morphologically ergative languages, conjunction reduction typically groups the nominative category of nominals. That is, the implicit A or S of a given coordinate clause may be coreferential with the explicit A or S of an adjacent clause. Consider the following example from Basque (Farrell 2005:50):

15.86	[ø	seme-a	eskolan	utzi]	eta	[klasera	joan	zen]
	A	son-ABS	at.school	leave	and	to.class	go	3SG.SAux
	“X left his/her son at school and X went to class.”							

In this example, we see that the null A of the first clause is coreferential with the S of the following clause, which is a 3rd person referent as evident from the presence of the 3rd person auxiliary form **zen**. (This analysis is taken from Farrell 2005.)

Not all languages with ergative morphology exhibit nominative syntax, of course. The most commonly-cited counterexample to this trend is Dyirbal (Dixon 1972), in which conjunction reduction works quite differently than in Basque (cf. Farrell 2005:51):

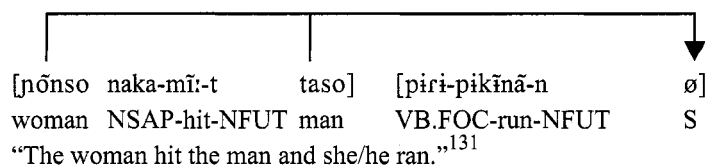
15.87



Interestingly, conjunction reduction in Karitiana does not adhere to the pattern found in Basque, nor to that found in Dyirbal. In Karitiana, conjunction reduction exhibits either nominative or absolutive grouping. That is, a reduced/null S referent may refer to the overt A *or* the overt O of an adjacent coordinate clause. A null A may be used to refer to the overt S of an adjacent clause, however a null O may also be used to refer to the overt S of an adjacent clause.

Neither the nominative nor the absolutive readings of a given pair of clauses exhibiting conjunction reduction is preferred, as we see in the following example in which an S of a one clause refers back to either the A or the O of the preceding clause:

15.88



¹³¹ As is the case in many Amazonian languages (cf. Derbyshire and Pullum 1986:19), Karitiana does not employ a coordinating conjunction.

It is interesting that in cases such as 15.88 the null S may refer back to either the A or the O of the preceding clause, even though the verb of the second clause occurs in the Verb-focus construction, which as we saw in the previous section only agrees with S and O arguments. Given this information regarding the Verb-focus construction, we might expect that the S argument of the **piri-** inflected verb would refer back to the O argument, however as we see in the gloss it can grammatically refer to either the A or the O argument of the first clause.

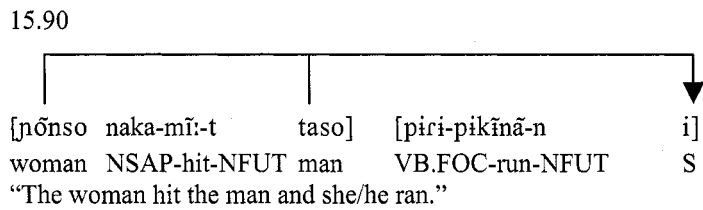
It is worth stressing that Karitiana, as we have seen in various examples in this work so far, is a pro-drop language, in which clauses with zero pronominalization can grammatically occur. Consider the following example, which is simply the second clause from 15.88:

15.89	piri-pikĩnã-n	∅
	VB.FOC-run-NFUT	S
	“S/he ran.”	

Of course the fact that Karitiana is a pro-drop is not particularly significant. After all, most languages of the world could be considered pro-drop languages. In Gilligan's (1987) crosslinguistic survey, 93 out of 100 languages surveyed are said to allow pro-drop. Karitiana's status as a pro-drop language simply suggests that examples such as 15.88 should be approached with caution, since it is possible that their ambiguity results from the fact that the pronoun is absent in the second clause, rather than from a systematic ambiguity of coreferentiality.¹³² It is worth noting, then, that even in those

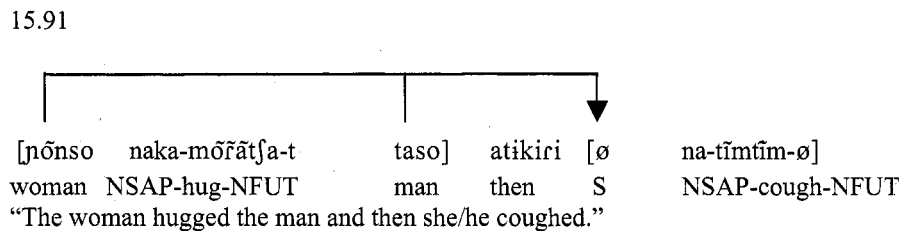
¹³² Shibatani (personal communication) notes that sentences equivalent to 15.88 are potentially ambiguous in Japanese, a pro-drop language, but that there is a qualitative difference in the two possible interpretations represented in 15.88 such that the ‘the woman ran (away)’ interpretation is more likely to hold. This is not the case in Karitiana, however.

cases without pro-drop, the same ambiguity results. Consider the following variant of 15.88:

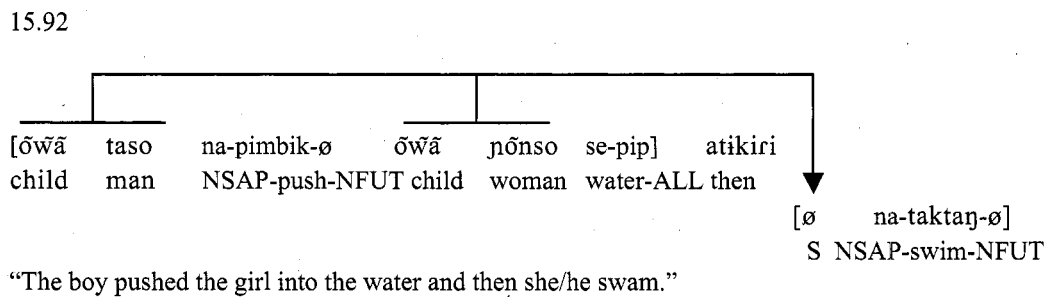


In 15.90, the 3rd person pronoun *i* could be coreferential with either the A or the O of the first clause. There is no evidence of either interpretation being preferred. This suggests that in 15.88, as well as examples such as 15.91-15.93 below, the ambiguity of coreferentiality would exist even if the relevant pronouns were present.

In the following example, we see once again that the S of a given clause may refer to the A or to the O of a coordinated transitive clause. In this case, the verbs of both clauses occur with the inflection characteristic of the SAP construction.



In the next example, we see that once again the null S can refer to either the A or the O of a preceding coordinated clause:



15.94

[nõnso naka-õ:t ip] atikiri [ø i-pitʔi-t]
 woman NSAP-get-NFUT fish then S INT-cook-NFUT
 "The woman caught the fish and then she ate."

Significantly, the ambiguity of null S's in coordinate clauses even extends to obliques. Consider the following example in which the implicit S of a coordinated clause is coreferential with either the S of the preceding copular clause, or the oblique of the preceding copular clause:

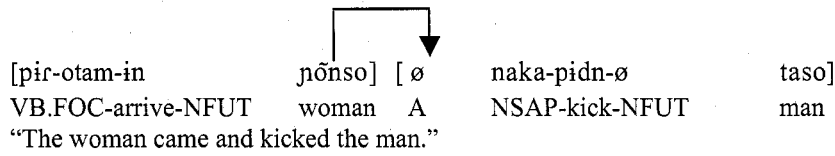
15.95

[taso na-aka-t i-ãpi:t õmbaki-ti:t] [ø naka-pop-ø]
 man NSAP-COP-NFUT INT-fight-NFUT jaguar-ACM S NSAP-die-NFUT
 "The man fought with the jaguar and he/the jaguar died."

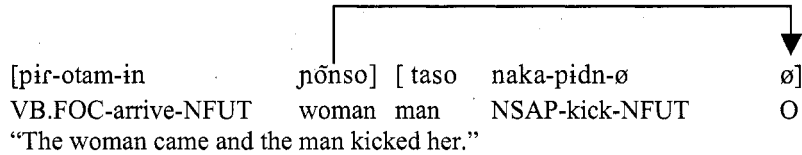
In this case, we see that the S may refer to a non-argument NP in the preceding clause, at the expense of a core argument. This example underscores the capricious nature of the typologically unusual conjunction reduction evident in Karitiana. Not only can the null S refer to a preceding oblique, at the expense of a preceding S, it can do so even if the oblique is further down the participant hierarchy than the relevant S. In 15.95, we see that even though the oblique in question refers to an animal, it can control the reduction of S in the following coordinated clause. Given that the S of the first clause is human, we might expect it to control coreferential deletion by default. However, it does not, and either gloss evident in 15.95 is acceptable.

Before concluding this section, let me provide a few examples in which the S of a clause is coreferential with a gapped A or O of a following, rather than a preceding clause. Consider the following grammatical examples:

15.96



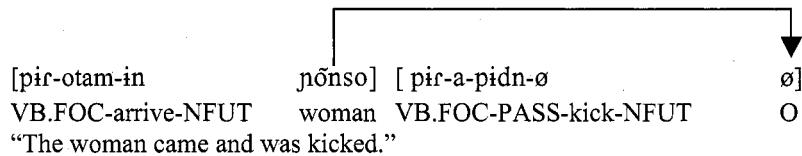
15.97



Note that in the first case, the S of the first clause is coreferential with the gapped A, while in the second clause the S of the first clause is coreferential with the gapped O. Neither clause is ambiguous, and the reason is fairly straightforward. When the gapped element in the second clause represents an A or an O, rather than an S as in the preceding examples, word order helps to disambiguate the nature of the coreference. (Recall from Chapter 14 that word order is generally AVO in those clauses with full NP's.)

When a gapped O of a second clause is coreferential with a preceding S, the second clause often occurs in the Verb-focus construction as in the following example:

15.98



Note, however, that in such cases the agent is also omitted from the passive-like Verb-focus clause, since A's are not usually permitted in this construction. More coreferentiality examples such as 15.98, involving construction-type/voice alternations, are discussed in the following section.

In conclusion, a null argument of a coordinated clause in Karitiana may refer to an S, A, O, or even an oblique nominal in an adjacent clause. None of these NP types

appear to be treated preferentially with respect to this phenomenon, and it seems clear that contextual/semantic cues are crucial to deciphering the coreferent of a reduced argument in a coordinated clause.

§15.3.2.2 Coreferentiality and embedded clauses

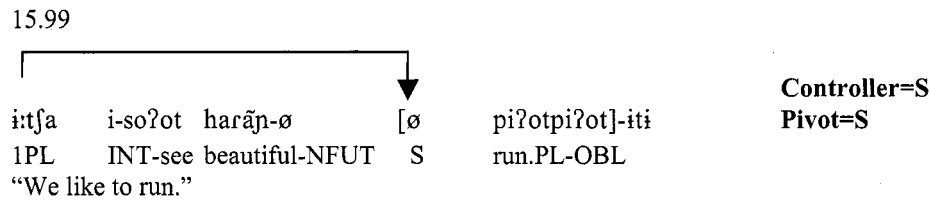
Before discussing coreferentiality and embedded clauses in Karitiana, I should be clear about the terms I will employ in the discussion. According to the classification of clause types suggested in works such as Payne (1997:313) and Noonan (1985), complement clauses are embedded clauses that function as arguments in a matrix clause. Other researchers (e.g. Foley and Van Valin 1984) extend the term “complement clause” to include all embedded clauses. In using the term “complement clause” below, I refer to embedded clauses that serve as an A, S, O, *or* oblique. The term “complement clause” as employed here does not refer to other embedded clauses such as relative clauses, which are used as modifiers rather than NP’s in the matrix clause. Both complement clauses and relative clauses are evident in the examples of embedded clauses discussed below. It should be noted that the complement clause/relative clause distinction is somewhat obfuscated in Karitiana, which does not employ any relativizers or complementizers.¹³³ Our primary concern here, however, is not to describe these clause types, but to describe the coreferentiality patterns evident in embedded clauses, whether or not these are relative or complement clauses.

The term “pivot” has also been used in somewhat different ways in the literature, so to be clear I will be adopting Farrell’s (2005:47) definition of a pivot, which is “the omitted dependent whose interpretation is keyed to another dependent.” In other words,

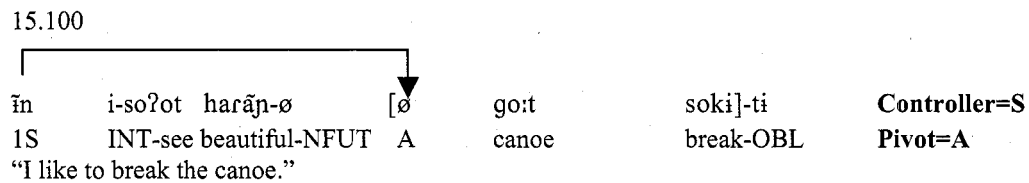
¹³³ Since both clause types are non-finite, and since relative clauses usually occur post-nominally (though there are *some* head-internal relative clauses), it is not usually clear if a given noun-non-finite verb sequence represents a noun-relative clause sequence or simply a noun-initial complement clause.

the pivot is the omitted dependent/nominal that refers to another overt dependent/nominal in the matrix clause, which is said to be the “controller” of the pivot.

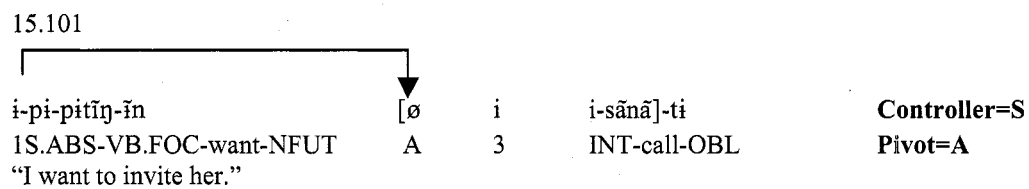
In the following example, we see that in the complement clause, which serves as an Oblique nominal, the omitted S is coreferential with the S of the matrix clause as we would expect:



In 15.100, however, we see that the S of the matrix clause controls an A pivot in the embedded oblique complement:



In the following example, the A of the nominalized complement clause is omitted. In the default interpretation of this clause, this A is also controlled by the S of the matrix clause.



Example 15.101 illustrates another important fact about Karitiana controllers and pivots, namely that the controller and pivot can occur in different construction types. In general, coreferential deletion applies across all declarative construction types, as we have seen in several of the examples in this chapter.

In the following example, the A of the nominalized complement clause is omitted, but refers to the same person as the S of the matrix clause.

15.102

	S		V	
[ø	kojpa	opī:]pa	i-īwā	
A	pinapple	cut NOM	INT-disappear	

“The pinapple cutter disappeared.”

In Karitiana copular clauses, the S argument usually precedes the copula. In the following clause, the S in question is the same referent as the A of the relative clause:

15.103

taso	[ø	so:tʃa	okit]	na-aka-t	i-osedna	Controller=S
man	A	pig	kill	NSAP-COP-NFUT	INT-happiness	Pivot=A

“The man that killed the pig is happy.”

Significantly, the patient of an embedded clause can only be coreferential with the S of a copular clause if the embedded clause evinces passivizing morphology, as in 15.104, or object-focus morphology, as in 15.105 and 15.106.

15.104

õwã	[ø	a-m-kerep]	na-aka-t	i-ho:bmã-t
child	S	PASS-CAUS-grow	NSAP-COP-NFUT	INT-drown-COP.AGR

“The child that was raised drowned.”

Controller=S
Pivot=Passive S (patientive)

15.105

õwã	[ø	ãn ti-m-kerep]	na-aka-t	i-ho:bmã-t
child	O	2S OFC-CAUS-grow	NSAP-COP-NFUT	INT-drown-COP.AGR

“The child that you raised drowned.”

Controller=S
Pivot=O in OFC

15.106

taso	[ø	õmbaki ti-oki]	na-aka-t	i-Karitiana-t
man	O	jaguar OFC-kill	NSAP-COP-NFUT	INT-Karitiana-COP.AGR

“The man the jaguar killed was Karitiana.”¹³⁴

Controller=S, Pivot=O in OFC

¹³⁴ The embedded clauses in 15.104-15.106 could be interpreted as complement clauses in which the words for ‘child’ and ‘man’ serve as the A of the relevant complement clauses, rather than the null form suggested by the transcriptions. Even with this interpretation it is clear that in cases such as 15.104 the passive/patientive S of the complement clause and the S of the matrix clause refer to the same person.

In the following example, the S of the complement clause and the A of the matrix clause refer to the same individual:

15.107

<u> A </u>	V	O
[akan taso aka]	a-taka-mĩ:t	ãn
village man COP	2S.ABS-SAP-hit-NFUT	2S

“That man in the village hit you.”

If the S of the complement clause and the undergoer of the matrix clause refer to the same individual, then the verb of the matrix clause may be passivized, as in 15.108. In such cases the matrix clause only has one argument, since it is passivized. Therefore, the S of the complement clause is not, strictly speaking, coreferential with the O of the matrix clause, since this passive clause does not have an O or an A. Instead, the S of the complement clause is coreferential with the non-agentive S of the matrix clause:

15.108

<u> S </u>	V	Obl
[ep ohĩnt taso aka]	na-aka-t	i-a-mĩ:t
tree on.top man COP	NSAP-COP	INT-PASS-hit-NFUT
		a-piri
		2S.ABS-by/from

“The man on top of the tree was hit by you.”

If the O of an embedded clause is coreferential with the O of a matrix clause, the verb of the complement clause is marked as in 15.109 in which the **ti-** object-focus marker is prefixed to the complement verb.

15.109

	┌──────────┐ ▼					
ãn	naka-mĩ:t	taso	[ø]	ĩn	ti-mĩ:]	Controller=O
2S	NSAP-hit-NFUT	man	O	1S	OFC-hit	Pivot=O in OFC

“You hit the man that was hit by me.”

Interestingly, the verb need not be marked if the O of the matrix clause controls an S pivot in the embedded clause, as in the relative clause of 15.110:

15.110

kĩmbi	ednā	na-okot-∅	jōnso	[∅	terektereŋ-tika]	
dog		NSAP-bite-NFUT	woman	S	dance-PROG	
"The dog bit the woman who is dancing."						Controller=O
						Pivot=S

In such exceptional cases, a pivot S and a controlling O are coreferential without the presence of passivizing or object-focusing morphology in the matrix clause. Apart from exceptions such as 15.114, a clear trend is evident in the above examples of controller-pivots in Karitiana. Specifically, the controller and the pivot generally represent some combination of S and A referents.

Occasionally in Karitiana two verbs may be serialized. In such cases, the second verb is often *tat*, "to go." The first verb is not similarly restricted. After the *verb-tat* sequence, a complement clause often occurs as in the following example:

15.111	i-kisepkisep	i-taka-tat	[i-taktaŋ]
	1S.ABS-jump	1S.ABS-SAP-go-NFUT	1S.ABS-swim
	"I went jumping to swim."		

In the case of the above clause, the complement clause following the serial verbs is intransitive, and the S of both the serial verbs and the complement clause is coreferential. However, there are also cases in which the complement clause following serial verbs is transitive. In such cases the A of the complement clause is not overtly present, and is coreferential with the S of the serial verbs. This is evident in 15.112 and 15.113:

15.112

i-kisepkisep	i-taka-tat-∅	[∅	bipān	atik]	Controllers=S
1S.ABS-jump	1S.ABS-SAP-go-NFUT	A	arrow	throw	Pivot=A
"I went-jumping to throw the arrow."					

15.113

i-taktaŋ	i-taka-tat-∅	[∅	sōŋ	okēp]	Controllers=S
1S.ABS-swim	1S.ABS-SAP-go-NFUT	A	firewood	cut	Pivot=A
"I went swimming to cut the firewood."					

Based on the examples considered above, we can conclude that, in general, the A or S of an embedded clause is coreferential with an A or S of the matrix clause. An O of a matrix or embedded clause may be coreferential with an argument in the adjacent embedded or matrix clause, respectively. However, in such cases the clause with the coreferential O is usually marked with object-focus morphology and concomitant object fronting. This suggests that the default pattern of coreferentiality between embedded and matrix clauses links S's with S's, or S's with A's, or A's with A's. In other words, controller-pivot combinations in matrix and embedded clauses are generally oriented according to a nominative rather than absolutive grouping.

I should mention that, while there are no complementizers or relativizers in Karitiana, the language does employ subordinators when an embedded clause is adverbial. These subordinators include **tikiʔort**, 'when, ʔort', 'while,' **tikiri**, 'if/then,' and **mik**, 'after.' (For example clauses using these subordinators, see Landin 1978:14.3) In clauses employing such words, the subordinators occur at the end of the non-finite embedded clause, as in the following example.

15.114 [o:pok-opip a-tat tykiri] ɪn a-tak-atiw-i
 white.people-ALL 2S.ABS-go if 1S 2S.ABS-SAP-find-FUT
 ‘‘If you go to the city, then I will find you.’’

Adverbial clauses in Karitiana are used to express the conditionality, simultaneity, or relative sequence of a given action expressed in a subordinate clause with respect to an action in the finite matrix clause. There are no cases in my data or in the literature in which such adverbial clause-matrix clause combinations involve the use of controller-pivot reduction of the sort seen in the complement and relative clauses considered above.

§15.3.3 Word order

In section §14.3 I discussed Karitiana word order at some length. In that section, I concluded that the basic word order in transitive declarative clauses is AVO, and the basic word order in intransitive declarative clauses is SV. I noted in §14.3 that there are many exceptions to this word order in Karitiana, most notably in the Verb-focus construction, which is verb-initial. The word order in clauses with Verb-focus morphology is typically VS, or VO. Based on this conclusion, we can state that the word order of clauses in the Verb-focus construction groups S and O nominals by their similar post-verbal placement. So, word order in the Verb-focus construction is oriented according to the absolutive category.

As was noted in §14.3, basic word order in the SAP, copular, and valence constructions can most accurately be described as SV and AVO. Word order in Karitiana is fairly flexible, and there are many exceptions in discourse to the SV/AVO orders. However, these orders represent the basic (as well as most frequent) sequences in the language. Therefore, we find that A's and S's are treated similarly by their default pre-verbal placement in the language. In other words, in these constructions Karitiana word order appears to be oriented according to the nominative category. So we can conclude that *basic* word order in Karitiana generally exhibits S/A grouping.

§15.3.4 Quantifier float

As in languages such as English and Indonesian (Farrell 2005:109), Karitiana exhibits quantifier float, in which a quantifier that typically follows the noun it modifies can move to another position within the clause. For example, consider the following

clause in which the S of an intransitive clause is modified by the modifier **akatĩm**, meaning “all.”¹³⁵

- 15.115 a. taso akatĩm na-ohi:t-ø
 man all NSAP-fish-NFUT
 “All the men fish.”¹³⁶

The quantifier can also occur clause-initially, in which case it is prefixed with **ta-**.¹³⁷

Consider 15.115b, a variant of 15.115a:

- 15.115 b. ta-akatĩm na-ohi:t-ø taso
 ta-all NSAP-fish-NFUT man
 “**All** the men fish.”

The following clause pair demonstrates another case of quantifier float, in which a post-nominal quantifier may occur clause-initially while still modifying an S nominal:

- 15.116 a. õwã akatĩm ta-pi?orot-ø
 child all SAP-run.PL-NFUT
 “All the children ran.”
- 15.116 b. ta-akatĩm õwã ta-pi?orot-ø
 ta-all child SAP-run.PL-NFUT
 “**All** the children ran.”

¹³⁵ The semantic judgments found in this discussion of quantifier float are fairly nuanced. For that reason, a few words on the methodology employed in obtaining these judgments are in order. In general, the judgments were obtained by first eliciting translations of relevant clauses (with hypothetical discourse contexts) via a meta-language, in this case Portuguese. These translations would be followed up on with questions about the truth conditions of the elicited clauses. That is, the language resource personnel were presented with relevant clauses containing floated quantifiers, and asked to make truth value judgments about the clauses. For instance, a speaker was presented with clause 15.117c, which had been judged grammatical by a Karitiana, and asked to state whether such a clause would be true (rather than grammatical) under the conditions found in the three glosses. Since the clause would only be true under the conditions found in the first gloss, only that gloss was judged acceptable. In general, the methodology employed in obtaining these judgments follows the suggestions made in Matthewson (2004). Chief among these is the suggestion that a meta-language can serve a central role in such investigations, since, as Matthewson notes, “the meta-language has only a negligible influence on the consultant.” (2004:396)

¹³⁶ See the third footnote in this chapter. Given that the default construal of nominals, such as “men” in this clause, is definite, this is the most accurate gloss. When provided with this clause in isolate, speakers provide a definite translation. This example could also be glossed, “All men fish,” however this interpretation is achieved upon prodding. If one were trying to express indefiniteness in a clause such as “all men fish,” s/he would be more likely to utter “**itʃa akatĩm na-ohi:t-ø**”, meaning “all people fish”.

¹³⁷ This morpheme requires future investigation, and it is not clear exactly what its function is at this point. It is attached to certain elements such as the quantifiers when they occur clause-initially. It also occurs in the reflexive-type pronoun **ta-ãn-ti**.

Quantifier float is not restricted to clauses with one NP. Significantly, when a quantifier occurs clause-initially in a clause with more than one NP, it modifies the S or A argument of a given clause. Consider first the following two clauses in which the quantifier follows the modified nominal, though the two may be separated by adjectives or adverbials:

- 15.117 a. *ōwā* *akatīm* *na-siki?i-t* [*kinda kowot*]-oti
 child all NSAP-like.ingest-NFUT thing sweet-OBL
 “All the children like sweet things/candy.”¹³⁸
- 15.117 b. *ōwā* *i-siki?i-t* *kinda kowot (pitat) akatīm*
 child INT-like-NFUT thing sweet very all
 “The child likes all the (very sweet) things/candy.”

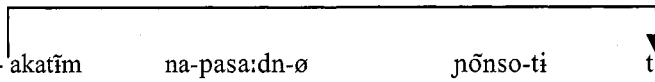
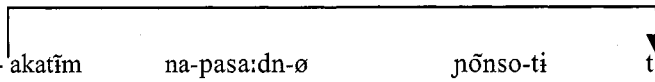
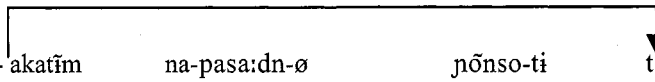
Significantly, when the quantifier occurs clause-initially it modifies the A-like nominal of the clause. This is true even if the A is not adjacent to the fronted quantifier, as in the following variation of 15.117a and 15.117b:

- 15.117 c. *ta-akatīm* *na-siki?i-t* *ōwā* [*kinda kowot*]-iti
 ta-all NSAP-like.food-NFUT child thing sweet-OBL
 “All the children like candy.”
 * “All the children like all the candy.”
 * “The child likes all the candy.”
-

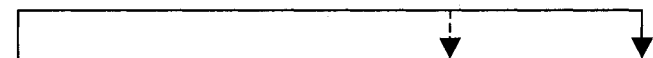
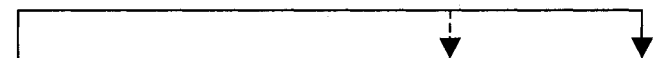
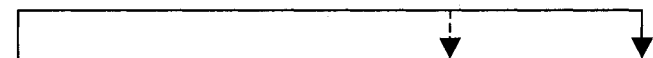
In 15.117c, the floated quantifier must be interpreted as referring to the A-like nominal, rather than the oblique nominal. In the next set of examples, we see that a floated quantifier is understood to modify an A nominal at the expense of an O nominal, which receives oblique marking only in the clause with quantifier float:

- 15.118 a. *taso* *akatīm* *na-pasa:dn-ø* *ḡōnso*
 man all NSAP-love-NFUT woman
 “All the men love the woman.”
- 15.118 b. *taso* *na-pasa:dn-ø* *ḡōnso akatīm*
 man NSAP-love-NFUT woman all
 “The man loves all the women.”

¹³⁸ It is unclear why in this example the verb is prefixed with *na-*, rather than *i-* as in 15.117b, since the verb in question is classified as intransitive. The intransitivity of *siki?i* is also evidenced by the oblique suffix attached to the post-verbal nominal.

15.118 c.				
	ta-akatim	na-pasa:dn-ø	jõnso-ti	taso
	ta-all	NSAP-love-NFUT	woman-OBL	man
	“All the men love the woman.”			
	* “All the men love all the women.”			
	* “The man loves all the women.”			

Based on the examples so far considered, it seems clear that the phenomenon of quantifier float is sensitive to the S/A (nominative) category of nominals. This is true, however as in the case of many phenomena so far considered, the GRs evident in quantifier floating are not always so straightforward. In some cases, the fronted quantifier of a transitive clause appears to modify both the A and O of the clause. This is true in the following clause, in which the O of a semantically transitive verb is marked with the oblique marking characteristic of transitive clauses with quantifier float:

15.119				
	ta-akatam	na-pasa:dn-ø	owā-ti	taso
	ta-all	NSAP-love-NFUT	child-OBL	man
	“All the men love the child.”			
	“All the men love all the children.”			
	* “The man loves all the children.”			

We see in this case that either of the first two interpretations are acceptable. Given that Karitiana nouns do not inflect for number, it is not clear whether the second interpretation, in which the O is also understood to be plural, is the result of the floated quantifier or general number ambiguity. Nevertheless, in such cases it is also not clear that the floated quantifier only refers to the A nominal. What is clear, however, is that the floated quantifier *must* modify the A nominal. Interpretations in which the quantifier refers only to the O nominal are unacceptable.

Based on the data presented above, it is clear that quantifiers, which normally occur immediately after the noun they modify, may also occur clause-initially. When they

do occur initially, they are prefixed with **ta-** and must refer to a subsequent S or A referent. In this way, quantifier float serves as a syntactic phenomenon used to reify the nominative category in Karitiana.

§15.4 Summary of grouping of S, A, and O

In sections §15.1-§15.3, I examined the various ways in which GRs surface in Karitiana, with respect to the S, A, and O NP's. The grouping of object types in ditransitive clauses was not considered, and is examined briefly in the following section. First, though, some general conclusions about the grouping of S, A, and O can be made.

Based on the morphological evidence alone, Karitiana could be classified as a predominantly ergative language. While there are no case affixes in Karitiana, there is a set of pronominal affixes that is only used to refer to S and O nominals. Similarly, there is a set of free pronouns that, while not strictly ergative, can only be used to refer to ergative nominals when occurring in a particular context, specifically pre-verbally in the SAP construction. Furthermore, some irregular verbs agree in number with S and O nominals, while progressive suffixes also agree in number with S and O nominals.

The syntactic evidence paints a different story, however, as in the case of most morphologically ergative languages. Some phenomena, such as coreferential deletion and word order, are neither strictly ergative nor strictly nominative. However, certain phenomena, such as controller-pivot reduction and quantifier float, are clearly oriented according to the nominative category.

In the following table, the basic GRs of Karitiana are summarized. Primarily morphological phenomena are listed in shaded cells, while primarily syntactic phenomena are placed in non-shaded cells:

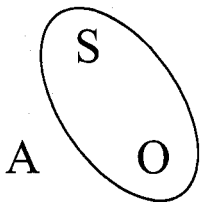
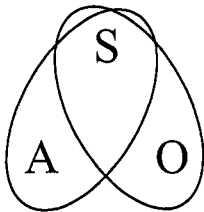
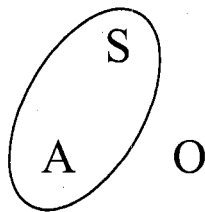
		
Number agreement, irregular verbs.	Coreferential deletion.	Object-focus construction.
Number agreement, aspect.	Post-verbal pronouns.	Word order in SAP construction.
Pronominal affixes.		Word order in valence construction.
Pre-verbal pronouns in SAP construction.		Controller-pivot phenomena.
na(ka)-/ta(ka)- distribution		Quantifier float.
Word order in Verb-focus construction		Imperatives.

Table 15.2 Summary of S, A, and O grouping in Karitiana.

As the table illustrates, shaded cells tend to fall under the S/O grouping system, while non-shaded cells tend to fall under the S/A grouping system. Of course, the depiction oversimplifies matters somewhat, since some phenomena (e.g. imperative formation) display traces of both absolutive and nominative grouping. Nevertheless, the general picture of GRs presented by Table 15.2 is accurate, and we are left with the impression that Karitiana is indeed a split-ergative language. The “meta-split” is oriented, at least in large part, according to the distinction between morphological and syntactic phenomena.

§15.5 GRs and object types

In his work on GRs and object types, Dryer (1986:814) makes the following claim:

... just as some languages employ the grammatical relations ERGATIVE and ABSOLUTIVE, which can be defined in terms of subject and object...so too some languages employ the grammatical relations P[RIMARY] O[BJECT] and S[ECONDARY] O[BJECT], which can be defined in terms of DO and IO.

According to Dryer's typology of O-types, languages can generally group objects in one of two ways. They can group direct objects in transitive clauses with the direct objects (patient-like) of ditransitive clauses. Such languages are said to have a direct object/indirect object distinction. Alternatively, languages can group direct objects in transitive clauses with the indirect objects (recipient-like) of ditransitive clauses. Such languages are said to have a primary object/secondary object distinction, according to which the O's of transitive clauses and the recipient-type O's of ditransitive clauses form the primary object category.

Before concluding the discussion of GRs in Karitiana, it is worth examining the classification of O's in ditransitive clauses, to test whether the language exhibits primary objectivity. To that end, the following examples contain the semantically ditransitive verb **mtat**, "send," followed by a patient/theme nominal and a recipient-type nominal:

- | | | | | | | |
|--------|----|----------------------------------|-------------------|--------|-------|-------------|
| 15.120 | a. | ĩn | naka-m-tat-ø | hĩm | pisip | õmbaki-kĩ:n |
| | | 1S | NSAP-CAUS-go-NFUT | animal | meat | jaguar-REC |
| | | "I sent the meat to the jaguar." | | | | |
| | b. | ĩn | naka-m-tat-ø | hĩm | pisip | ambi-p |
| | | 1S | NSAP-CAUS-go-NFUT | animal | meat | house-ALL |
| | | "I sent the meat to the house." | | | | |
| | c. | ĩn | naka-m-tat-ø | hĩm | pisip | elivar-kĩ:n |
| | | 1S | NSAP-CAUS-go-NFUT | animal | meat | Elivar-REC |
| | | "I sent the meat to Elivar." | | | | |

As examples 15.120a-15.120c demonstrate, when the ditransitive verb for "send" is used, it is generally followed by two nominals. One of these nominals, the recipient of the item being sent, is marked with a suffix indicating its status as a recipient. This suffix also serves to mark the relevant nominal as a non-core-argument. Such suffixation suggests that the clause-final NP's of the above examples could be considered indirect objects.

In the case of the verb **mtat**, the patient/theme nominal cannot be marked with an oblique marker, which also suggests that this nominal serves as a clause argument, i.e. as the syntactic O of the ditransitive clause:

15.120	d.	*ĩn	naka-m-tat-ø	hĩm	pisip-iti	elivar
		1S	NSAP-CAUS-go-NFUT	animal	meat-OBL	Elivar
		"I sent Elivar the meat."				

Word order does not seem to play a role in distinguishing IO's from O's. IO's may occur clause-finally (as in 15.120a-c) or immediately after the verb:

15.120	e.	i	naka-m-tat-ø	i-kĩ:n	hĩm	pisip
		3	NSAP-CAUS-go-NFUT	1S.ABS-REC	animal	meat
		"He sent the meat to me."				

This is also true in the case of the ditransitive verb **mbirit** (literally, "cause to receive"):

15.121	i	na-mb-irit-ø	i-kĩ:n	hĩm	pisip	
	3	NSAP-CAUS-arrive-NFUT	1S.ABS-REC	animal	meat	
		"He sent the meat to me."				

To this point, the distinction between object types in Karitiana seems clear-cut. Indirect objects appear to be marked morphologically, while direct objects seem to be unmarked as we would expect absolutive nominals to be. Once a wider range of ditransitive verbs is considered, however, it becomes apparent that the situation is in fact more complex. Consider the following examples containing the verb **hit**, "give:"

15.122	a.	elivar	naka-hit-ø	i-ti	ãn	
		Elivar	NSAP-give-NFUT	3-OBL	2S	
		"Elivar gave her to you."				
	b.	elivar	naka-hit-ø	ãn-ti	i	
		Elivar	NSAP-give-NFUT	2S-OBL	3	
		"Elivar gave you to her."				
	c.	i	naka-hit-ø	hĩm	pisip-iti	i
		3	NSAP-give-NFUT	meat-OBL		3
		"She gave the meat to him."				

In each of the above clauses, the patient/theme nominal is inflected with an oblique suffix, while the recipient nominal is not inflected. This sort of pattern is suggestive of a

primary object/secondary object distinction, in which the IO's (recipient-type O's) of ditransitive clauses are treated in the same manner as the O's of monotransitive clauses. The recipient in a ditransitive clause containing **hi:t** is also treated as an absolutive O in another manner. If the recipient is a 1st or 2nd person referent, it may be represented by one of the relevant absolutive prefixes attached to verb forms, as in 15.123:

15.123 i i-taka-hi:t-ø [kinda o]-ti
 3 1S.ABS-SAP-give-NFUT thing fruit-OBL
 "She gave me the fruit."

This absolutive treatment of the recipient nominal is also apparent in ditransitive clauses with some other verbs, for instance **mso?ot**, "show.":

15.124 ān i-ta-m-so?ot-ø ōm-ti
 2S 1S.ABS-SAP-CAUS-see-NFUT image-OBL
 "You showed me the picture."

The recipient is also an unmarked O in clauses without 1st or 2nd person O referents prefixed to **mso?ot**, as in the following case in which the patient/theme NP receives oblique suffixation (as in 15.122a-c):

15.125 ĩn nā-m-so?ot-ø ōm-ti jucilene
 1S NSAP-CAUS-see-NFUT image-OBL jucilene
 "I showed Jucilene the picture."

Based on data such as those in 15.120-15.125, it seems clear that some semantically ditransitive verbs in Karitiana treat indirect object/recipient-type nominals as O's. Clauses with these verbs exhibit primary objectivity, that is, the IO's of ditransitive clauses and the O's of monotransitive clauses are grouped together morphosyntactically. There are other verbs, however, that treat the direct object/patient-type nominals of ditransitive clauses like the O's of monotransitive clauses. Clauses with these verbs evince a direct object class, or direct objectivity. In other words, Karitiana

exhibits a system of split-objectivity. This finding is depicted graphically in the following table:

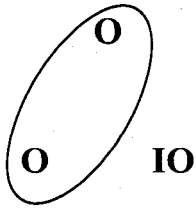
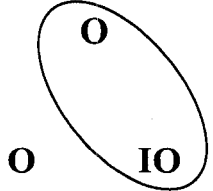
Split-objectivity in Karitiana		
	Direct-Object Verbs	Primary-Object Verbs
Examples	mbirit , “cause to arrive/send,” mtat , “send,” atot , “take”	mso?ot , “show” hit , “give” mpipid , “teach”
Monotransitive Clauses		
Ditransitive Clauses		

Table 15.3 Split-objectivity in Karitiana.

Unlike the basic GR split associated with the S, A, and O categories in transitive and intransitive clauses, the split-objectivity evident in ditransitive clauses is based on verb semantics. Given how small the class of ditransitive verbs is, it is difficult to derive a meaningful generalization that explains why some verbs are “primary object” verbs and others are “direct object” verbs. Nevertheless, Table 15.3 does reveal one interesting, though tentative, generalization. Semantically ditransitive actions that *require* an animate goal appear to fall into the “primary object” category. In other words, one must “show,” “give,” and “teach” something to another animate being. However, one can “take” or “send” something from/to a place, not just a person. Perhaps it is because verbs such as “show,” “give,” and “teach” all require animate goals that these animate goals are treated as primary objects, i.e. occur as direct arguments in the clause core. This issue requires further investigation.

It is worth noting that ditransitive clauses with “direct object” verbs do not appear to distinguish between O’s and IO’s with respect to syntactic phenomena. For example,

both O's and IO's may be shifted to pre-verbal position in passivized variants of the ditransitive clause. This is evident in the following two sets of clauses. Clause 15.126a is a ditransitive clause with the verb *mtat*. As expected, the verb is followed by an unmarked O and a morphologically marked IO:

- 15.126 a. i naka-m-tat-ø piejip i-kĩ:n
 3 NSAP-CAUSE-go-NFUT letter 3-REC
 "She sent the letter to him."

In 15.126b and 15.126c, the IO (15.126b) and the O (15.126c) serve as the pre-verbal NP's of passive clauses:

- 15.126 b. i-kĩ:n i-a-m-tat-ø piejip
 3-REC INT-PASS-CAUS-go-NFUT letter
 "She was sent the letter." or "To her was the letter sent."

The gloss in 15.126b is based in part on the meta-language translation of the language resource person who produced the clause. Note, however, that there is only one core argument in the clause, as evidenced by *i-* prefixation on the verb and the recipient marker following the 3rd person pronoun. The focus on the third person referent is the result of clause-initial placement. (A similar analysis applies to clause 15.127c.)

- 15.126 c. piejip i-a-m-tat-ø i-kĩ:n
 letter INT-PASS-CAUS-go-NFUT 3-REC
 "The letter was sent to her."

The promotion of a direct and indirect objects in passive clauses is apparent in the following clauses as well:

- 15.127 a. i na-atot-ø piejip i-kĩ:n
 3 NSAP-take-NFUT letter 3-REC
 "She took the letter to him."
- b. piejip na-aka-t i-a-atot-ø i-kĩ:n
 letter NSAP-COP-NFUT INT-PASS-take-NFUT-NFUT 3-REC
 "The letter was taken to him."
- c. i-kĩ:n i-a-atot piejip
 3-REC NSAP-PASS-take letter
 "He was taken the letter." or "To him was the letter taken."

Based on clause sets such as 15.126 and 15.127, it appears that passivization does not distinguish between direct and indirect O's in Karitiana. Passivization also does not distinguish between primary O's and secondary O's. Consider first clause 15.128a, which contains the verb **hit** as well as an unmarked primary object and an oblique-marked secondary object:

15.128 a. i naka-hit:Ø piejip-iti henato
 3 NSAP-give-NFUT letter-OBL Renato
 "She gave the letter to Renato."

In 15.128b, we see that the secondary object may be placed pre-verbally in a passive clause:

15.128 b. piejip-iti i-a-hit-Ø
 letter-OBL INT-PASS-give-NFUT
 "The letter was given."

A primary object may also be placed pre-verbally in a passive clause, as in this example:

15.128 c. henato i-a-hit-Ø piejipi-ti
 Renato INT-PASS-give-NFUT letter-OBL
 "Renato was given the letter."

In such cases, one of the core arguments must occur as an oblique. If it is not, the clause is ungrammatical:

15.128 d. *henato i-a-hit-Ø piejip
 Renato INT-PASS-give-NFUT letter
 "Renato was given the letter."

Interestingly, the object-focus construction, unlike the passive construction, does distinguish between primary objects and secondary objects. Specifically, only secondary objects can occur in this construction, as we see in the following examples:

15.129 a. õ:m-ti an ti-m-so?o:t-Ø
 picture-OBL 2S OFC-CAUS-see-NFUT
 "The picture was shown by you." or "The picture you showed."

15.129 b. *õ:m-ti i an ti-m-soʔot-ø
 picture-OBL 3 2S OFC-CAUS-see-NFUT
 “The picture was shown to him/her by you.”

Example 15.129b is ungrammatical due to the presence of a primary object, which cannot grammatically occur anywhere in the clause with object-focus morphology, as it can in passive clauses such as 15.128c.

Ditransitive verbs that display direct/indirect object classification *can* occur in the object focus construction with two overt objects, however, unlike “primary object” ditransitive verbs (e.g. that in 15.129). Consider example 15.130:

15.130
 piejip i-kĩ:n an ti-m-tat-ø (naka-mpi:p i pitimadn-ipa-pip João)
 letter 3-REC 2s OFC-CAUS-go-NFUT NSAP-remove 3 work-NOM-ALL João
 “The letter you sent to the person (made João lose his job).”

The fact that primary objects are not allowed to occur in the object-focus construction may relate to the observation, noted above, that primary objects appear to be necessarily animate, while indirect objects, while often animate, are not necessarily animate. As I suggested previously, this issue requires further exploration.

Clearly, the objects of Karitiana ditransitive clauses are not categorized in a straightforward fashion. Nevertheless, the distribution of NP suffixes in ditransitive clauses suggests that certain ditransitive verbs in Karitiana co-occur with primary and secondary objects, while other ditransitive verbs co-occur with direct objects and indirect objects. In short, Karitiana demonstrates split-ergativity *and* split-objectivity.

§15.6 Comments on the Tupí context

As Derbyshire and Pullum (1986:19) point out, ergativity is a common feature of many Amazonian languages. Derbyshire (1999:61) suggests that there is likely a long history of ergativity in Amazonia, based on the pervasive ergative phenomena evident in

e.g. Arawá, Carib, Jê, Pano, Tupí, Yanomami, and Tucano. Jensen (1998) argues that the mixed ergative/accusative GRs evident in many Tupí-Guaraní languages are the vestige of a dominant ergativity found in proto-Tupí-Guaraní. Given the pervasive ergativity found in Amazonian languages and Tupí languages more specifically, it is not surprising that Karitiana exhibits ergativity in many facets of its GRs. As we have seen, however, there is a mix of ergative/absolute and nominative/accusative GRs in Karitiana.

In general, morphologically ergative languages in Amazonia exhibit nominative patterns upon closer inspection. There are suggestions in the literature of strict ergativity, for instance Franchetto (1990:424) suggests that Kuikúro “presents a strictly ergative system of encoding grammatical relations in basic, declarative clauses.” Franchetto (1990) relies primarily on morphological phenomena, however, in arriving at this assessment. Careful documentation of split-GR systems have been provided for some Tupí languages in the literature, especially with respect to Tupí-Guaraní (Jensen 1990, 1999) languages and Kamaiurá more specifically (Seki 1990, 2000). The contrast apparent between the Tupí-Guaraní splits and the Karitiana split presented above is noteworthy in that the splits are oriented according to very different parameters. The GR splits evident in Tupí-Guaraní languages are based primarily on verb semantics. Generally speaking, intransitive verbs are classified as either active or stative, yielding a split system in which some S’s are grouped with A’s, while others are grouped with O’s. This sort of split intransitivity is of course common crosslinguistically. Given its prevalence in Tupí-Guaraní languages, we might have expected a similar split to have surfaced in the Tupí-Arikém Karitiana data. Instead, though, the split evident in Karitiana is not oriented according to verb semantics/classification. Verb classification does play a

prominent role in Karitiana morphosyntax, however as we have seen this classification does not involve distinguishing active intransitive verbs from stative intransitive verbs.

The split of GRs in Karitiana is, broadly speaking, aligned with the distinction between morphological instantiations of GR patterns and syntactic instantiations of GR patterns. It should be noted that many studies of Amazonian languages do not carefully document the latter sort of GR phenomena,¹³⁹ and so it is presently unclear the extent to which Karitiana split-GRs resemble those of many Tupí languages, excepting those of Tupí-Guaraní languages, which by and large are more well documented. It is also unclear the extent to which Karitiana split-GRs resemble those of many other split-ergative Amazonian languages not belonging to the Tupí family. Hopefully future studies will help to clarify the presently turbid picture of the GRs of many Amazonian languages.

¹³⁹ As Rodrigues (1999:121) notes vis-à-vis Tupí languages.

An Overview of Karitiana Voices

§16.1 Introduction

§16.1.1 The interrelationship between GR categories and voice types

The discussion of basic voice types in Karitiana found in this chapter is in some senses parallel to the discussion of basic grammatical relations and argument types outlined in Chapter 15. The topics of voice and GRs are inextricably linked for two primary reasons. First, voice alternations cannot be understood apart from grammatical relations. Consider the following, one of the many definitions of basic voices offered in the literature:

Every language has operations that adjust the relationship between semantic roles and grammatical relations in clauses. Such devices are sometimes referred to as alternative **voices**. (Payne 1997:169)

In other words, different voice types represent variations of the typical association between a given semantic role, e.g. agent, and a given grammatical relation, e.g. subject. In the passive voice, for example, a non-agent is often coded with the GR characteristics of a subject. Obviously, such a voice alternation cannot be understood outside the context of the basic GR characteristics of a given language, and for that reason any discussion of voice must rely on a discussion of the relevant GRs in the language. Having outlined the basic GR categories of Karitiana in Chapter 15, we are now equipped with the data necessary to understand the operations that adjust the relationship between semantic roles and these categories.

The second reason the topics of voice and GRs are inextricably linked is that GRs cannot be faithfully described without some reference to the sorts of voice alterations that

help to reify certain GR categories. For instance, in the preceding chapter we saw that the GR category of indirect objects can safely be postulated in part because such objects can serve as the pre-verbal nominals of a passive clause. Such pre-verbal nominals in ditransitive clauses are typically agentive, however when the passive verbal prefix *a-* is employed the ditransitive “subject” is not in fact agentive. The important point here is that to understand the GR category of “indirect object” in Karitiana, some reference must be made to the fact that members of this category may occur clause-initially in passivized clauses.

Given the inherent linkage between GRs and voice alternations, and given how basic both sets of phenomena are to language, it seems natural that each phenomenon receive a fair amount of attention, in juxtaposition. (For that reason this chapter is presented after the chapter on GRs.)

§16.1.2 The approach to voice types adopted here

Voice alternations play a prominent role in Karitiana. In the preceding chapters, some of the forms associated with the voices of Karitiana have been described indirectly to varying extents. In this chapter, I take a closer look at some of the major functions that the basic voice alternations of Karitiana seem to serve. Drawing on previous conclusions on the subject in the field of cognitive linguistics, I seek to examine the ways in which the voices of Karitiana reflect different construals of the actions described in a given clause. The purpose of this chapter is to outline the *basic* conceptual patterns and functions associated with each of the main voices in Karitiana. These basic semantic functions are not necessarily the only functions served by voice alternations, however they are consistent with the data found in this monograph and elsewhere, and seem to

represent the functional core of the respective voices. I should stress, though, that this is not meant to be a comprehensive treatment of voices in Karitiana. Such a treatment would require a more discourse-oriented approach, since voice alternations are often sensitive to patterns in discourse.

Given their elemental nature, the conceptual functions of the voices I will outline can be represented diagrammatically. Each major voice alternation discussed in this chapter is represented schematically, in the tradition of works such as Langacker (1987,1991, 2002, *inter alia*). The basic conceptual patterns discussed below are consistent with the basic semantic and pragmatic correlates of the various voices, as evidenced in many clauses in my data.

Since this chapter focuses on the central functions of voice alternations, some voices receive very synoptic treatment (e.g. the antipassive and the causative). Others, however, are discussed in much greater detail. The motivation for this is that the relevant voices receiving greater attention are extremely frequent in Karitiana discourse, and play a more central role in the language. This is true in the case of the “Speech Act Participant” (SAP) voice, the “Non-Speech Act Participant” (NSAP) voice, and the “Verb-focus” voice. Another reason that the functions of these voices are considered in greater detail is that they are typologically unusual. The SAP voice and the NSAP voice are similar to the direct and inverse voices found in many languages, nevertheless their pragmatic and semantic correlates differ from those typically associated with these other voice types. Similarly, the Verb-focus voice does not correspond neatly to any known voice category. Nevertheless, given the definition of voice adopted below, it can also be considered one of the basic voices of Karitiana.

The definition of voice being adopted in a study such as this one is crucial to how the data are approached. To be clear, then, this study is oriented according to Shibatani's (2006) approach to voice, which is based on typological data and a cognitive-linguistic orientation. Shibatani (2006:5) suggests that the general function of voice is to highlight something about "how an action evolves—that is," something "about the nature of its origin, the manner in which it develops, and the way that it terminates." According to Shibatani's approach, the voices of a language such as Karitiana can be understood as relating to one of the following major voice parameters:

I. The origin of an action

- (a) How is the action brought about?
- (b) Where does the action originate?
- (c) What is the nature of the agent?

II. The development of an action

How does the action develop?

- (a) Does the action extend beyond the agent's personal sphere or is it confined to it?
- (b) Does the action achieve the intended effect in a distinct patient, or does it fail to do so?

III. The termination of an action

Does the action develop further than its normal course, extend beyond the immediate participants of the event, and terminate in an additional entity?

As we will see in the discussion below, each of the Karitiana voices can be fruitfully understood as involving one of the primary voice parameters mentioned above. More generally, each of the voices can be understood as placing greater emphasis on some aspect of the origin, development, and termination of a depicted event.

§16.1.3 Basic sentences and subjects in Karitiana

Voice alternations are often described in relation to how particular argument types are promoted to or demoted from subject in a given language. The difficulty with such an approach when describing a language such as Karitiana is that there is not a clear-cut subject category in the language. While certain arguments can be defined as "subjects" according to particular heuristics, the same arguments may be non-subject like according

to other heuristics. This is evident in the meta-split characterizing Karitiana GRs, which is discussed in the previous chapter. As we saw in that chapter, syntactic phenomena tend to group S's and A's together, in a category that might be considered the subject of Karitiana. However, if morphological grouping is considered the basic criterion in demarcating the subject class of arguments, then S and O arguments would more likely be considered the subject of Karitiana. This is problematic for approaches to diathesis that focus primarily on the promotional and demotional characteristics of such alternations. However, the absence of a clearly defined subject in Karitiana is not problematic to a description of voice that employs the framework outlined in the previous section. After all, according to the framework adopted here, the various voices in a language are concerned with making more or less salient different aspects of the origin, development, and termination of an action. In other words, this approach is concerned primarily with the effects of a given voice alternation on the conceptual depiction and construal of an event. As the major voice parameters in the previous section suggest, the approach is not couched in terms related to promotion and demotion from "subject." In that sense, the approach is very amenable to an analysis of voices in a language like Karitiana, in which the status of the "subject" is not altogether clear. Along with factors already discussed, it is for this reason that the delineation of GRs in Chapter 15 serves as a necessary background for the discussion in this chapter. The approach to voice adopted here is selected in part due to the murky status of the subject category in Karitiana, evident in the previous chapter.

Despite the fact that there is not a clear-cut subject in many Karitiana clauses, it might seem that such a category can be uncovered by examining only basic sentences of

Karitiana, in the sense of Keenan (1976). Keenan discusses several characteristics of b-sentences (basic sentences) in language. He concludes that, b-sentences are declarative and affirmative, are semantically primitive¹⁴⁰, and structurally unambiguous.¹⁴¹ Also a sentence is said to be basic if it tells the audience “who is being talked about” (1976:308), that is, who the participants in a given event are. In this sense, Keenan suggests that clauses with non-pronominal arguments are in some sense more basic than those that employ pronominal arguments, since such clauses are not self-contained and are in some sense “incomplete.”

If we accept Keenan’s criteria for selecting a basic sentence in a language such as Karitiana, then we can state that b-sentences in Karitiana are structurally simple declarative clauses with non-pronominal NP’s. I would suggest, based on these criteria, that the most basic sentences in Karitiana employ the NSAP or SAP construction (cf. §12.8). The reasons for this are simple. In the Verb-focus construction, A arguments are typically omitted (cf. §12.9). In that sense, sentences employing the Verb-focus construction do not represent all the arguments in a given event and are “incomplete.” Sentences in the valence construction are not basic in the sense that not all events can be described via this construction, since semantically transitive verbs cannot occur in this construction (cf§12.2). In this sense these clauses are semantically restricted and not semantically basic. The same reasoning suggests that sentences in the copular construction, which also does not permit semantically-transitive verbs (cf §12.3), are less basic given the relevant semantic restrictions.

¹⁴⁰ According to Keenan (1976:308), a sentence *x* is judged to be semantically more basic than a sentence *y* if, and only if, the meaning of *y* depends on that of *x*.

¹⁴¹ This is not a comprehensive list of the characteristics discussed in Keenan (1976).

Aside from these motivations, there is another reason for considering declarative sentences in the NSAP/SAP construction to be more basic. Specifically, they appear to be more frequent in discourse than the other major declarative constructions, which, as I will suggest below, can be considered to represent basic voices in Karitiana. For instance, in one transcription representing two minutes of discourse among four Karitiana speakers, the following distribution of construction types in matrix clauses was found: Of a total of 57 *matrix* clauses, 13 represented the copular construction, 12 represented the Verb-focus construction, and 11 represented the valence construction. The remaining 21 sentences represented the SAP/NSAP construction, making this the most frequent construction type in this discourse segment. (Similar findings obtain for other discourse transcripts, e.g. the monologue mentioned in the first three footnotes of Chapter 14.)

If b-sentences in Karitiana do in fact occur in the SAP/NSAP construction, then a b-sentence in Karitiana, with non-pronominal NP's, looks like the following:

- 16.1 sopām na-pimbop-ø epesap kerera
 sopām NSAP-look.for-NFUT leaf green.PL
 "Sopām looked for the money."

An intransitive b-sentence looks like one of the following:

- 16.2 na-irit-ø sopām
 NSAP-come-NFUT sopām
 "Sopām came."
- 16.3 sopām ta-irit-ø
 sopām NSAP-camee-NFUT
 "Sopām came."

Even if we restrict ourselves to clauses such as 16.1-16.3, however, the notion of subject in Karitiana remains elusive. As I suggested in §15.3.3, it appears that the default word order in the language is AVO or SV. However, as we see in 16.2, basic sentences may not adhere to this pattern. Also, as we saw at length in Chapter 15, S and O arguments are

grouped in many respects, while S and A arguments are also grouped in many respects. This is true even in sentences with SAP/NSAP morphosyntax, such as the b-sentences in 16.1-16.3. If we were to define the subject according to syntactic phenomena cited in Keenan (1976), than the S/A grouping in Karitiana b-sentences could plausibly be understood to represent the subject category. If we were to define the subject according to morphological phenomena in Keenan (1976), than the S/O grouping in Karitiana b-sentences could be understood to represent the subject category.

Despite the elusiveness of the subject category in Karitiana, the heuristics in Keenan (1976) are useful in pointing to the basic sentences in Karitiana, such as 16.1-16.3. It appears that such basic sentences represent the basic depiction and construal of the origin, development, and termination of described events. For that reason, I begin the discussion of voices in Karitina with a voice-oriented analysis of the SAP/NSAP construction.

§16.2 The NSAP and SAP voices

As has been made clear at various points throughout the preceding chapters, the **na(ka)-/ta(ka)-** verb prefix set plays a prominent role in Karitiana. In §12.8, I outlined the basic distribution of the two verbal prefixes in question. I also stressed that the previous accounts of these prefixes were inadequate in their description of the functions of these morphemes, since the morphemes could not simply be understood as “declarative” (Storto 1999:163) markers or “affirmative” (Landin 1984:225) markers. Also, I suggested in that section that the relevant accounts of the distribution of the morphemes were inadequate, since **na(ka)-** does not simply occur following ergative pronouns, as Landin (1984:225) suggests, and since **ta(ka)-** does not always occur

following an absolutive person agreement prefix, as Storto (1999:163) suggests. Exceptions to Landin's generalization include clauses such as the following in which **na(ka)-** follows a non-ergative pronoun¹⁴²:

16.4 i na-oków-i i-ṅōṅō
 3 NSAP-break-FUT 3.GEN-arm
 "She's gonna break his arm."

Exceptions to Storto's generalization include clauses such as the following, in which **ta(ka)-** does not follow a person agreement prefix:

16.5 calipos ta-iri-t
 Carlinhos SAP-arrive-NFUT
 "Carlinhos arrived."

I believe that a generalization based entirely on the presence of preceding pronominal prefixation is also inadequate in that it ignores the *function* of the **na(ka)-/ta(ka)-** alternation. Such a generalization is only generally accurate because verbal agreement prefixes in Karitiana are restricted to 1st and 2nd person referents. It appears that the fact that **ta(ka)-** generally occurs after person prefixation is the result of this fact. In other words, the **na(ka)-/ta(ka)-** alternation is oriented according to the status of a clause's absolutive nominal, as either a 1st/2nd person referent (speech act participants) or a non-1st/2nd person referent (non-speech act participants).

Absolutive nominals can be understood to represent the termination points of given actions, whether they are the S's of intransitive clauses (which may also represent the origin of an action) or the O's of transitive clauses. So, one way of capturing the **na(ka)-/ta(ka)-** alternation is by stating that the choice between these forms depends on the pragmatic status of the *termination point* of a given action. This generalization relates

¹⁴² As I noted in the previous chapter, the 1st and 2nd person pronouns of Karitiana exhibit ergative-like tendencies. Landin (1984) considers these pronouns to be ergative. Example 16.4 contains a clause with the 3rd person pronoun, which does not exhibit ergative tendencies at all, and could not be considered an ergative pronoun under any analysis.

generally to parameter III in Shibatani's parameters of voice, found in the previous section.

According to the account being offered here, the distinction between **na(ka)**-inflected verbs and **ta(ka)**-inflected verbs is in many ways similar to the basic distinction evident in many languages between direct and inverse voices. This observation serves as a useful starting point for a discussion of the **na(ka)**-direct-type voice and the **ta(ka)**-inverse-type voice. Consider the following transitive clauses, similar to many found in previous chapters:

- | | | |
|------|---|--------------------------------|
| 16.6 | nelson naka-o:t-ø
Nelson NSAP-catch-NFUT
"Nelson caught the piranha." | ipsõŋ
piranha |
| 16.7 | Nelson a-taka-o:t-ø
Nelson 2S.ABS-SAP-catch-NFUT
"Nelson caught you." | |
| 16.8 | ãn na-pimbop-ø
2S NSAP-look.for-NFUT
"You looked for the money." | epesap kerera
leaf green.PL |
| 16.9 | cecilia ij-ta-pimbop-ø
Cecilia 1PL.ABS-SAP-find-NFUT
"Cecilia looked for us." | |

As we see in examples 16.6-16.9, and as we have seen throughout this study, when the O nominal of a transitive clause is a 1st or 2nd person referent, the **ta(ka)**-verb prefix is used. In other words, if the action represented by a transitive clause ends in a speech act participant, then the clause's predicate is inflected with **ta(ka)**-. If the action does not terminate in an SAP participant, e.g. if it terminates in a 3rd person pronoun, it receives **na(ka)**-prefixation.¹⁴³ Crucially, the choice between **na(ka)**- and **ta(ka)**- does not

¹⁴³ This account also provides a motivation for the absence of 3rd person verbal prefixation. Since **na(ka)**-prefixation is only used with 3rd person absolutes, 3rd person prefixation is superfluous. In other words, it is not altogether surprising that **na(ka)**-prefixation is not preceded by person marking of some sort in the verbal template, given that the **na(ka)**- is only used with 3rd person referents.

depend at all upon the status of the A nominal of the transitive clause. In that sense, the distribution of this prefix set is dissimilar to the distribution of inverse marking in many languages. As Givón suggests, (2001:155-156), inversion is typically triggered when the agent of a given clause is outranked by the patient according to some measure of topicality. Shibatani (2006:32) suggests the following in describing the inverse voice:

The event configuration SAP → 3/N is realized as an unmarked expression: a direct form in the direct/inverse system.

The event configuration 3/N → SAP is realized as a marked expression: an inverse form in the direct/inverse system.

The inversion-type **ta(ka)-** marking of Karitiana calls to mind the suggestions made by researchers such as Givón and Shibatani. However, it does not correspond completely to the inverse voice they describe, since **ta(ka)-** inflection in transitive clauses surfaces independent of the topicality of the agent. Nevertheless, we can adapt Shibatani's above characterization of the inverse voice to describe the relevant morphological variation in Karitiana *transitive* clauses:

The event configuration X → 3/N is realized as an unmarked expression: the direct form prefix **na(ka)-** is attached to the verb.

The event configuration X → SAP is realized as a marked expression: the inverse-type form **ta(ka)-** is attached to the verb.

Given that both **na(ka)-** and **ta(ka)-** prefixes occur in sentences that might be considered b-sentences as in 16.1-16.3, these two prefixes represent two of the basic voices in Karitiana. However, since only the **na(ka)-** prefix occurs in transitive clauses with two non-pronominal NP's (e.g. 16.1), this prefix seems to represent the most basic voice of Karitiana, the direct-like NSAP voice. The SAP voice appears to be a variation of this direct voice.

Another interesting factor related to this morphological choice is the apparent constituent order inversion that seems to have characterized the **ta(ka)-** construction. In

clauses with **ta(ka)**- verb prefixation, the 1st or 2nd person pronominal form takes the form of an affix occurring *before* the verb. (Though it may optionally occur post-verbally as a pronoun as well.) In clauses with **na(ka)**- verb prefixation, the 3rd person referent takes the form of an NP or the pronoun *i*, and in either case occurs *after* the verb. Given that many languages express semantic/pragmatic inversion through word-order variation, this distribution suggests another similarity between the transitive construction with **ta(ka)**- verbal inflection and many crosslinguistic inverse constructions. When we consider that the pronominal prefixes preceding **ta(ka)**- are clearly reduced forms of the free 1st or 2nd person pronouns, it seems extremely plausible that 1st or 2nd person O NP's once preceded the verb, while 3rd person O NP's followed the verb. Such word order variations are common in inverse/direct clause-type alternations (see e.g. Givón 2001:162).

Clearly, there are similarities between the NSAP/SAP voice distinction and the direct/inverse distinction found in many languages. These similarities are crucial to an understanding of Karitiana grammar, given the prevalence of these morphemes in declarative clauses.

Despite the similarities between the **na(ka)**-/**ta(ka)**- inflections and many direct/inverse inflections, there are also important differences. With respect to transitive clauses, these differences are evident in the above contrast between Shibatani's characterization of the inverse voice and my adaptation of that characterization. The differences become even greater when we consider that the **na(ka)**-/**ta(ka)**- distinction also arises in intransitive clauses, which are not expected to evince direct/inverse alternations according to previous findings on the inverse voice. As we have seen in

previous chapters, and as we see in the following examples, the choice between **na(ka)-** and **ta(ka)-** is also evident in Karitiana intransitive clauses.

16.10	na-kisep-ø	i	
	NSAP-jump-NFUT	3	
	“They/she/he jumped.”		
16.11	ij-ta-kisep-ø		(i:tʃa)
	1PL.ABS-SAP-jump-NFUT		1PL
	“We jumped.”		
16.12	na-irit-ø	i	
	NSAP-come-NFUT	3	
	“They/she/he came.”		
16.13	aj-ta-irit-ø		(a:tʃa)
	2PL.ABS-SAP-come-NFUT		2PL
	“You guys came.”		
16.14	na-anggat-ø	i	
	NSAP-stand.up-NFUT	3	
	“They/she/he stood up.”		
16.15	i-ta-anggat-ø		(i:n)
	1S.ABS-SAP-stood.up-NFUT		1S
	“I stood up.”		

As was suggested in §12.8, and as is apparent in the above examples, **ta(ka)-** is *usually* attached to intransitive verbs that have SAP referents, while **na(ka)-** is attached to verbs with non-SAP referents. Exceptions to this pattern will be discussed shortly. However, first let me present a cohesive account of the patterning of **ta(ka)-** and **na(ka)-** prefixation, given the patterning of these morphemes in transitive *and* intransitive clauses. I believe the following simple account generally holds true for the relevant data:

When a described event terminates within the “scene” of discourse, that is, in an SAP, it is prefixed with **ta(ka)-**.

When a described event terminates outside the “scene” of discourse, that is, in a non-SAP, it is prefixed with **na(ka)-**.

Here we are accepting a broad definition of the termination of an action that involves not just transitive events, but intransitive events also. In a transitive event, the action

terminates in the O referent, while in an intransitive event the action necessarily terminates in the S referent.

The above characterization of the direct-like SAP voice and the inverse-like NSAP voice suggests that these voices are concerned with the termination points of actions, specifically with the pragmatic status of the termination points of actions. These voices relate to parameter III on Shibatani's list of voice parameters:

III. The termination of an action

Does the action develop further than its normal course, extend beyond the immediate participants of the event, and terminate in an additional entity?

In the case of Karitiana, I am claiming that the **na(ka)-/ta(ka)-** distinction is concerned with whether an action develops and "extends beyond the immediate participants" of the speech act, rather than "beyond the immediate participants of the event."¹⁴⁴ Given that the distribution of **na(ka)-** and **ta(ka)-** is clearly relatable to parameter III, it seems appropriate to consider these prefixes morphological instantiations of voice categories.

The suggestions being made here can be represented schematically, if we employ schemas of the sort evident in cognitive grammar. As an example of the way in which such schemas can be used to depict different voice categories, let me briefly examine how Langacker (2002:216-217) employs schemas to demonstrate the cognitive basis of the passive voice in English. First, consider clauses 16.16 and 16.17, which can be used to represent the same situation:

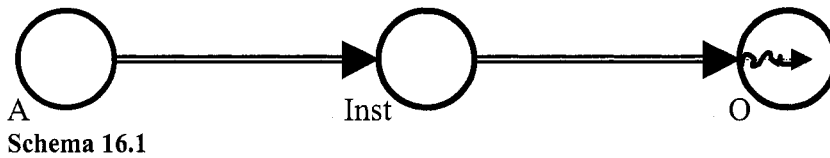
16.16 Floyd broke the glass with the hammer.

16.17 The glass broke.

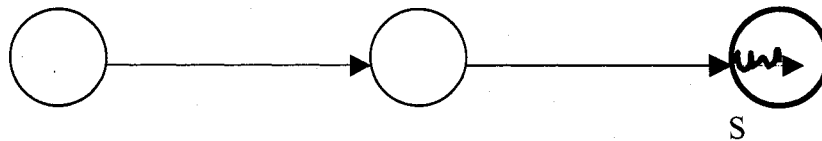
Clause 16.16 represents a particular construal of a given event, in which Floyd is an active profiled participant in the event schema (referred to as the trajector of the schema

¹⁴⁴ This second state of affairs describes applicative constructions in many languages.

in CG terminology). Schema 1 below is a very basic representation of the transitive event in clause 16.16:

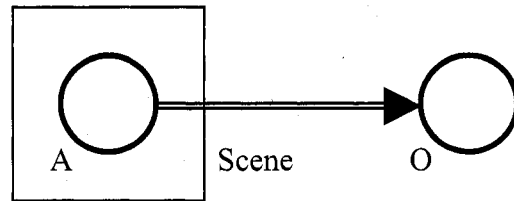


In the case of clause 16.17, however, the profiled head of the action chain in 16.16 is omitted altogether. This clause profiles the tail of an action chain in the given event, as evident in Schema 2, in which the A and the instrument are not profiled as they are in Schema 1:



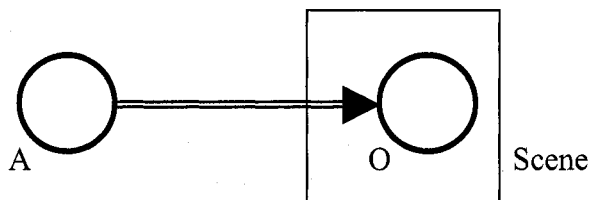
Different profiling choices, such as those evident in Schemas 16.1 and 16.2, surface when different voices are employed, according to Langacker. In a passive clause such as “The glass was broken by Floyd,” the profiled element is not the head of the action chain as it is in Schema 16.1. Instead the profiled element is the tail of the action chain, much as it is in Schema 16.2, which represents a clause in which the broken element is the S nominal.

Returning now to Karitiana voices, let us consider how we might represent the direct-like NSAP voice and the inverse-like SAP voice schematically. In Schema 16.3, I represent the profiling of an event characteristic of a transitive verb inflected with **na(ka)-**:



Schema 16.3 A transitive clause with **na(ka)**- verb prefixation.

As we see in this example, the A nominal and the O nominal are both profiled, with the A serving as the head of the action chain. However, the fact that the action terminates outside what I am loosely referring to as the discourse “scene,” i.e. the O is a non-SAP, is evident by the fact that the arrow representing the action begins within the “scene” (the box) and ends outside the box. Schema 16.3 represents, in a very basic fashion, a clause such as 16.8 above.¹⁴⁵



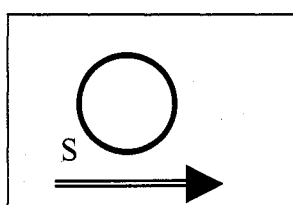
Schema 16.4 A transitive clause with **ta(ka)**- verb prefixation.

In Schema 16.4 we see a different situation depicted. In this schema, the A nominal and the O nominal are again both profiled, with the A again serving as the head of the action chain. However, this case differs from that in Schema 16.3 in that the arrow representing the action ends within the “discourse scene,” again represented by a box. Schema 16.4 represents clauses such as 16.9 above.¹⁴⁶

¹⁴⁵ Of course clauses with the **na(ka)**- morphology may represent actions that also *begin* with non-SAP participants. Such uses are less frequent, but are still captured by the generalization that **na(ka)**- inflected verbs terminate in non-SAP participants.

¹⁴⁶ Clauses with **ta(ka)**- morphology may represent actions that also begin with SAP participants. Since 16.9 is an example with a non-SAP A, however, Schema 16.4 has been represented with an action beginning outside the discourse scene. The important point, however, is that the arrow representing the action ends within the scope of the box representing the speech act/discourse scene.

Schemas 16.3 and 16.4 are generally consistent with all of the transitive clauses found in this study that exhibit **na(ka)-/ta(ka)-** morphology. As we have seen, though, this morphology also occurs in intransitive clauses. Nevertheless, even intransitive clauses with this morphology can be characterized in a similar way, in which the termination of an action chain is represented as occurring inside or outside the scope of the discourse participants. Schema 16.5 represents clauses with intransitive **ta(ka)-** inflected verbs, e.g. clauses 16.11, 16.13, and 16.15 above:

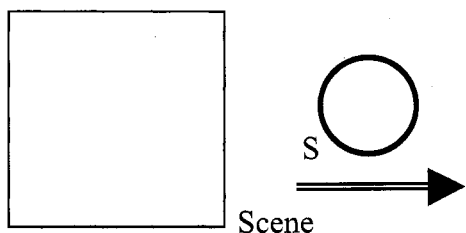


Scene

Schema 16.5 An intransitive clause with **ta(ka)-** verb prefixation.

As we see in this schema, intransitive clauses with SAP S's can be understood as describing events that terminate within the discourse scene, even though these events do not involve the transfer of energy from one participant to another. Since there is only one argument associated with Karitiana intransitive verbs, if this argument is a speech act participant the action predicated of the argument can be said to terminate within the speech act scene.

Intransitive clauses with non-SAP S's can be understood as describing events that terminate outside the discourse scene, however. This is evident in Schema 16.6, which represents clauses such as 16.10, 16.12, and 16.14:



Scene

Schema 16.6 An intransitive clause with **na(ka)-** verb prefixation.

As in Schema 16.5, the action represented by the arrow does not depict an energy transfer from one participant to another. Instead, the arrow refers to an action performed by the solitary argument, which is not a discourse participant and so falls outside the discourse scene.

The cognitive patterns evident in schemas 16.3-16.6 are consistent with the Karitiana data. While simple, the schemas reflect important cognitive patterns that surface in the language. They reflect different voices in Karitiana that are concerned with the termination points of the event described in a particular clause. Specifically the voices are concerned with the SAP-status of S and O nominals, which represent the termination points of actions in intransitive and transitive clauses, respectively. Given that these voices are concerned with the distinction between referents that are high on the participant hierarchy (1st and 2nd person) or lower on the hierarchy (all non-SAP referents), they are similar to the direct and inverse voices found in many languages. However, they differ in important respects as described above.

It is worth noting that other Amazonian languages display interesting morphosyntactic phenomena that are oriented according to the speech-act status of a given referent. For instance, in Tupinambá, a Tupí-Gurani language spoken in coastal Brazil in the 16th and 17th centuries, the person pronouns were sensitive to the SAP/non-SAP distinction. Rodrigues (1990:402) states the following:

In conclusion, in Tupinambá the verbal person marker *o-* means that 3rd person is in focus and that there is no contrast between the speaker and the hearer; that is to say, it means {[you, I, and he]^{+f}} as well as {he^{+f}}. Analogously, *ya-* means that 3rd person is out of focus and that there is no contrast between the speaker and the hearer; it means {[you and I]^{+f}} and {he^{-f}}. In both cases, then, a single form indicates both 'you and I (and he)' and 'neither you nor I (but he)'.

While not a voice phenomena, the person pronoun system described by Rodrigues is similar to the Karitiana data in that it reflects a clear distinction between SAP and non-SAP participants, as we see in the above account of the Karitiana SAP and NSAP voices.

Seki (1990:384) describes the SAP/non-SAP distinction that surfaces in Kamaiurá, a Tupí-Guaraní language. She notes that:

There is a basic opposition in Kamaiurá involving 1st and 2nd person versus 3rd person, or, in terms of Beneveniste 1976, involving [+person] vs. [-person] categories: whenever O is [-person] (i.e. 3rd), A is marked and whenever O is [+person] (i.e. 1st or 2nd), O is marked.

The Kamaiurá person agreement system does distinguish between first and second person referents. However, in certain cases as described above, Kamaiurá grammar groups 1st and 2nd person referents as SAP referents, at the expense of non-SAP 3rd person referents. Again, this SAP/non-SAP distinction is reminiscent of the Karitiana SAP and NSAP voices.

The SAP/non-SAP distinction surfaces in the grammar of non-Tupí Amazonian languages as well, for instance in Carib languages. As Franchetto notes (1990:420-421):

In Carib languages no special verbal morphology is used when the person hierarchy and the agentivity hierarchy coincide. Instead, the Carib system can be generally described as follows: when speech act participants, i.e. 1st and 2nd persons, are in the A role the prefixes that appear on transitive verbs vary with the person of the A in the same way that prefixes on intransitive verbs vary with the person of the S...When speech act participants (less the first person exclusive category) are in the P role, special transitive prefixes (prefix set 2) vary according to the person of the P.

The importance of the SAP/non-SAP distinction in inverse-type phenomena in other genetically and areally affiliated languages is consistent with the account I am suggesting for the **na(ka)-** and **ta(ka)-** prefixes.

As was mentioned above, there are superficial exceptions to this account (and to previous accounts) of clauses with **ta(ka)-** and **na(ka)-** inflected verbs. However, upon closer inspection I believe that these exceptions are generally consistent with an account based on the discourse scene. The exceptions to the account occur only in intransitive

clauses. Recall that, in intransitive clauses with **ta(ka)-** or **na(ka)-** verb prefixation, the prefix chosen is **ta(ka)-** when the S is an SAP, as we saw in 16.11, 16.13, and 16.15. There are no exceptions to this pattern in my data. In intransitive clauses with **ta(ka)-** or **na(ka)-** verb prefixation, the prefix chosen is **na(ka)-** when the S is a non-SAP, as we saw in 16.10, 16.12, and 16.14. There *are* exceptions to this pattern in my data, however. Specifically, **ta(ka)-** prefixation can take the place of **na(ka)-** prefixation in such clauses, though **na(ka)-** prefixation is the default choice. Exceptional cases such as 16.18-16.20, which correspond to 16.10, 16.12, and 16.14, respectively, are nevertheless grammatical:

16.18	ta-kisep- \emptyset	i
	SAP-jump-NFUT 3	
	“They/she/he jumped.”	
16.19	ta-irit- \emptyset	i
	SAP-come-NFUT	3
	“They/she/he came.”	
16.20	ta-angat- \emptyset	i
	SAP-stand.up-NFUT	3
	“They/she/he stood up.”	

It should be noted that these cases are also exceptions to the accounts of Landin and Storto, who suggest that **ta(ka)-** prefixation occurs following overt pronominal prefixation. An exceptional clause such as these was first provided in Everett (1994).

Upon closer inspection of the semantic correlates of the unusual prefixation in clauses 16.18-16.20, we find that such prefixation is not actually inconsistent with the account suggested here. The basic reason for this is as follows: when **ta(ka)-** prefixation is used in a clause with a 3rd person S, the result is that the described event is conveyed as being closer to the speech act participants and the discourse scene. In other words, such usages take advantage of the fact that **ta(ka)-** is usually employed when an event

terminates in a speech act participant, so that an event that does not terminate in an SAP can be construed as being more relevant to the SAP's and the discourse scene.

There are two pieces of evidence supporting my account of clauses such as 16.18-16.20. Both of these pieces relate to the interpretation of such clauses by Karitiana speakers. In general, the interpretation of such clauses by Karitiana speakers suggest that **ta(ka)-** prefixation can be used when an S is a 3rd person referent, but only if the conveyed event somehow falls within the scope of the discourse scene. Perhaps the strongest piece of evidence is that, when presented with clauses 16.18-16.20 and asked to differentiate these clauses from their counterparts in 16.10-16.14, a Karitiana speaker suggested that clauses 16.18-16.20 imply that the speaker *saw* or *is seeing* a given action take place. For this to be the case, of course, the given event must fall within the physical domain of the speaker, and so is more relevant to the SAP's and the discourse scene.

The second piece of evidence, supporting the suggestion that **ta(ka)-** inflected verbs fall within the scope of the discourse scene, relates to tense. While intransitive verbs with **ta(ka)-** inflection and **na(ka)-** inflection can generally be used in the future and nonfuture tenses (as described in §12.4), it appears that the use of **ta(ka)-** in clauses such as 16.18-16.20 alters somewhat the interpretation of the perceived time of an event. Specifically, a Karitiana person is more likely to construe clauses 16.18-16.20 as representing ongoing events, while clauses 16.10, 16.12, and 16.14 are more likely to be interpreted as having occurred in the past. These interpretations are not necessary, since **na(ka)-** and **ta(ka)-** are not tense markers. Nevertheless, such interpretations suggest that, when an intransitive verb with a third person S is inflected with **ta(ka)-** instead of **na(ka)-**, it is more likely to be perceived as an ongoing event.

Based on the information in the preceding paragraphs, it is clear that clauses such as 16.18-16.20 are likely to be construed by Karitiana hearers as representing events that are ongoing and/or that can be seen by the speaker. It seems logical to suggest that an event that 1) can be seen by the speaker and which 2) is occurring at the time of an utterance, somehow falls within the scope of the SAP's or discourse scene. Events that have occurred in the past and which are not visible to the SAP's are in some sense less relevant to the SAP's and the discourse scene.

The interpretations (by Karitiana speakers) of exceptional clauses such as 16.18-16.20 are not always consistent. Nevertheless, it is clear that the semantic correlates of such clauses differ in subtle but important ways, when contrasted with their counterparts' in 16.10, 16.12, and 16.14. Based on data such as these, it seems reasonable to conclude that, while **na(ka)-** prefixation is usually used in clauses with 3rd person referents, **ta(ka)-** prefixation can be employed instead to imply that the conveyed event somehow falls within the physical or temporal scope of the SAP's or discourse scene. Such an interpretation is consistent with the data, and further buttresses this account of the SAP and NSAP voices.

In conclusion, we have seen that clauses with **ta(ka)-** verbal inflection are used when an event terminates in an SAP or, more generally, the discourse scene. Clauses with **na(ka)-** verbal inflection are used when an event terminates in a non-SAP (3rd person) or, more generally, outside the discourse scene. Clauses with **ta(ka)-** are therefore said to occur in the "SAP" voice, while clauses with **na(ka)-** are said to occur in the "N(on)SAP" voice. Both voices are morphologically similar and functionally similar,

given that both are sensitive to the presence of SAP's at a certain point in a given event. In other words, both voices could be said to be SAP-oriented or scene-oriented.

§16.3 The passive-like Verb-focus voice

In section §12.9, I discussed the morphosyntactic correlates of the Verb-focus construction, in which **piri-** or one of its variants is prefixed to a clause-initial verb. In this section I outline in greater detail the semantic and pragmatic correlates of the construction, which I am categorizing as a voice due to its passive-like features and due to the fact that it relates to Parameter I in Shibatani's above characterization of voice (see §16.1). In the Verb-focus voice, the point of origin of a transitive action is de-emphasized, and is demoted from argument position. This agent demotion is characteristic of the passive voice in many languages.¹⁴⁷ Nevertheless, the primary function of this voice is to emphasize the predicate of a given clause.

In English, clauses are said to have predicate-focus in unmarked contexts. As Lambrecht (1994:304) suggests:

Sentences whose verb phrases carry an accent have predicate-focus structure. The predicate-focus structure is the unmarked focus structure and allows for alternative focus readings. Such alternative readings are contextually determined.

The claim I am making is that the predicate-focus structures in Karitiana are signified via morphosyntactic means, rather than prosodic means as in English. (As we saw briefly in Chapter 7, prosody plays a fairly limited role in distinguishing Karitiana clause types.)

There are several principal pieces of evidence suggesting that **piri-** inflected verbs receive special focus. The first is that such verbs are required to occur clause-initially. As Storto (1999,2003) suggests, clause-initial elements are focused in Karitiana. Her claim

¹⁴⁷ In fact the most basic function of the passive voice crosslinguistically appears to be agent demotion (cf. Shibatani 1985).

that the clause-initial position (Spec, CP) bears focus is supported by the fact that question words occur clause-initially, answers to content questions occur clause-initially, and objects occur clause-initially when in the object-focus construction. These claims will not be reintroduced here, though I should note that my data are consistent with these claims, made concisely in Storto (2003:418-421).

Verbs with **piri-** prefixation always occur clause-initially, as we have seen throughout this study and as we see in the following examples:

- | | | |
|-------|---|--|
| 16.21 | i-pi-pitʔi-n
1S.ABS-VB.FOC-eat-NFUT
"I ate." | (i:n)
1S |
| 16.22 | ij-pir-oʔot-i:n
1PL.ABS-VB.FOC-play-NFUT
"We played." | (i:tʃa)
1PL |
| 16.23 | pir-atot-i:n
VB.FOC-take-NFUT | pieji-pa
write-NOM
"They/she/he took the letter." or "The letter was taken." |

Interestingly, clause-initial verbs with **piri-** prefixation can also occur without pronominal agreement, as we see in the following variants of 16.21 and 16.22:

- | | | |
|-------|--|--------------|
| 16.24 | pi-pitʔi-n
VB.FOC-eat-NFUT
"I ate." | i:n
1S |
| 16.25 | pir-oʔot-i:n
VB.FOC-play-NFUT
"We played." | i:tʃa
1PL |

The fact that clauses with **piri-** prefixed verbs occur clause-initially and without pronominal prefixation supports the notion that such predicates are focus-bearing. This notion is further supported by verb-initial clauses that occur without any nominal referent:

- 16.26 pir-atot-ĩn
 VB.FOC-take-NFUT
 "It was taken.

In cases such as 16.26, the O of the semantically transitive verb is understood to be a 3rd person referent. When semantically intransitive verbs occur in the Verb-focus voice, without a nominal referent, the S is understood to be a 3rd person referent.

The second piece of evidence supporting the notion that such verbs are focused is that, as Landin (1984:242) first suggested, verbs with **piri-** prefixation are used in "polar responses," that is in responses to yes or no questions. The following question-answer pairs are further evidence of this fact:

- | | | | | | |
|-------|----|---------------------------------|---------------|----------|----|
| 16.27 | a. | a-oti | ãn-õ | hĩ | |
| | | 2S.ABS-bathe | 2S-Q.NOM | Q | |
| | | "Did you bathe?" | | | |
| | b. | i-pir-oti-dn | | | |
| | | 1S.ABS-VB.FOC-bathe-NFUT | | | |
| | | "I bathed." | | | |
| 16.28 | a. | ãn | i-okit boroti | ãn-õ | hĩ |
| | | 2S | IRR-kill paca | 2S-Q.NOM | Q |
| | | "Did you kill the paca?" | | | |
| | b. | i-pir-okit-ĩn | | | |
| | | 1S.ABS-VB.FOC-kill-NFUT | | | |
| | | "I killed (it)." ¹⁴⁸ | | | |

In general, an O such as "boroti" in 16.28b is treated in the same way as the S of a semantically intransitive verb in the Verb-focus construction. As was noted in sections §14.3 and §15.3.3, in the Verb-focus construction S and O referents occur post-verbally, while A referents are generally absent. As was noted in the preceding chapter, S and O referents in this construction are also grouped via the absolutive set of verbal prefixes, in the case of 1st and 2nd person S's and O's.

¹⁴⁸ The response form **ihĩ**, "yes" could also be used.

As the gloss of a clause such as 16.28b suggests, the participants in polar responses are less focused than the verbs. This is not surprising given that the arguments are mentioned in the question, and are therefore understood. The questioned element in such polar status relates to an event, that is whether or not a given event occurred. Responses naturally emphasize the predicate. Therefore, **piri-** prefixation and the clause-initial placement of the verb are employed, in order to emphasize the predicate, rather than the participants.

As was noted previously, e.g. in §12.9, clauses with **piri-** prefixed verbs involve agent demotion. More specifically, the agent of a **piri-** prefixed verb that is classified as transitive according to valence morphology (i.e. cannot be prefixed with **i-** in a declarative clause) is omitted or occurs with oblique marking in some cases. Typically, only the S or the O of **piri-** prefixed verbs are present in clauses with such morphology.

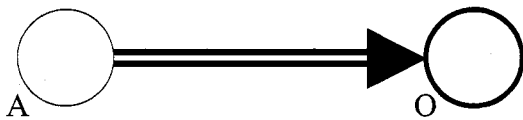
The agent demotion associated with such clauses is the third principal piece of evidence supporting the suggestion that they are used to emphasize the predicate. It is well established that, crosslinguistically, O's are more closely tied to their verbs than are A's.¹⁴⁹ It is perhaps not surprising, then, that in a Karitiana transitive construction with predicate-focus morphology the O is permitted but the A, being less predicate-like and less closely tied to the verb, is de-focused. In other words, the concomitant passive-like agent demotion associated with such clauses appears to be a natural by-product of predicate focus. As we will see shortly, Karitiana also exhibits passive morphology,

¹⁴⁹ This is evident in many typological findings, for instance the fact that in both the world's two major word orders—SVO and SOV, the O and V are adjacent. Of course, it has long been recognized that VP's are either V's or V+O constructs. This does not imply a VP grouping such as that found in X-bar analyses, however. As Van Valin (2005:81) notes, "VPs, to the extent that they exist in languages, are the grammaticalization of focus structure; they are not primitive categories in clause structure."

which is used to de-focus the agent of a transitive clause without simultaneously emphasizing the predicate in the manner that clauses with **piri-** morphology do.

Since the clausal arguments found in discourse tend to be egophoric (Dahl 2002), the new information found in a clause is usually the event represented by the verb. For this reason, clauses in English with predicate-focus are unmarked, as suggested by Lambrecht (1994:296). I should stress, then, that I am not suggesting that the events in other Karitiana clause types, which often represent new information as well, are not focused upon to some degree. The suggestion being made here is that clauses with **piri-** verb prefixation are employed when *greater* emphasis is placed on the verb, when contrasted to the emphasis naturally placed on the verb in the other declarative clause types of Karitiana.

Based on the above account of clauses with **piri-** verb prefixation, we can employ schemas to represent the basic patterns associated with the Verb-focus construction. For instance, consider the following schema that could be used to generally represent clauses such as 16.23. (The gloss of which is, “The letter was taken.”) Note that the agentive nominal is not focused upon in such a transitive clause. However, the verb is focused upon, and the object is not demoted/de-emphasized like the agentive nominal is:

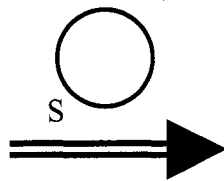


Schema 16.7 A transitive clause with **piri-** verb prefixation.

Of course, such a schema says nothing about the discourse correlates associated with the given construction. It simply reflects the most basic conceptual correlate associated with the transitive **piri-** construction, i.e. the emphasis that is placed on the

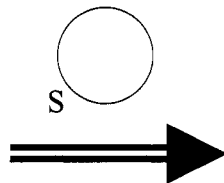
event, as evidenced by the factors mentioned above. The agent of such clauses, which unlike the O is not part of the predicate, is de-focused to the point of syntactic demotion or omission. The object is present, though not focused upon in the same manner as the verb. Karitiana objects are focused upon through a different construction altogether, which was described in §14.2.2.4.

The basic conceptual pattern associated with intransitive clauses containing a **piri-** inflected verb can also be described via a schema. The following schema depicts, in a very basic manner, intransitive clauses such as that represented in 16.25 above:



Schema 16.8 An intransitive clause with **piri-** verb prefixation and an overt S.

Not all intransitive clauses with with **piri-** verb prefixation can be represented in this manner, since in some cases, e.g. 16.23 above, the S in such clauses is omitted, leaving only the highlighted verb. In such cases, the following schema better represents the state of affairs:



Schema 16.9 An intransitive clause with **piri-** verb prefixation and an omitted S.

Schemas such as 16.8 and 16.9, as well as all of the others presented in this chapter, obviously do not represent the specific semantics associated with the represented clauses. Instead, they generally represent the patterns associated with the given construction types evident in the relevant clause types. For instance, schema 16.8 is said to represent clause

16.25 above. However, the schema obviously does not represent the concept of “playing,” or of a plural S argument. Instead, it simply represents an S argument that performs a given action, without transferring energy to another argument. That action is then emphasized, as suggested by the increased size of the arrow in the schema.

The conceptual patterns exemplified by the Verb-focus construction entail the demotion of the A nominal, as is evident in Schema 16.7. As was mentioned above, this agent-demotion yields a passive-type interpretation of the construction. However, this passivization is essentially epiphenomenal, resulting from a predicate orientation in such clauses. (After all, the chief characteristics of this construction, e.g. strict clause-initial verb placement and use in polar responses, relate primarily to verb emphasis.) As we will see in the following section, however, Karitiana also employs passive morphology that is used specifically for the purpose of demoting or defocusing an agentive nominal. In passive clauses with such morphology, agent demotion is not epiphenomenal as it is in the Verb-focus construction.

§16.4 The passive voice

Before discussing the passive voice in Karitiana, I should be clear about what exactly I am referring to. Crystal suggests the following definition of the passive voice:

A term used in the grammatical analysis of voice, referring to a sentence, clause or verb form where the grammatical subject is typically the recipient or goal of the action denoted by the verb, (1990:222)

This definition implies that the purpose of the passive voice is related to the promotion of a recipient or goal NP to the subject position. The idea that the basic motivation for the passive voice is promotion has been accepted by many linguists, and is central to the theory of Relational Grammar (cf. Perlmutter 1983). However, Shibatani provides convincing dialectic that, crosslinguistically, passives generally serve primarily to

defocus agents (1985:830), rather than to promote O-type nominals. This conclusion is based in part on the well-established fact that passive clauses generally do not express agents overtly. This is especially true in Amazonian languages. Derbyshire and Pullum (1986:19) note that one of the areal features of Amazonian languages is that they typically have “no construction identifiable as an agentive passive.” This generalization holds in Karitiana. As we will see momentarily, agents are not present in Karitiana passive clauses, which serve primarily to defocus agentive referents.

The passive voice clearly relates to Parameter I, in the list of voice-related parameters presented in §16.1 above. That parameter relates in turn to the following question, taken from Shibatani (2006:25):

Does the action originate with an agent extremely low in discourse relevance, or at least lower relative to the patient?

Yes → Passive

No → Active

The third clause in example 16.29 below, uttered by a Karitiana, represents a situation in which the discourse relevance of the agent in the represented event is so low that it is unmentioned. The clause could be uttered as well if the agent is unknown. The topic in the preceding two clauses is maintained, and the agent in the third clause is omitted. (This interpretation is consistent with the suggestions of the Karitiana speaker.) In the third clause in 16.29, the topical patientive nominal occurs pre-verbally, and the normally transitive verb is inflected with the **a-** passivizing morpheme:

16.29	na-irit-ø NSAP-come-NFUT “Sopām came.”	sopām Sopām
	piri-tat-ĩn VB.FOC-go-NFUT “(Then) she went to the jungle.”	gopi-p jungle-ALL

i	na-aka-t	i-a-okot-ø
3	NSAP-COP-NFUT	INT-PASS-bite-COP.AGR
“(Then) she was bitten.”		

Similarly, the following two clauses would be uttered in a situation in which one was describing him or herself, and in which other participants were non-topical:

16.30	[i-pitāṅā	sogŋ]	i-ta-a-kīno-t	īn
	1S.ABS-steal	because	1S.ABS-SAP-PASS-close/arrest-NFUT	1S
“Because I stole, I was arrested.”				
16.31	[i-pitāṅā	sogŋ]	i-a-okēŋ-ø	i-pi
	1S-steal	because	INT-PASS-cut-NFUT	1S.GEN-hand
“Because I stole, my hand was cut.”				

The agentive referents are omitted in the above examples. When passivizing morphology is present, agents are not typically permissible, even as demoted obliques. (See 15.108 for an exception to this pattern, however.) The deletion of agents in passive clauses is supported by the ungrammaticality of 16.32, a variant of the third clause in 16.29:

16.32	*i	na-aka-t	i-a-okot-ø	kīmbi edna-ti
	3	NSAP-COP-NFUT	INT-PASS-bite-COP.AGR	dog-OBL
“She was bitten by the dog.”				

Examples 16.29-16.31 also suggest that the passive *a-* prefix allows an undergoer-type nominal to occur as the S of an intransitive clause. In general, the *a-* prefix appears to reduce the valence of transitive verbs from two arguments to one. This conclusion is supported by the fact that semantically transitive verbs take the *i-* intransitive prefix if they are prefixed with *a-* and occur in the basic valence construction. Consider the following intransitive clauses:

16.33	ep o:sid	i-a-hīřā-t
	tree flower	INT-PASS-smell-NFUT
“The flower was smelled.”		
16.34	bola	i-a-pidnā-t
	ball	INT-PASS-kick-NFUT
“The ball was kicked.”		

Clauses 16.33 and 16.34 contain verbs that are classified as semantically transitive by Karitiana grammar. However, in these particular clauses the verbs co-occur with one argument only, and are prefixed with the intransitive marker.

The intransitivity of passivized verbs is also evidenced by the fact that passivized verbs often co-occur with the copula, as in 16.29 above. (As was noted in §12.3, the copula can only be used as a pre-verbal auxiliary when preceding semantically intransitive verbs.)

Semantically ditransitive verbs are also passivized via the *a-* prefix. In clauses with passivized semantically-ditransitive verbs, one argument, typically the recipient type argument, becomes the S nominal. Another argument may be referred to as an oblique. This is evident in examples such as 15.126c, 15.127b, 15.127c, and 15.128c in the previous chapter, as well as 16.35a and 16.36a below. In 16.35b and 16.36b, the active counterparts of the respective passive clauses are presented:

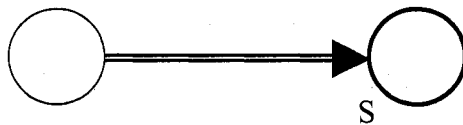
- 16.35 a. *sopām* *i-a-hit-∅* *tiʔi-ti*
 sopām INT-PASS-give-NFUT food-OBL
 “Sopām was given the food.”
- b. *i* *naka-hit-∅* *tiʔi-ti* *sopām*
 3 NSAP-give-NFUT food-OBL *sopām*
 “She gave the food to Sopām.”
- 16.36 a. *sopām na-aka-t* *i-a-hit-∅* *epesap kerer-era-ti*
 sopām SAP-COP-NFUT INT-PASS-give leaf green-PL-OBL
 “Sopām was given the money.”
- b. *i* *naka-hit-∅* *epesap kerer-era-ti* *sopām*
 3 NSAP-give-NFUT leaf green-PL-OBL *sopām*
 “She gave the money to Sopām.”

The syntactic intransitivity of passivized verbs is further supported by the fact that the passive prefix *a-* may be attached to *piri-* inflected verbs, which generally have only one argument. As was noted in the previous section, *piri-* inflected verbs are also

passive-like in that they do not allow the presence of an overt agent. However, the primary function of **piri-** prefixation appears to be verb emphasis, rather than agent defocusing. It is interesting to note, then, that **piri-** prefixation and **a-** prefixation may occur on the same verb stem. This supports the suggestion that the **piri-** prefixation does not serve the same function as the passivizing morpheme. Consider the following examples of this dual prefixation:

- | | | |
|-------|---|--|
| 16.37 | pir-a-hi:t-ĩn
VB.FOC-PASS-give-NFUT
“The money was given.” | epesap ker-era-ti
leaf green-PL-OBL |
| 16.38 | pir-a-miŋgidn-ĩn
VB.FOC-PASS-swallow-NFUT
“The medicine was swallowed.” | kinda oti ʔap
thing pain medicine |
| 16.39 | i-pir-a-pimbik-ĩn
1S.ABS-VB.FOC-PASS-push-NFUT
“I was pushed.” | ĩn
1SG.ERG |

Based on the evidence so far considered, the passive voice in Karitiana is used to defocus the agentive nominal of a semantically transitive or ditransitive action. This function of the passive voice is reflected in the following cognitive schema, representing a clause with a semantically transitive verb that is inflected with **a-** prefixation:



Schema 16.10 A clause with an **a-** prefix attached to a semantically transitive stem.

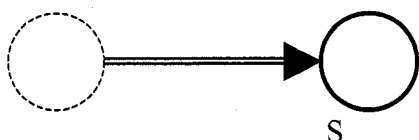
In all of the clauses considered so far in the discussion of Karitiana passives, the passivized stems represent semantically multivalent actions, rather than semantically intransitive actions. That is, the relevant verbs cannot be prefixed with **i-** in the valence construction (see §12.2). Interestingly, however, there is also a passive morpheme that

can be prefixed to verbs that are classified as semantically intransitive by Karitiana grammar, i.e. verbs that *can* occur with *i-* prefixation in the valence construction. As was discussed in Chapter 12, most such verbs entail one participant only. However, some of the verbs that take *i-* prefixation can also involve two participants in some cases. This is true in the case of e.g. **soʔot**, “see,” **opiso**, “hear,” and **pitĩŋ**, “want.” Note that, while each of these verbs can possibly co-occur with two participants, each verb also does not entail a prototypical agent. Interestingly such intransitive verbs with the *potential* for two referents may be prefixed by a passive **pĩn-** morpheme. When this prefix is attached to a verb that is classified as semantically intransitive, the S of the resultant clause is understood to be an undergoer-type nominal. This is evident in the following three clause pairs:

- | | | | | |
|-------|----|------|--------------------|---------------------------|
| 16.40 | a. | ĩtʃa | i-soʔot-ø | |
| | | 1PL | INT-see-NFUT | |
| | | | “We saw.” | |
| | b. | i | na-aka-t | i-pĩn-soʔot-ø |
| | | 3 | NSAP-COP-NFUT | INT-PASS.INT-see-COP.AGR |
| | | | “S/he was seen.” | |
| 16.41 | a. | ĩtʃa | i-opiso-t | |
| | | 1PL | INT-hear-NFUT | |
| | | | “We heard.” | |
| | b. | i | na-aka-t | i-pĩn-opiso-t |
| | | 3 | NSAP-COP-NFUT | INT-PASS.INT-hear-COP.AGR |
| | | | “S/he was heard.” | |
| 16.42 | a. | ĩtʃa | i-pitĩŋ-ø | |
| | | 1PL | INT-want-NFUT | |
| | | | “We want.” | |
| | b. | i | na-aka-t | i-pĩn-pitĩŋ-ø |
| | | 3 | NSAP-COP-NFUT | INT-PASS.INT-want-COP.AGR |
| | | | “S/he was wanted.” | |

In the first clause of each of the above pairs, an intransitive verb is used, as reflected by the *i-* prefix attached to the verb stem. Note that the S of each these clauses is an

experiencer and does not represent a prototypical undergoer. In the second clause of each of the above pairs, the same intransitive verbs are used, only with **pĩn-** prefixation and the copular auxiliary. However, the S of these clauses represents the undergoer of a given action. The actor-like performer of the actions in question is omitted. The following schema represents the basic conceptual orientation associated with **pĩn-** prefixation:



Schema 16.11 An intransitive clause with **pĩn-** verb prefixation.

As in the case of the **a-** passive morpheme, the **pĩn-** passive morpheme functions to defocus or de-emphasize the origin of an action. Put another way, both of these morphemes are used when the agent or actor-like nominal of a given action is “extremely low in discourse relevance.” (Shibatani 2006:25) However, there is an important conceptual distinction between these two sorts of passives, which is evident when Schemas 16.10 and 16.11 are contrasted. Specifically, the origin of the action is construed differently. In the case of an **a-** passivized verb, the agent that is profiled in the counterpart active clause, represented by the solid circle on the left in Schema 16.10, is defocused. In the case of a **pĩn-** passivized verb, the defocused origin of the action does not represent a prototypically agentive nominal, and in the active counterpart the origin of the action is not treated as an agent. This is evidenced by the fact that such verbs are not allowed to occur with two core arguments, like prototypical semantically transitive actions. The less agentive, defocused origin of such actions is represented in Schema 16.11 by the dashed circle on the left.

Before discussing the antipassive voice in Karitiana, one final observation about the passive prefixes should be made. Both of the passive prefixes discussed in this section can be employed to create passive-type adjectives, which refer to someone or something that has undergone a particular action. Some of the adjectives created in this way are found in Table 16.1.

Pass-Transitive Verb	Gloss	Pass-Intransitive Verb	Gloss
a-atik	“thrown”	pĩn-kiwiti	“believed in”
a-okot	“bitten”	pĩn-pitĩj	“wanted”
a-ʔawpijt	“left”	pĩn-pasa:dna	“loved”

Table 16.1 Passive-type adjectives.

§16.5 The antipassive voice

While the passive voice is generally concerned with the origin of an action, specifically whether a given action originates in a referent with low discourse relevance, the antipassive voice is generally concerned with the development of an action. That is, it relates to parameter II in the list of voice parameters found in Shibatani (2006) and §16.1 above. Shibatani (2006:18) provides the following encapsulation of the active/antipassive distinction evident in some ergative languages:

Does the action develop to its full extent and achieve its intended effect on a patient?

Yes → Ergative(Active)

No → Antipassive

In other words, if the effect on a potential patient is not conveyed in a given clause, or if that effect is de-emphasized, then the clause may occur in the antipassive voice.

It is interesting to note that even though Karitiana morphology is generally oriented according to the absolutive/ergative grouping of nominals, the language does not exhibit antipassive morphology. In this sense the language differs from some well-known ergative languages such as Dyrbal and Yidiny. As we saw in the previous section, passive morphology plays a fairly central role in Karitiana grammar. Given the well-

established similarities between the passive morphology and ergative morphology, it is interesting that the passive/ergative distinction plays a more prominent role than the antipassive/ergative distinction in Karitiana.

This is not to suggest that there is not an antipassive voice in Karitiana, however. If we define the antipassive voice according to the functional parameters suggested by Shibatani, then we find that there is in fact an antipassive voice in Karitiana. That is, if we characterize the antipassive as the voice that is used in situations in which an action's effects on a patient are reduced or de-focused, then Karitiana does exhibit antipassivization. However, the antipassive voice is not instantiated through morphology, but through the demotion of an absolutive O nominal in a given transitive clause. In fact, in clauses with semantically transitive verbs, the absolutive O is demoted via simple deletion. In that sense, the relevant Karitiana clauses could be said to be antipassives. However, they do not exhibit other common crosslinguistic patterns found in antipassive clauses. Specifically the ergative A NP's of the Karitiana antipassive clauses retain their ergative status and are not "promoted" to absolutives. (If they were, they would be indexed on the verb via the absolutive prefix set.) Furthermore, there is no antipassive morpheme.

The following clauses exemplify the antipassive voice in Karitiana. (These examples call to mind previous examples, such as those in Table 12.2.) As we see in each of the clauses below, the patient of a semantically transitive verb is omitted.

16.43 ĩn naka-mĩ:-t
 1S NSAP-hit-NFUT
 "I hit (something)."

16.44 ĩn ga-mʔa:t
 1S NSAP-make-NFUT
 "I made (something)."

- 16.45 ĩn na-bipõm-ø
 1S NSAP-kiss-NFUT
 "I kissed (someone)."
- 16.46 ĩn ga-pidn-ø
 1S NSAP-kick-NFUT
 "I kicked (something)."

As we see in clauses 16.43-16.46, the absolutive O nominal of transitive clauses can be omitted. In such cases, the O may be omitted because it is unclear whether the action conveyed had a particular effected patient. What is clear in antipassive cases such as these is that a given agent performed a given semantically transitive action. The undergoer is unmentioned, and therefore demoted. It is important to recognize that such antipassive clauses are similar in form to some clauses with pro-drop, in which the patient is understood from context. If clauses 16.43-16.46 allowed a definite interpretation of the omitted NP, they would be understood as clauses with a dropped O, which is high in discourse relevance. Instead, as we see from the relevant glosses, they represent situations in which only an indefinite reading of the omitted O is permitted. Therefore, they are functionally antipassive.

Clauses such as 16.43-16.46 do not state explicitly whether "the action developed to its full extent and achieved its intended affect on the patient." To that extent, the clauses can be said to represent the antipassive voice.

The following schema represents the antipassive voice in Karitiana:



Schema 16.12 A clause with a semantically transitive verb and no overt O argument.

As we see in the schema, the O nominal is not expressed. However, it is still implied by the transitive morphology, as suggested by the circle at the tail of the action arrow.

It is worth noting that clauses such as 16.43-16.46, which contain transitive morphology and no O nominal, only occur with implied 3rd person referents. In other words, if the O of a given clause is a 1st or 2nd person referent, it cannot be omitted, since such referents are represented via verbal prefixation rather than a post-verbal nominal.

§16.6 The morphological causative voice

Karitiana employs a morphological causative morpheme, **m-**, which is prefixed to many verbs. The causative voice in Karitiana could be said to relate to parameter I from the list of voice parameters found in §16.1. More specifically, the causative voice can be understood to signify something about the origin of an action, as captured by the following heuristic:

Does the action originate with an agent heading the action chain that is distinct from the agent or patient of the main action?

Yes → Causative

No → Non-causative (Shibatani 2006:12)

In Karitiana, the most common way of signifying that the agent of the main action is not the same as the source of the action chain is by inflecting the verb with **m-**. In doing so, the speaker signifies that there is another agent causing another participant to act in a certain manner.

Consider the following sample clause pairs. In the first clause of each pair, there is a semantically intransitive verb, prefixed with the **i-** intransitive marker. The second clause of each pair contains the same verb as the first, only with the **m-** prefix attached to the verb:

16.47 a. ĩn i-pitʔi-t
 1S INT-eat-NFUT
 "I ate."

- b. ĩn na-m-pitʔi-t i
 1S NSAP-CAUS-eat-NFUT 3
 "I fed him." or "I gave him food."
- 16.48 a. ĩn i-taktãŋ-ø se-pip
 1S INT-swim-NFUT water-ALL
 "I swam in the water."
- b. ĩn na-m-taktãŋ-ø se-pip
 1S NSAP-CAUS-swim-NFUT water-ALL
 "I helped him swim in the water."

Interestingly, the **m-** prefix is only attached to verbs that are classified as intransitive by Karitiana grammar. The prefix also serves to increase the valence of such intransitive verbs. When the **m-** prefix is attached to a given intransitive verb, the argument following the verb may be inflected with an oblique marker or other postposition, as in example 16.48b. However, it is generally more common for the nominal following a verb with **m-** prefixation to be treated as an argument (as in 16.47b) rather than an oblique. This is also apparent in the causative examples below in which the argument following the verb is not marked with a postposition.

- 16.49 a. ĩn i-pipop-ø
 1S INT-burn-NFUT
 "I burned."
- b. ĩn na-m-pipop-ø epesap
 1S NSAP-CAUS-burn-NFUT leaf
 "I burned the leaf."
- 16.50 a. ĩn i-otam-ø
 1S INT-arrive-NFUT
 "I arrived."
- b. ĩn na-mb-otam-ø akan calipos
 1S NSAP-CAUS-arrive-NFUT village Carlinhos
 "I made arrive (brought) Carlinhos to the village."
- 16.51 a. ĩn i-oti-t
 1S INT-bathe-NFUT
 "I bathed."

- b. ĩn na-mb-oti-t ōwā
 1S NSAP-CAUS-bathe-NFUT child
 “I gave the child a bath.”

Examples such as 16.49-16.51 suggest strongly that the **m-** morpheme derives a transitive verb from an intransitive verb. The prefix does not serve as an applicative marker that increases the valence of transitive verbs, however, since it is only attached to verbs that are otherwise considered intransitive. The resulting causativized verbs may be used in semantically transitive clauses, as in 16.51b, or in semantically ditransitive clauses such as 16.50b and the following two clauses, which are taken from the discussion of ditransitive clauses found in the preceding chapter:

- 16.52 ĩn naka-m-tat-ø hĩm pisip elivar-kĩn
 1S NSAP-CAUS-go-NFUT animal meat Elivar-REC
 “I sent the meat to Elivar.”
- 16.53 ãn i-ta-m-so?ot-ø ōm-ti
 2S 1S.ABS-SAP-CAUS-see-NFUT image-OBL
 “You showed me the picture.”

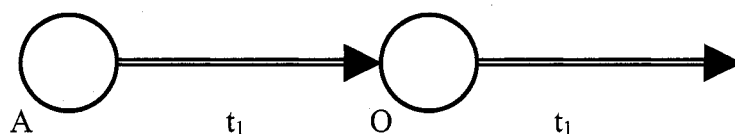
The prefixation of the **m-** causative morpheme is very productive. However, as I have stated it is limited in its distribution to semantically intransitive verbs. Clauses in which an agent is caused (by another agent) to perform a transitive action are much less common in Karitiana. When they do occur they are formed not via morphological derivation, but via a periphrastic strategy, as evident in the following example:

- 16.54 ĩn a-taka-mĩ:t tipõŋ i-ti
 1S 2S.ABS-SAP-hit-NFUT cause(?) 3-OBL
 “I made you hit him.”

The word **tipõŋ** is used as a periphrastic causative when the source for causation acts on an agent that performs a transitive action. This periphrastic sort of causative is less common than the morphological causative. It also appears to represent a less direct sort of causation. This is not entirely surprising, given that it is used in clauses such as 16.54

where the person who is caused to perform a given action retains a certain degree of agency. In general, periphrastic causatives in languages tend to represent less direct causation than their morphological counterparts. Karitiana causation is consistent with this pattern observed in many languages, and discussed in works such as Haiman (1985) and Shibatani and Pardeshi (2002). As Haiman (1985) suggests, this pattern is iconic in that causation that is more tightly bound morphosyntactically (i.e. through lexical and morphological causatives) represents more direct causation, that is causation that is tightly bound with a caused event, in the spatiotemporal realm. In Karitiana, the **m-** prefix represents direct causation in that the action performed and the causation that results in that action occur at the same time and place. For instance, in examples 16.49-16.51, the causative verbs are **mbotit** “bathe,” **mbotam** “bring,” and **mpipop** “burn something.” All of these verbs entail that the causer be present at the place and time of the action represented by the verb.

The causative voice represented by **m-** prefixed forms can be represented schematically as follows:



Schema 16.13 A transitive clause with **m-** verb prefixation, where O is derived from an intransitive S argument.

The directness of the causation represented by Schema 16.13 is evident in two ways. First, the performer of the intransitive verb is now represented with O since the causer, represented as A, acts directly upon the performer of the intransitive verb. The causing

action and the resulting intransitive action occur at the same time according to the schema, as represented by the t_1 time markers occurring under each arrow.

I should stress that 16.13 accurately describes most instances of the morphological causative in Karitiana. There are exceptions, however. For example, in some cases the **m-** prefix may be used to represent less direct causation. The correlation between the morphological causative and direct causation, as well as between the periphrastic causative and indirect causation, is only that, a correlation. This correlation requires more study.

In this section I have briefly discussed the morphological causative in Karitiana, and mentioned the periphrastic causative. Of course, Karitiana also exhibits lexical causatives, which represent actions such as **okit** “kill/hurt,” which can be analyzed as a causing event in which an agent “causes X to die.” Lexical causatives are of course universal and are not treated in any distinct way, morphosyntactically, from other transitive verbs in Karitiana.

Before moving on to the discussion of the middle voice, it is worth noting that the morphological causative in Karitiana bears a fair amount of similarity to the morphological causative in Guaraní. As Shibatani and Pardeshi (2002) note, the morphological causative in that related language is an **mbo-/mo-** prefix. This prefix is obviously similar phonologically to the Karitiana causative prefix. It is also similar functionally, in the sense that it is generally used to represent direct causation as well. (See Shibatani and Pardeshi 2002:102)

§16.7 The middle voice

According to Shibatani's list of voice parameters, the middle voice relates to parameter II from the list recapitulated in §16.1. That parameter reads as follows:

II. The development of an action

How does the action develop?

(a) Does the action extend beyond the agent's personal sphere or is it confined to it?

(b) Does the action achieve the intended effect in a distinct patient, or does it fail to do so?

In other words, many languages demonstrate basic voices that are oriented according to whether or not a represented action extends beyond the originator of the action. Those actions that do not extend beyond the agent, that is those actions that only involve only one participant, receive a certain morphological marking. Those actions that do extend beyond the originator/agent of the action, affecting another distinct participant, may receive a separate morphological marking. Shibatani (2006:14) provides the following pithy heuristic as a basis for defining the active and middle voices according to functional criteria:

Active/middle opposition

Active: The action extends beyond the agent's personal sphere and achieves its effect on a distinct patient.

Middle: The development of an action is confined within the agent's personal sphere so that the action's effect accrues on the agent itself.

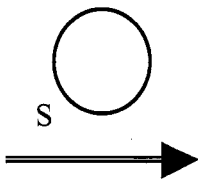
If we accept this distinction between the middle and active voices, which Shibatani bases on crosslinguistic data, we see that what he terms the middle voice is in fact morphologically demarcated in Karitiana. As was discussed at length in Chapter 12, Karitiana semantically intransitive verbs in the basic valence construction are inflected with an *i-* prefix. As I noted at that time, the semantic unity of the verbs that are inflected in this manner seems to rest on their requirement of only one nominal referent/macrorole. In contrast, verbs that cannot be inflected with *i-* in the basic valence construction generally require two nominal referents/macroroles. If we accept the heuristic suggested

by Shibatani for distinguishing between active and middle voices, it seems that the *i*-intransitive prefix could also be construed as a middle prefix.¹⁵⁰

The fact that *i*-prefixed verbs almost always represent actions requiring only one participant was evident in Table 12.1. Since many relevant examples of this verb type are highlighted in that table (and throughout this work), I refrain from providing further examples at this point.

If we accept the definition suggested by Shibatani for the middle and active voices, then we are left with an important conclusion: The central voice distinction in Karitiana is that between the middle and active voices. All verbs are classified as representing actions that are inherently middle-like or active-like. This morphological distinction represents a basic conceptual distinction. Active-like verbs, in which “The action extends beyond the agent’s personal sphere and achieves its effect on a distinct patient,” are represented by semantically transitive verbs occurring in the NSAP and SAP voices, which as I suggested in §16.1.3 are used in the most basic sentences of Karitiana. Therefore, the active voice in Karitiana is represented by Schemas 16.3 and 16.4 above.

In contrast, clauses in the middle voice, which contain verbs inflected with *i*-, can be represented by the following schema:



Schema 16.14 A middle intransitive clause with *i*-verbal prefixation.

¹⁵⁰ Of course, not all accounts of the middle voice accord entirely with Shibatani’s. For a somewhat different perspective, which is also based on crosslinguistic data and functionally oriented, see Kemmer (1993).

Schema 16.14, like all of the schemas found in this chapter, represents action types in a very basic manner. It is worth stressing, though, that the distinction between *i-* inflected verbs and other verbs is oriented according to a semantic distinction that is in fact quite basic. The distinction between active/transitive and middle/intransitive verbs is remarkably basic conceptually. The distinction plays a central role in Karitiana, and surfaces in multifarious manners morphosyntactically, as we have observed throughout Part II of this study. Given its extensive effect on Karitiana morphosyntax, it is not surprising that the distinction between middle/intransitive verbs and active/transitive verbs can be represented in a conceptually basic manner.

A discussion of the middle voice, even one in an overview such as this, would not be complete without some mention of reflexives in Karitiana. As Shibatani suggests, reflexive verbs are a sub-type of middle-voice verbs, in that they also involve action that is confined to the agent. He makes the following remarks (2006:15):

Natural middle actions—e.g. sitting and walking—tend to be lexicalized as intransitive verbs, while those typically directed to others—e.g. hitting and kicking—tend to be expressed by periphrastic constructions involving a reflexive form when they are confined within the agent's personal sphere.

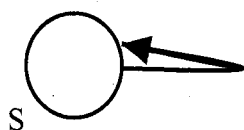
Natural middle actions in Karitiana are in fact semantically intransitive verbs. In Karitiana, these actions are unified morphologically by the presence of the *i-* verbal prefix in the valence construction. Reflexive actions are those that only entail one participant in a particular usage, but would otherwise be expected to involve two participants.¹⁵¹ Consider the following examples:

¹⁵¹ Apart from natural middle and reflexive-type middle actions, we might expect to find a third kind of middle in Karitiana, representing actions that one frequently does to oneself (like a natural middle action) but also does to another frequently (like a reflexive-type middle). In Karitiana, actions of this third sort are classified as either natural middles or reflexive-type middles, however. For instance, the verb for “bathe,” **oti**, is classified as a natural middle/semantically intransitive verb. The words for “comb,” **si:ka**, and “shave,” **ket**, on the other hand, are classified as semantically transitive and employ reflexive-type morphology when in the middle voice.

16.55	i-ʔaso:ta 1S.ABS-REF “I hit myself.”	i-taka-mī-t 1S.ABS-SAP-hit-NFUT	(īn-ti) 1S-OBL
16.56	a-ʔaso:ta 2S.ABS-REF “You cut yourself.”	a-ta-osāŋ-ø 2S.ABS-SAP-cut-NFUT	(ān-ti) 2S-OBL

In these two examples, the verb represents an action that is normally directed outwards from a particular agent, and typically involves a distinct patient. However, in these cases the represented action is confined to the sphere of the agent, that is the agent acts upon him or herself. For that reason, the verbs represented in these sorts of reflexive actions are unified conceptually with lexical intransitive verbs in Karitiana.

The following schema represents reflexive actions such as 16.55 and 16.56:



Schema 16.15 A reflexive clause with a semantically transitive verb.

The conceptual similarity between reflexives and other middle voice verbs is captured by the similarities between schemas 16.14 and 16.15, both of which involve only one participant.

In the discussion of the middle voice in this section, I have suggested that most intransitive verbs in Karitiana involve only one participant. While accurate, there are also exceptions to this trend in which an *i*-marked verb may represent a verb that can involve a second participant. Interestingly, these *i*-marked verbs may also occur with reflexive-type patients, as we see in the following examples:

- 16.57 ta-ʔaso:ta i-soʔot-ø ta-ãn-ti harahara-pip
 ta-REF INT-see-NFUT ta-2S-OBL mirror-ALL
 “She saw herself in the mirror.”
- 16.58 ãn i-soʔot-ø ta-ãn-ti harahara-pip
 2S INT-see-NFUT 2S-OBL mirror-ALL
 “You saw yourself in the mirror.”

It is interesting to note that the oblique-marked reflexive-type pronoun, which is required to occur in examples 16.57 and 16.58, differs from the true reflexive pronouns found clause-initially in 16.55 and 16.56. (These consist of an absolutive agreement marker suffixed with the reflexive marker *-ʔaso:ta*.) This pronoun differentiation is yet another example of how the distinction between transitive and intransitive verbs influences Karitiana morphosyntax.

Interestingly, the oblique-marked reflexive-type pronoun used for 3rd person nominals, evident in example 16.57, can take the same form as that used for 2nd person nominals, as seen in 16.58. It is unclear at this point how the *ta-* prefix, which is attached to the oblique-marked reflexive-type pronouns, should be glossed. This prefix seems to serve as an emphasis marker, which is also prefixed to floated quantifiers. (See §15.3.4)

§16.9 Conclusion

Beginning in Chapter 12, we noted that there are various declarative construction types in Karitiana. These construction types can be initially perplexing to someone confronted with data from the language. However, after some inspection certain patterns, associated with each construction, begin to surface. In this chapter I have suggested that the various basic constructions/verb-prefix types in Karitiana can be understood to reflect basic conceptual patterns associated with the description of particular events. More specifically, these constructions can in many cases be understood to represent the basic voices of Karitiana, in a manner that is consistent with Shibatani’s (2006)

characterizations of basic voice types. Different aspects of the origin, development, and termination of actions (e.g. the SAP status of the patients) can be focused upon, or defocused, in Karitiana by employing different voices. A basic understanding of these voices is central to an understanding of the language's morphosyntax. While the effort presented in this chapter represents an important step in the description and understanding of these voices, it nevertheless only represents an overview of the subject. It is left to future studies to explore in greater detail the individual voices of Karitiana.

Concluding remarks

This dissertation represents an investigation into many fundamental aspects of Karitiana. It is inevitable that such a study not address all of the important aspects of the language. Some topics that might be of interest to particular linguists were excluded from analysis altogether. Other topics were discussed in some detail, while others were covered in a more cursory manner. Unfortunately, only so much ground can be covered in one monograph. My hope for this particular study is that it meets its stated objective, namely to outline the phonetics, phonology, and morphosyntax of Karitiana and, in so doing, to describe basic articulatory, perceptual, and grammatical patterns evident in the language.

I should conclude by noting that some of the areas that were not touched upon in this study are the subjects of current inquiries, while others will be the subjects of future inquiries. For instance, there is already a project underway to study the information structure evident in Karitiana discourse. A corpus of transcribed spoken data is being created to assist in the exploration of this and other topics.

Appendix A

The Social and Physical Setting

Relatively little is known about the history of the Karitiana. It appears that they are descendants of a group who were decimated by European settlers, and who moved south to the inter-fluvial lands of the Amazonian headwaters due to pressures from European settlers and other indigenous nations. Landin (1989), based upon interviews collected in 1974, suggests that at some point “they appear to have been kept in a state of semi-slavery and they tell of fleeing for their lives into the forest away from the men who threatened them.” For more information on the history of the people, I refer the reader to Landin (1989).

The Karitiana subsist by agriculture, via slash-and-burn fields maintained near their village, as well as by hunting and fishing. Their primary crop, as with so many Amazonian groups, is manioc. They have two “fornos,” large open-fire burners, which allow them to make “farinha,” a ground meal made from the treated manioc. They typically employ shotguns for hunting, rather than their traditional bows and arrows. The skulls of large game are kept as trophies, hung by the males on strings outside their homes.

The primary source of income for many Karitiana is the selling of artifacts. This is accomplished via a small store at the *Casa do Indio*. The Karitiana also travel to different locations within Porto Velho (and occasionally elsewhere in Brazil) to sell artifacts. During my time with the Karitiana, they requested that I develop a web site to

assist them in selling their artifacts, which I have done. The web site is expected to go online in September 2006.

The typical Karitiana home is rectangular, with mud and straw walls and thatch roofs. Many of the homes are now made with wooden walls, in a style similar to that of local Brazilians. The Karitiana once employed long houses, which are fairly elaborate structures made of thatch and wood. There are two of these structures in the present village, utilized as churches. The largest is approximately 25 meters long, and 10 meters high, oval in shape.

There are three churches, representing the Baptist and Assembly of God denominations, in the Karitiana village. These churches grew out of conversions occurring in the last three decades or so. While many of the Karitiana have converted to Christianity, many have not. There is some tension, largely covert, between these two groups of Karitiana. There is also a traditional shaman who now lives near the city of Candeias, where he is attempting to start a new village.

The Karitiana are, in my experience, an exceptionally warm and welcoming group. They have been friendly to me since my first encounter with them in 2004. The field research for this work was carried out among the Karitiana in Porto Velho and, to a lesser extent, in the village, from November 2004 through June 2006.

The Karitiana village is found at the northern extreme of the reservation demarcated by FUNAI for the Karitiana in 1977. From Porto Velho, the village can be reached by car, first by travelling 50 km southwest along BR-364. Then one must traverse a circuitous jungle road, for approximately 42 km. In the past this road often became impassable at certain points of the rainy season, and was often interdicted by

fallen trees. In 2005 the road was widened by a local logging company. Much of this road is located within the Karitiana reservation.

There are several streams in the Karitiana reservation, as well as the Rio Garças. This is a minor river by the standard of the region. In the center of the village there is a small narrow swamp with clear water, used by the Karitiana for bathing and washing clothes. The village is surrounded by jungle as well as cleared fields, for instance there are several manioc fields adjacent to the northeast portion of the village.

In August 2005 I created a detailed map of the Karitiana village. The primary purpose of creating this map was to describe the location of the houses in the village, in order to better understand the distribution of the Karitiana population. It was felt that the resultant map might serve as a useful reference for future sociolinguistic studies. According to the map, there are 36 structures that serve as houses. This is much lower than the previous figure of 64 suggested by surveyors (Jore 2004), though there are over sixty structures in the village. Many of these houses are empty at any given time, given that so many Karitiana also spend a considerable amount of time at the *Casa do Indio* in Porto Velho. The most recent survey (see Appendix B) suggests a population of 260 Karitiana.

The map of the village found in Figure A.3 was created in the following manner: I used a hand-held GPS to fix the positions of the relevant structures in the village. These positions were then entered into a database, and were then charted onto a map. The edges of the jungle and the village swamp were then drawn into the chart, based on impressionistic data.

In the following two figures I present two regional maps. The first contains the general location of Rodônia within South America. The second provides the location of the Karitiana reservation within Rondônia. The final figure contains the map I have made of the Karitiana village.

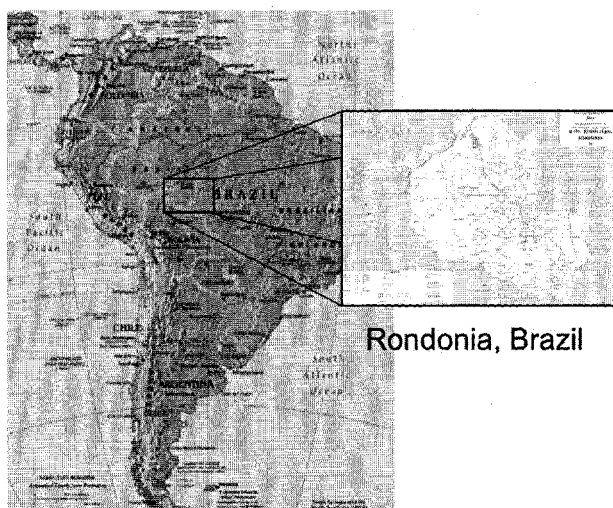


Figure A.1 Location of the state of Rondônia within South America.

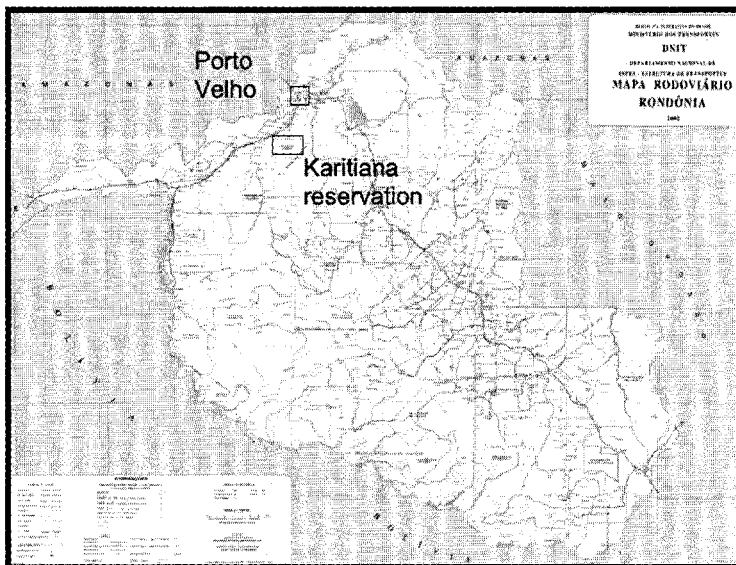


Figure A.2 Location of Porto Velho and the Karitiana reservation within Rondônia.

Longitude 64°00'__ W

Everett 456

200

150

100

50

Latitude 9°17'__ W

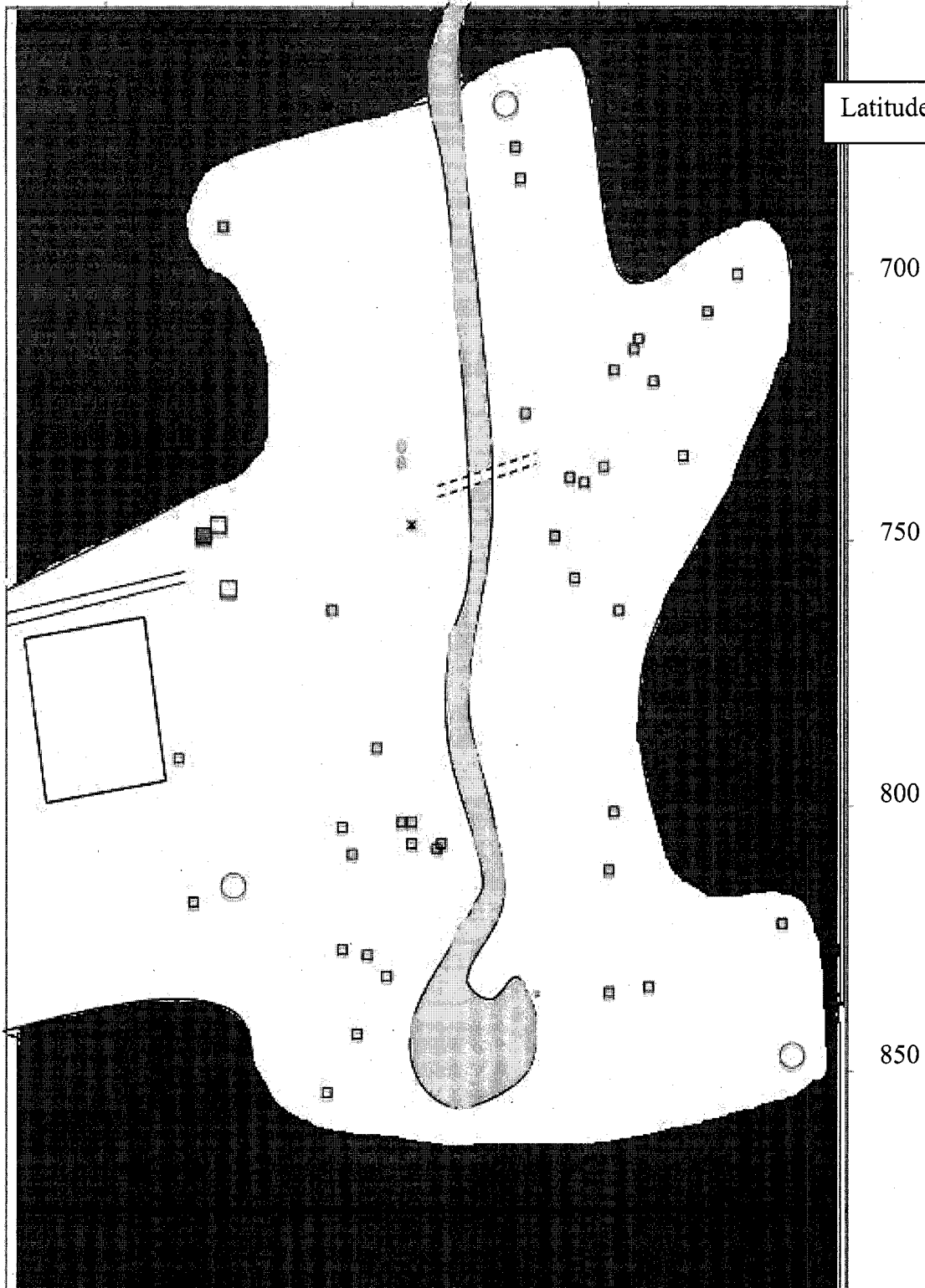


Figure A.3 The Karitiana village. The structure locations are based upon GPS readings. The key to the structures is found on the following page. The jungle, swamp, and soccer field (far left) outlines are based upon impressionistic findings. The latitude and longitude figures along the axes represent hundredths of minutes. The longitude and latitude figures found in the boxes contain the degrees and minutes of latitude and longitude.

▣	House
○	Church
□	Pharmacy
■	School
*	Generator
•	Forno
▣	Govt. Bldg
-	Bathing pool

Key to Figure A.3 (Map of village)

Appendix B

Karitiana Demographics

As I noted in the Preface, the Karitiana population appears to have grown substantially since the 1970's. During that time, Rachel Landin performed a census of the people, suggesting a population of 65. Since that time, the population has grown about 300%, and the population currently stands at 260. This number includes all of those indigenous people who speak Karitiana as a mother tongue. The Karitiana are generally endogamous, though approximately 20 Karitiana are either married to people from another indigenous group, or are the progeny of at least one non-Karitiana parent. They are generally monogamous, though in the past many were polygamous. At present, four Karitiana men have more than one wife.

The data in this appendix is based on a census performed in 2004 by FUNASA, the Brazilian health agency in charge of gathering such data. I have updated the census as of March 2006, accounting for the births and deaths among the Karitiana since 2004. Also, I have analyzed the age and gender distribution of the Karitiana.

At present, there are 135 female Karitiana and 129 male Karitiana. This disparity is not significant. The average age of the Karitiana is 18.8 years. There is no significant difference between the average ages of the females and the males. The median age of the Karitiana is 14. Both the average ages and median ages are obviously quite low, relative to average and median ages typically found in such studies.¹⁵²

¹⁵² Not surprisingly, such studies typically describe the populations of large nations, and in that sense cannot be fruitfully compared with these data. As a reference, however, consider that the median age of

While the population of the Karitiana is growing, the age distribution data are also consistent with a low life-expectancy. In the following figure I present the overall age distribution of the Karitiana population:

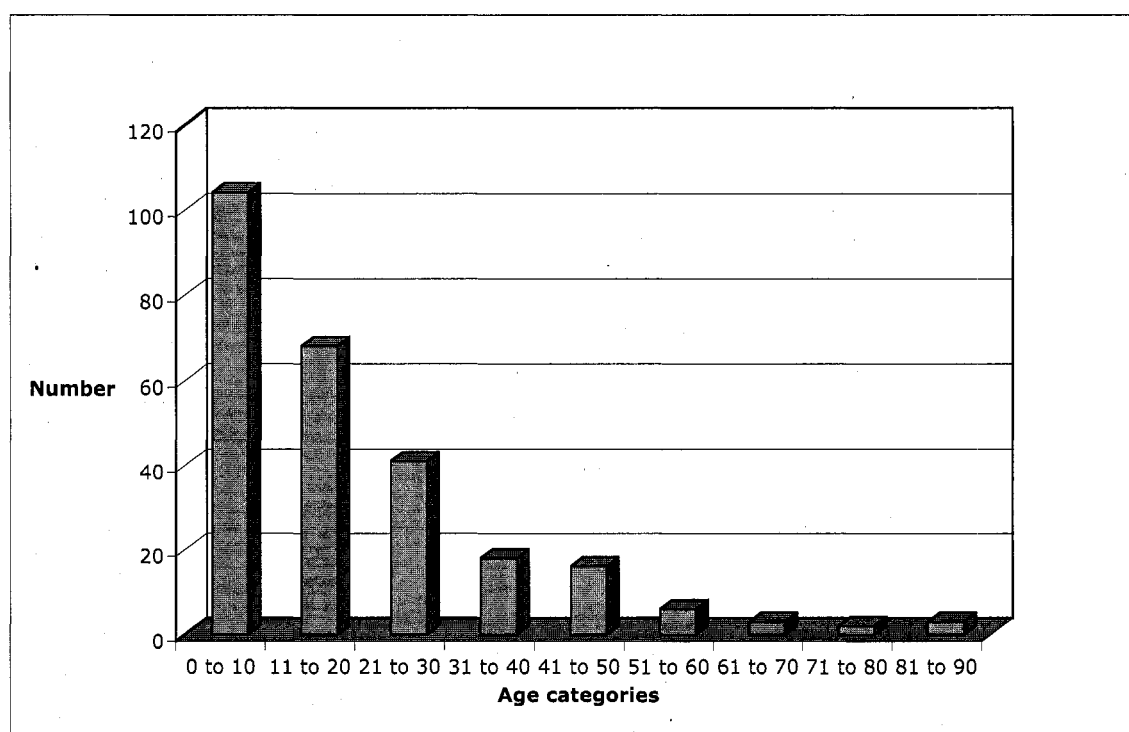


Figure B.1 Age distribution of Karitiana population.

As Figure B.1 demonstrates, there are only a few Karitiana (14) that are older than 50.¹⁵³

The age distributions for the female and male populations were also calculated, and no major difference between the distributions was found, though it is worth noting that all three of the Karitiana over the age of 80 are females.

As Figure B.1 suggests, the age dependency ratio in Karitiana is very high. The age dependency ratio is arrived at by taking the total number of persons under the age of

Americans is 36.3. The median age of Brazilians is 28, twice that of the Karitiana median age. (Figures taken from www.cia.gov) It is likely that the median age in Rondônia, one of the least developed states in Brazil, is lower the Brazilian national average.

¹⁵³ The ages of these Karitiana are based on the FUNASA survey. It is unclear at this point how accurate the ages are, nevertheless assigning Karitiana to such age brackets seems reasonable.

15 and over the age of 60, and dividing this total by the number of persons in the intervening age group. According to my data, 133 Karitiana are less than 15 years old. Only 7 Karitiana are older than 60. The remaining 124 are between 15 and 60 years old. Therefore, the age dependency ratio in Karitiana is 1.13. In other words, each working-age Karitiana supports, on average, one non-working-age person. The age dependency ratio in most developed nations is typically around 0.5. The high dependency ratio in Karitiana suggests that the working-age adults have a heavy economic burden to carry. The Karitiana who live in Porto Velho live in relative squalor, and most adults try to provide for their relatively young families via artifact-selling.

It would be interesting to contrast these Karitiana demographic data with demographic data from other Amazonian indigenous groups, however such data are not available in most cases. Green and Crocker (1994) do provide fairly detailed demographic data for the Canela, a Gê group located in northeast Brazil in the state of Maranhão. Interestingly, the age dependency ratio for the Canela was found to be 1.38 in 1988, having increased from .84 in 1970. Green and Crocker's data is generally similar to the Karitiana data. This suggests that the Karitiana age distribution may be relatively normal when contrasted to other Amazonian groups.

References

- Abrahamson, Stanley and Joyce Abrahamson. 1984. Os Fonemas da Língua Juma. In *Estudos Sobre Línguas Tupí do Brasil*. Ed. Dooley, Robert. 157-174. Brasília: SIL.
- Adank, Patricia Martine. 2002. *Vowel normalization, a perceptual-acoustic study of Dutch Vowels*. Doctoral dissertation, University of Nijmegen.
- Adank, Patti, Roel Smits and Roeland van Hout. 2004. A comparison of vowel normalization procedures for language variation research. *Journal of the Acoustical Society of America*. 116.5.3099-3107.
- Anderson, Stephen. 1976. On the notion of subject in ergative languages. In *Subject and Topic*. Ed. Li, Charles. New York: Academic Press, 1-23.
- Anderson, Victoria. 2000. *Giving Weight to Phonetic Principles: The case of Place of Articulation in Western Arrernte*. PhD dissertation, UCLA.
- Arnott, David. 1970. *The Nominal and Verbal Systems of Fula*. Oxford: Clarendon Press.
- Austin, Peter. 1981. *A Grammar of Diyari*. Cambridge: Cambridge University Press.
- Baker, Mark. 2003. *Lexical categories: Verbs, Nouns, and Adjectives*. Cambridge: Cambridge University Press.
- Barlow, Michael and Suzanne Kemmer. 2000. *Usage-Based Models of Language*. Cambridge: Cambridge University Press.
- Beddor, PS, and W. Strange. 1982. Cross-language study of perception of the oral-nasal distinction. *Journal of the Acoustical Society of America*. 71.1551-1561.
- Bendor-Samuel, David. 1972. *Hierarchical Structures in Guajajara*. Norman, Oklahoma: Summer Institute of Linguistics.
- Bird, Steven and Gary Simons. 2003. Seven dimensions of portability for language documentation and description. *Language*, 79.3. 557-582.
- Bittner, M. and Hale, Ken. 1996b. Ergativity: Towards a theory of a heterogeneous class. *Linguistic Inquiry* 27:531-604.
- Boersma, Paul and David Weenink. 2005. *Praat: doing phonetics by computer (Version*

- 4.3.14) [Computer program]. Retrieved November 2004, from www.praat.org
- Bontkes, W. and R.A. Dooley. 1985. Verification particles in Suruí. In *Porto Velho Workshops*. ed. Fortune, D.L. 166-88. Brasília: SIL
- Browman, C.P. and L. Goldstein. 1986. *Towards an Articulatory Phonology*. *Phonology Yearbook*, 3, 219-252.
- Bybee, Joan. 1985. *Morphology: A Study of the Relation Between Meaning and Form*. Philadelphia: John Benjamins.
- _____. 2001. *Phonology and Language Use*. Cambridge Studies in Linguistics, vol. 94. Cambridge: Cambridge University Press.
- Bybee, Joan and Paul Hopper. 2001. Introduction to frequency and the emergence of linguistic structure. In *Frequency and the Emergence of Linguistic Structure*. eds. Joan Bybee and Paul Hopper. Philadelphia: John Benjamins.
- _____. 1992. Articulatory phonology: An overview. *Phonetica*, 49, 155-180.
- Bynon, Theodora. 1977. *Historical Linguistics*. Cambridge: Cambridge University Press.
- Caspar, F. and A.D. Rodrigues. 1957. Versuch einer Grammatik der Tuparí-Sprache. Ms.
- Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- _____. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.
- _____. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
- Cole, Jennifer, Hansook Choi, and Heejin Kim. 2004. Acoustic evidence for the effect of accent on CV coarticulation in radio news speech. In *Proceedings of the 2003 Texas Linguistics Society Conference: Coarticulation in Speech Production and Perception*. Eds. Agwuele, Augustine, Willis Warren, and Sang-Hoon Park. Cascadilla Proceedings Project: Somerville, Massachusetts.
- Comrie, Bernard. 1976. *Aspect*. Cambridge: Cambridge University Press.
- _____. 1978b. Ergativity. In *Syntactic Typology: Studies in the Phenomenology of Language*. Ed. Lehmann, Winfred. Austin: University of Texas Press.
- _____. 1985. *Tense*. Cambridge: Cambridge University Press.
- _____. 1989. *Language Universals and Linguistic Typology* (2nd edition). Chicago: University of Chicago Press.
- Croft, William. 2001. *Radical Construction Grammar: Syntactic theory in typological*

- perspective*. Oxford: Oxford University Press.
- Crofts, Marjorie. 1973. Gramática Mundurukú. In *Série Lingüística 2*. Brasília: SIL.
- _____. 1985. *Aspectos da lingual Mundurukú*. Brasília: SIL.
- Cunha, Péricles. 1987. *Análise Fonêmica Preliminar da Língua Guajá*. Master's thesis, Universidade Estadual de Campinas.
- Crystal, David. 1990. *A Dictionary of Linguistics and Phonetics, 2nd edition*. Oxford: Blackwell.
- Crosswhite, Katherine. 1999. *Vowel Reduction in Optimality Theory*. PhD Dissertation, UCLA.
- _____. 2004. Spectral tilt as a cue to word stress in Macedonian, Polish, and Bulgarian. *15th International Congress of Phonetic Sciences*. Barcelona.
- Dahl, Östen. 2000. Egophoricity in discourse and syntax. *Functions of Language* 7.1 37 ff.
- Delattre, P.C., Liberman, A., and F. Cooper. 1955. Acoustic loci and transitional cues for consonants. *Journal of the Acoustical Society of America*, 27. 769-773.
- Derbyshire, D.C. 1981. A diachronic explanation for the origin of OVS in some Carib languages. *Journal of Linguistics* 17.209-20.
- _____. 1999. Carib. In *The Amazonian Languages*. eds. Dixon, R.M.W. and Alexandra Aikhenvald. 23-61. Cambridge: Cambridge University Press.
- Derbyshire, D.C. and G.K. Pullum 1986. (eds.) Introduction to the *Handbook of Amazonian Languages*, vol.I. eds. Derbyshire, D.C. and G.K. Pullum. Berlin: Mouton de Gruyter.
- Dixon R.M.W. 1972. *The Dyirbal language of North Queensland*. Cambridge: Cambridge University Press.
- _____. 1977a. *A Grammar of Yidin^y*. Cambridge: Cambridge University Press.
- _____. 1979. Ergativity. *Language* 55.1.59-134.
- _____. 1994. *Ergativity*. Cambridge Studies in Linguistics 69. Cambridge: Cambridge University Press.
- _____. 2005. *The Jarawara Language of Southern Amazonia*. Oxford: Oxford University Press.

- Dixon, R.M.W. and Alexandra Aikhenvald. 1999. (eds.) *The Amazonian Languages*. Cambridge: Cambridge University Press.
- Dooley, Robert. 1984. Nasalização na Língua Guaraní. In *Estudos Sobre Linguas Tupi do Brasil*. Ed. Dooley, Robert. Brasilia: Summer Institute of Linguistics.
- Dryer, Matthew. 1986. Primary objects, secondary objects, and antitativity. *Language* 61:808-45.
- _____. 1991. SVO languages and the OV:VO typology. *Journal of Linguistics* 27.443-82.
- _____. 1992. The Greenbergian word order correlations. *Language* 68.81-138.
- _____. 1997. On the six-way word order typology. *Studies in Language* 21.1.69-103.
- Du Bois, John. 1987. The discourse basis of ergativity. *Language*, 63.805-852.
- Durie, Mark. 1985. *A grammar of Achenese*. Dordrecht:Foris.
- _____. 1985. The grammaticalization of number as a verbal category. In *Proceedings of the 11th annual meeting of the Berkeley Linguistic Society*. Berkeley, CA: Berkeley Linguistic Society.
- Eckert, Penelope. 1999. *Linguistic Variation as Social Practice*. Oxford:Blackwell.
- Epps, Patience. 2005. *A Grammar of Hup*. PhD dissertation, University of Virginia.
- Everett, Caleb. 2003. A cognitive account of word order correlates. Paper delivered at the *Rice Linguistics Department Colloquium Series*.
- _____. 2004. Orthographic influences on formal phonology: Evidence from Portuguese and English. Qualifying Paper, Rice University.
- Everett, Daniel. 1985. A note on ergativity, S' and S'' in Karitiana. In *Workpapers of the Summer Institute of Linguistics-University of North Dakota*. ed. Desmond Derbyshire. Dallas: SIL. 69-81.
- _____. 1991. *A Língua Pirahã e a Teoria da Sintaxe*. Campinas, Brazil: Editora da Unicamp.
- _____. 1994. Case spreading and phrase structure in Karitiana. In the proceedings of the Western Conference of Linguistics, XXIII.
- _____. 2005. Cultural constraints on grammar and cognition in Pirahã: Another look at the design features of human language. *Current Anthropology*. 46.4.621-647.
- Everett, Daniel and Keren Everett. 1984. On the relevance of syllable onsets to stress

- placement. *Linguistic Inquiry* 15.705-711.
- Everett, Daniel and Barbara Kern. 1997. *Wari*. London: Routledge.
- Farrell, Patrick. 2005. *Grammatical Relations*. Oxford: Oxford University Press.
- Flemming, Edward. 2005. A Phonetically-Based Model of Phonological Vowel Reduction. Unpublished.
- Foley, W.A. and R.D. Van Valin, JR. 1984. *Functional Syntax and Universal Grammar*. Cambridge: Cambridge University Press.
- Franchetto, B. 1990. Ergativity and nominativity in Kuikúro and other Carib languages. In *Amazonian Linguistics: Studies in Lowland South American Languages*. ed. Payne, Doris. 407-427. Austin: University of Texas Press.
- Fry, D.B. 1995. Experiments in the perception of stress. *Language and Speech* 1.126-152.
- Gabas, N. 1989. *Estudo fonológico da lingual Karo (Arara de Rondônia)*. MA Thesis, Universidade Estadual de Campinas.
- Gahl, S. and S. Garnsey. 2004. Knowledge of grammar, knowledge of usage: Syntactic probabilities affect pronunciation variation. *Language* 80.4.748-75.
- Gerstman, L. 1968. Classification of self-normalized vowels. *IEEE Trans. Audio Electroacoust.* AU-16.78-80.
- Gilligan, Gary. 1987. *A cross-linguistic approach to the Pro-Drop Parameter*. Ph.D. dissertation: University of Southern California.
- Givón, Talmy. 2001. *Syntax: a Typological Functional Introduction*, vol. I. Amsterdam: John Benjamins.
- _____. 2001. *Syntax: a Functional-Typological Introduction*, vol. II. Amsterdam: John Benjamins.
- Goldberg 1995. *A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Graham, Albert, Sue Graham and Carl Harrison. 1984. Prefixos pessoais e numerais da Língua Sateré-Mawé. In *Estudos Sobre Linguas Tupi do Brasil*. Ed. Dooley, Robert. Brasília: SIL.
- Greene, Margaret and Crocker, William. 1994. Some demographic aspects of the Canela Indians of Brazil. *South American Indian Studies* 4.

- Greenberg, Joseph. 1966a. On some universals of language with particular reference to the order of meaningful elements. In *Language Universals*. ed. Joseph Greenberg. The Hague: Mouton.
- Grimes, Barbara. 2000. *Ethnologue*, Volume I, Languages of the World. Fourteenth Edition. Dallas: SIL International Press.
- Haiman, J. 1985. *Iconicity in Syntax*. TSL 6. Amsterdam: John Benjamins.
- Hale, Ken. 1998. On endangered languages and the importance of linguistic diversity. *Endangered Languages*. 192-216. eds. Lenore Grenoble and Lindsay Whaley. Cambridge: Cambridge University Press.
- Harnsberger, James D. 2001. The perception of Malayalam nasal consonants by Marathi, Punjabi, Tamil, Oriya, Bengali, and American English listeners: A multidimensional scaling analysis. *Journal of Phonetics*, 29.303-27.
- Harrison, Carl. 1984. The Morphophonology of Asurini Words. In *Tupi Studies 1*. Ed. Bendor-Samuel, David. 21-72. Norman, Oklahoma: SIL.
- _____. 1986. Guajajara. *Handbook of Amazonian Languages*, vol.I. eds. Derbyshire, D.C. and G.K. Pullum. Berlin: Mouton de Gruyter.
- Hata, K. and Y. Hasegawa. 1988. Delayed pitch fall phenomenon in Japanese. *Proceedings of the Western Conference on Linguistics*. 87-100. Fresno: California State University.
- Heine, Bernd. 1997. *Cognitive Foundations of Grammar*. New York: Oxford University Press.
- Hooper, Joan Bybee. 1976b. Word frequency in lexical diffusion and the source of morphophonological change. In *Current Progress in Historical Linguistics*. Ed. W. Christie. Amsterdam: North Holland.
- Hopper, Paul and Sandra Thompson. 1980. Transitivity in grammar and discourse. *Language* 56.251-299.
- Huang, Tsan. 2001. The interplay of perception and phonology in tone 3 sandhi in Chinese Putonghua. In *Studies on the Interplay of Speech Perception and Phonology*, Ohio State University Working Papers in Linguistics. Eds, Hume, E., and K. Johnson. 55.23-42.
- Hume, Elizabeth. 1992. *Front Vowels, Coronal Consonants and their Interaction in*

- Non-Linear Phonology*. PhD dissertation, Cornell.
- Idsardi, William. A phonological perspective on locus equations. *Behavioral and Brain Sciences*, 1998.21.2.
- Jassem, Wiktor. 1968. Acoustic description of voiceless fricatives in terms of spectral parameters. In *Speech Analysis and Synthesis*. Ed. W. Jassem. 189-206. Warsaw: Państwowe Wydawnictwo Naukowe.
- Jensen, Cheryl. 1990. Cross-referencing changes in some Tupí-Guaraní languages. In *Amazonian Linguistics: Studies in Lowland South American Languages*. ed. Payne, Doris. 117-60. Austin: University of Texas Press.
- _____. 1998. Comparative Tupí-Guaraní Morphosyntax. In *The Handbook of Amazonian Languages, Volume 4*. eds. Derbyshire, Desmond and Geoffrey Pullum. 489-618. New York: Mouton.
- _____. 1999. Tupí-Guaraní. In *The Amazonian Languages*. eds. Dixon, R.M.W. and Alexandra Aikhenvald. 23-61. Cambridge: Cambridge University Press.
- Johnson, Keith. 2003. *Auditory and Acoustic Phonetics*. Oxford: Blackwell.
- Jones, Daniel. 1950. *The Phoneme: Its Nature and Use*. Cambridge: Heffer.
- Jore, Ben. 2004. A sociolinguistic survey of the Karitiana language. Summer Institute of Linguistics.
- Kager, René. 1999. *Optimality Theory*. 142-149. New York: Cambridge University Press.
- Kakumasu, James. 1986. *Urubu-Kaapor*. . In *The Handbook of Amazonian Languages, Volume 4*. eds. Derbyshire, Desmond and Geoffrey Pullum. 326-403. New York: Mouton.
- Keenan, Edward. 1976. Towards a Universal Definition of "Subject." In *Subject and Topic*. ed. Li, Charles. 303-334. New York: Academic Press.
- Kemmer, Suzanne. 1993. *The Middle Voice*. Amsterdam: John Benjamins.
- Kiparsky, Paul. 1985. Some consequences of Lexical Phonology. *Phonology Yearbook* 2.85-138.
- _____. 1996. The Shift to Head-Initial VP in Germanic. In *Comparative Germanic Syntax*. eds. H. Thrainsson, J. Peter, and S. Epstein. Kluwer.
- Labov, William. 2001. *Principles of Linguistic Change, Social Factors*. Malden,

- Massachusetts: Blackwell.
- Ladefoged, Peter. 2003. *Phonetic Data Analysis*. Malden, Massachusetts: Blackwell Publishing.
- Ladefoged, Peter and Dan Everett. 1997. The status of phonetic rarities. *Language*, 72.4.794-800.
- Ladefoged, Peter and Ian Maddieson. 1996. *Sounds of the World's Languages*. Oxford: Blackwell.
- Lambrecht, Knud. 1994. *Information Structure and Sentence Form*. Cambridge: Cambridge University Press.
- Landin, David. 1978. *Karitiana for Language Learners*. Ms.
- _____. 1983. *Dicionário e Léxico Karitiana/Portugues*. Brasília: Summer Institute of Linguistics.
- _____. 1984. An Outline of the Syntactic Structure of Karitiana Sentences. In *Estudos Sobre Linguas Tupi do Brasil*. Ed. Dooley, Robert. Brasília: SIL.
- Landin, Rachel. 1982. Word order variation in Karitiana. Unpublished ms. Brasília, Summer Institute of Linguistics.
- _____. 1989. *Kinship and Naming Among the Karitiana of Northwestern Brazil*. M.A. thesis, University of Texas at Arlington.
- Langacker, Ronald. 1987. *Foundations of Cognitive Grammar*, Vol I. Stanford: Stanford University Press.
- _____. 1991. *Foundations of Cognitive Grammar*, Vol II. Stanford: Stanford University Press.
- _____. 2002. *Concept, Image, and Symbol*. Berlin: Mouton de Gruyter.
- Lehmann, Winfred P. 1973. A structural principle of language and its implications. *Language* 49.47-66.
- Levinson, Stephen, Sérgio Meira, and the Language and Cognition Group. 2003. 'Natural concepts' in the spatial topological domain—adpositional meanings in crosslinguistic perspective: An exercise in semantic typology. *Language* 79.3.485-516.
- Liljencrants, Johan, and Bjorn Lindblom. 1972. Numerical simulation of vowel quality systems: The role of perceptual contrast. *Language* 48.839-62.

- Lindblad, Per. 1980. *Svenskans sje- och tje-ljud I ett Allmanfonetisk Perspektiv. Travaux de l'Institut de Linguistique de Lund* 16. C. W. K. Gleerup, Lund.
- Lindblom, Bjorn. 1990. Explaining phonetic variation: a sketch of the H&H theory. In *Speech Production and Speech Modeling*. eds. Hardcastle, W.J. and A. Marchal. 403-39. Dordrecht: Kluwer.
- Lightfoot, D. 1991. *How to Set Parameters*. Cambridge, Massachusetts: MIT Press.
- Lobanov, B.M. 1971. Classification of Russian vowels spoken by different speakers. *Journal of the Acoustical Society of America*. 49.606-608.
- Matthewson, Lisa. 2004. On the methodology of semantic fieldwork. *International Journal of American Linguistics* 70.4.369-415.
- McCarthy, John and Alan Prince. 1994. The Emergence of the Unmarked: Optimality in Prosodic Morphology. In *Proceedings of the North-East Linguistics Society* 24. Ed. Gonzalez, Merce 333-379. Amherst, MA: Graduate Linguistic Student Association. ROA- 13. Rutgers Optimality Archive, <http://roa.rutgers.edu/>
- Miller, George, and Patricia Nicely. 1955. An analysis of perceptual confusions among some English consonants. *Journal of the Acoustical Society of America*, 27, 338-52.
- Mithun, Marianne. 1998. The significance of diversity in language endangerment and preservation. *Endangered Languages*. 163-191. Eds. Lenore Grenoble and Lindsay Whaley. Cambridge University Press.
- Moore, Denny. 1984. *Syntax of the Language of the Gavião Indians of Rondônia, Brazil*. Doctoral dissertation, City University of New York.
- Nearey, T.M. 1978. *Phonetic Feature Systems for Vowels*. Indiana University Linguistics Club, Indiana.
- Newman, John. 2002. *The Linguistics of Sitting, Standing, and Lying*. Philadelphia: John Benjamins.
- Nichols, Johanna. 1992. *Linguistic Diversity in Space and Time*. Chicago: The University of Chicago Press.
- Noonan, Michael. 1985. Complementation. In *Language Typology and Syntactic Description*, vol. II: *Complex Constructions*. ed. Timothy Shopen, 42-140. Cambridge: Cambridge University Press.

- Ortiz de Urbina, J. 1989. *Parameters in the Grammar of Basque: A GB approach to Basque syntax*. Dordrecht: Foris.
- Pan, HH. 2004. Nasality in Taiwanese. *Language and Speech*, 47.267-296.
- Paradis, Carole and Jean-Francois Prunet. 1991. (eds.) *Phonetics and Phonology: The Special Status of Coronals: Internal and External Evidence*. Orlando: Academic Press.
- _____. 2000. Nasal vowels as two segments: Evidence from borrowings. *Language* 76.2.324-57.
- Payne, Doris. 1990. (ed.) *Amazonian Linguistics: Studies in Lowland South American Languages*. Austin: University of Texas Press.
- Payne, Thomas. 1997. *Describing Morphosyntax*. Cambridge: Cambridge University Press.
- Pease, Helen and LeVera Betts. 1971. Parintintin Phonology. In *Tupí Studies 1*. Ed. Bendor-Samuel, David. 1-15. Norman, Oklahoma: SIL.
- Perlmutter, David. 1983. (ed.) *Studies in Relational Grammar 1*. Chicago: Chicago University Press.
- Perlmutter, David and C. Rosen. 1984. (eds.) *Studies in Relational Grammar 2*. Chicago: Chicago University Press.
- Port, Robert and Adam Leary. 2005. Against Formal Phonology. *Language* 81.4.927-64.
- Prince, Alan and Paul Somelensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Ms., Rutgers University, New Brunswick, and University of Colorado, Boulder. RuCCS-TR-2.
- Recasens, Daniel. 1983. Place cues for nasal consonants with special reference to Catalan. *Journal of the Acoustical Society of America*, 73.1346-53.
- Roca, Iggy and Wyn Johnson. 1999. *A Course in Phonology*. Oxford: Blackwell.
- Rodrigues, A.D. 1990. You and I=Neither you nor I: The personal system of Tupínamba (Tupí-Guaraní). In *Amazonian Linguistics: Studies in Lowland South American Languages*. Ed. Payne, Doris. 393-406. Austin: University of Texas Press.
- _____. 1999. Tupí. In *The Amazonian Languages*. Eds. Dixon, R.M.W. and Aikhenvald, Alexandra. 107-124. Cambridge: Cambridge University Press.

- Rodrigues, Daniele. 1974. *Fonologia do Guarani Antigo*. Master's Thesis, Universidade Estadual de Campinas.
- Rose, Sharon and Rachel Walker. 2004. A typology of consonant agreement as correspondence. *Language* 80.3.475-531.
- Seki, Lucy. 1990. Kamaiurá (Tupí-Guaraní) as an active-stative language. In *Amazonian Linguistics: Studies in Lowland South American Languages*. ed. Payne, Doris. 367-392. Austin: University of Texas Press.
- _____. 2000. *Gramática do Kamaiurá, língua Tupí-Guaraní do Alto Xingu*. Campinas: Editora da Unicamp.
- Shepard, R.N. 1972. Psychological representation of speech sounds. In *Human Communication: A unified view*. Eds. David, E.E. and P.B. Denes. 67-113. New York: McGraw-Hill.
- Shibatani, Masayoshi. 1985. Passives and related constructions: a prototype analysis. *Language* 61.4.821-48.
- _____. 2006. On the conceptual framework for voice phenomena.
- Shibatani, Masayoshi and Prashant Pardeshi. 2002. The Causative Continuum. In *The Grammar of Causation and Interpersonal Manipulation*. Ed. Shibatani, Masayoshi. Amsterdam: John Benjamins.
- Silverstein, Michael. 1976. Hierarchy of features and ergativity. In *Grammatical categories in Australian languages*. ed. R.M.W. Dixon. Linguistic Series 22.112-71. Canberra: Australian Institute of Aboriginal Studies.
- Stampe, David. 1976. Cardinal numeral systems. *Chicago Linguistic Society* 12.594-609.
- Stockwell, Robert P. and Donka Minkova. 1991. Subordination and word order change in the history of English. In *Historical English syntax*. ed. Dieter Kastovsky. Berlin-New York: Mouton de Gruyter.
- Stonham, John. 1990. *Current Issues in Morphological Theory*. Doctoral dissertation, Stanford University.
- Storto, Luciana. 1994. *Closure and Release—Pre and Post Oralization of Nasal Stops in Karitiana*. M.A. thesis, Pennsylvania State University.
- _____. 1999. *Aspects of a Karitiana Grammar*. PhD dissertation, Massachusetts Institute of Technology.

- _____. 2003. Interaction between verb movement and agreement in Karitiana. Curitiba: *Revista Letras* 60:411-433.
- Storto, Luciana and P. Baldi 1994. The Proto-Arikem Vowel Shift. Paper presented at the LSA.
- Sussman, Harvey M, H.A. McCaffrey and S.A. Matthews. 1991. An investigation of locus equations as a source of relational invariance for stop place categorization. *Journal of the Acoustical Society of America*. 90.1309-1325.
- Traugott, Elizabeth and Bernd Heine. 1991. *Approaches to Grammaticalization, vol II*. Typological Studies in Language, 19. Amsterdam: John Benjamins.
- Thompson, Sandra A. 1988. A discourse approach to the cross-linguistic category "adjective." In *Explaining Language Universals*. ed. John A. Hawkins. 167-85. Oxford: Blackwell.
- Van der Meer, Tine. 1982. Fonologia da Língua Suruí. Master's thesis, Universidade Estadual de Campinas.
- Van Geenhoven, Veerle. 2001. Aspect, pluractionality, and adverbial quantification. Presented at *Perspectives on Aspect*. www.uilots.let.uu.nl/conferences/Perspectives_on_Aspect/Proceedings/geenhoven.pdf
- Van Valin, R.D. Jr. 2005. *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press.
- Vennemann, Theo. 1974. Topics, subjects, and word order: from SXV to SVX via TVX. In *Historical Linguistics*. eds. Anderson, John and Charles Jones. North-Holland Linguistic Series 12.339-76. Amsterdam: North Holland.
- Willett, Thomas. 1988. A cross-linguistic survey of the grammaticization of evidentiality. *Studies in Language* 12.51-97.
- Wise, Mary Ruth. 1999. Small language families and isolates in Peru. In *The Amazonian Languages*. Eds. Dixon, R.M.W. and Aikhenvald, Alexandra. 107-124. Cambridge: Cambridge University Press.
- Wright, James T. 1986. The behavior of nasalized vowels in the perceptual vowel space. In *Experimental Phonology*. 45-67. eds. Ohala, J.J. and J.J. Jaeger. New York: Academic Press.
- Zipf, GK. 1965 (1935). *Psychobiology of Languages*. Cambridge, Massachusetts: MIT

Press.