PROSODY AND INTONATION OF WESTERN CHAM

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Kaori Ueki

Dissertation Committee:

Victoria B. Anderson, Chairperson
Barbara W. Andaya
Patricia Donegan
Amy J. Schafer
Kenneth Rehg
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ABSTRACT

This dissertation investigates the prosodic and intonational characteristics of Western Cham (three letter code for International Organization for Standardization’s ISO 639-3 code: [iso=cja]), an Austronesian language in the Chamic sub-group. I examine acoustic variables of prominence at word and postlexical levels: syllable duration, pitch excursion, and mean intensity. WC syllable duration is highly correlated with word level prominence. Western Cham disyllabic words display a strong iambicity, with final syllables having twice the duration of initial syllables. This iambicity is also present in phrases comprised of two monosyllabic words. Phrase position has an effect on syllable duration and pitch excursion. Syllables in phrase-final position showed a lengthening effect and display greater pitch movement in phrase-final position. I also present a tonal grammar of Western Cham using the Autosegmental-Metrical framework and the Tones and Break Indices (ToBI) labeling convention. Two prosodic units above the word level were defined: the Accentual Phrase (AP) and Intonational Phrase (IP). Three kinds of tones are defined: edge tones, phrase tone, and pitch accent. With this inventory of tones, a mapping of sentence types to tonal contours is presented.
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### LIST OF ABBREVIATIONS

#### Grammatical Categories

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<th>Description</th>
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<tbody>
<tr>
<td>1s</td>
<td>First person singular</td>
</tr>
<tr>
<td>1SG.LORESP</td>
<td>First person singular, lower respect (Baumgartner)</td>
</tr>
<tr>
<td>2s</td>
<td>Second person singular</td>
</tr>
<tr>
<td>3s</td>
<td>Third person singular</td>
</tr>
<tr>
<td>1p</td>
<td>First person plural</td>
</tr>
<tr>
<td>2p</td>
<td>Second person plural</td>
</tr>
<tr>
<td>3p</td>
<td>Third person plural</td>
</tr>
<tr>
<td>CL</td>
<td>Classifier</td>
</tr>
<tr>
<td>CLF</td>
<td>Classifier (Thurgood)</td>
</tr>
<tr>
<td>DEM</td>
<td>Demonstrative</td>
</tr>
<tr>
<td>DIST</td>
<td>Distal demonstrative (Thurgood)</td>
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<tr>
<td>F</td>
<td>Focus</td>
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<tr>
<td>LOC</td>
<td>Locative</td>
</tr>
<tr>
<td>NEG</td>
<td>Negation</td>
</tr>
<tr>
<td>NEG.IMP</td>
<td>Negative imperative</td>
</tr>
<tr>
<td>PAST</td>
<td>Past tense (Baumgartner)</td>
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<td>POSS</td>
<td>Possession</td>
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<tr>
<td>Q</td>
<td>Question marker</td>
</tr>
<tr>
<td>REL</td>
<td>Relativizer</td>
</tr>
<tr>
<td>YN.QM</td>
<td>Yes/no question marker (Baumgartner)</td>
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#### Segmentation Labels

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<tr>
<td>s1~s6</td>
<td>Speaker number</td>
</tr>
<tr>
<td>ini</td>
<td>Initial frame</td>
</tr>
<tr>
<td>med</td>
<td>Medial frame</td>
</tr>
<tr>
<td>fin</td>
<td>Final frame</td>
</tr>
<tr>
<td>_1</td>
<td>Pre-syllable</td>
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</table>
_2  Main syllable
*   Syllabic onset
!   Preceded by unexpected pause
$   Followed by unexpected pause
NI  Word does not have pre-syllable
vl  voiceless syllable
CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

In this dissertation, I explore some aspects of prosody in Western Cham (hereafter WC), an Austronesian language spoken on the Southeast Asian mainland. Prosody may refer to word-level prominence where a part of a word has a stronger presence than other parts. It may refer to rhythm and intonation of larger units such as the sentence – the tune or melody that speakers use in saying a sentence. I examine both lexical, or word level, and sentential prosody in this work. My aim, along with description and analysis, is to expand the area of inquiry into this language and language family. At the same time, I wish to expand the study of intonational typology by adding data from a language previously understudied in this area. This study will provide one example of prosodic work on a Chamic language. Previous studies of Chamic, and especially Western Cham, have tended to focus on certain areas of the language, namely historical reconstruction and phonological conditioning of vowel quality distinctions. This study will broaden the area of inquiry for future scholars. It will add to the body of knowledge on the language and add primary data which may be used by scholars to pursue research on other aspects of this language.

1.2 RESEARCH QUESTIONS

My research questions consist of three parts as formulated below:

1. How is prominence within a word realized?

   A language may or may not exhibit word-level prominence, by which I mean that one or more syllables or morae within a word are more prominent than others. Moreover, syllables or morae may be prominent because of either lexical or metrical stress assignment. Whether lexically or metrically assigned, prominence at word level may be realized by one or a combination of multiple acoustic cues. Which cues are utilized is language specific. In English, for example, a stressed syllable of a word may have a pitch excursion and it may be louder than the unstressed syllables. Besides pitch and
loudness, duration is a possible cue; a stressed syllable may be longer than unstressed ones. I examine these acoustic variables to isolate those relevant in WC lexical stress.

2. How is prominence above the word realized?

Does WC have postlexical, or phrasal, prominences? If so, how are they realized phonetically? To investigate postlexical prominence, I examine three acoustic variables of syllables with respect to how the syllables are positioned in a phrase. By placing the same set of words in different phrasal positions, I compare the realizations of the variables across phrasal positions.

3. What is the intonational structure of WC?

What are the possible intonational contours in the language and what is their tune to meaning mapping? Ultimately, where does WC fit into the typology of intonation developed in Jun 2005? This typology categorizes a language in terms of its rhythmic units and prominence types at the level of the word and larger units such as phrases. A detailed overview of this typology will be given in the following section.

I employ instrumental techniques to address these questions. In the two sections that follow, I discuss two areas of linguistics that inform this work.

1.3 AUTOSEGMENTAL-METRICAL PHONOLOGY AND ToBI

The framework I use for intonation analysis is the Autosegmental-Metrical (A-M) framework (Beckman & Pierrehumbert, 1986; Pierrehumbert, 1980). The A-M framework has been used to analyze a variety of languages including commonly studied ones like English, Japanese, and Korean, but also less studied ones such as Chickasaw and Bininj Gun-wok. These analyses indicate that ToBI is flexible enough to apply to typologically different languages.

The A-M framework represents prosody as a separate phonological level from the segmental representation. An intonation contour is represented linearly by a series of tones. The framework allows two tonal primitives, High (H) and Low (L). The Highs
and Lows describe relative prominence, so that a Low at the beginning of a sentence may have higher absolute pitch compared to a High at the end of the same sentence.

ToBI, which stands for Tones and Break Indices, is an phonologically based annotation convention based on the A-M framework. Again, there are only two tones, High and Low; these may be combined to define contour tones such as L+H. The Highs and Lows mark local maxima and minima. The basic components of a ToBI annotation are the pitch track showing the fundamental frequency (F0), the orthographic transcription, the tonal representation, and the break indices, all on different tiers that are time-aligned with each other. The tone tier may represent both lexical level and postlexical level prominences. The break index tier represents the degree of disjuncture between prosodic units in numbers, with a smaller number representing a smaller disjuncture.

The original ToBI system was developed in order to annotate American English (called “Mainstream American English” or MAE). Since that initial development, ToBI has been extended and modified to allow for prosodic descriptions of other languages: J-ToBI for Japanese, K-ToBI for Korean, etc. Each system is a phonological representation with language-specific features, and one system is only valid for one language. ToBI has some built-in flexibility to accommodate language-specific features. Inventories of tones and break indices vary across languages. Other language-specific extensions are possible, for instance, the addition of a tier to represent phonetic form separate from the phonological representation, a comments tier to note uncertainties, or a “Phones” tier to segment consonants and vowels (Jun, 2005, p. 32).

Jun (2005) proposes a cross-linguistic typology of intonation based on A-M and ToBI. This typology describes a language in terms of prominence type and timing type. Prominence may be characterized in terms of lexical level and postlexical level prominences. At the lexical level, there are three possible ways for a language to mark prominence: stress (e.g., English, German), tone (e.g., Thai), lexical pitch accent (e.g., Japanese, Serbo-Croatian); languages may have some combination of the three (e.g., Mandarin has tone and stress) or no lexical prominence (e.g., Korean). At the phrasal level, a language may have “head-marking,” that is, it marks the prominent element of a phrase (e.g., English), or “edge-marking”—it marks the boundary of a phrase (e.g.,
French, Korean); a language may have both head and edge marking. A “head-marker” may be a postlexical pitch accent or phrase tone. A postlexical pitch accent is a kind of head-marker that marks prominent syllables or morae of a phrase. In contrast, a lexical pitch accent marks the prominent element of a word, and may serve to distinguish between two lexical items. Lexical and postlexical prominences may interact; for instance, the English phrasal pitch accent falls on lexically stressed syllables, and the Japanese phrasal accent is not realized when a word in the phrasal unit has a lexical pitch accent. Although lexical and postlexical levels may interact, having one type of lexical marking does not necessarily imply a certain type of postlexical marking. A language with lexical stress may have head-marking, i.e., postlexical pitch accent—or both head and edge marking.

Another category in this typology is rhythmic unit. At the lexical level, the rhythmic unit is described either as stress-timed, syllable-timed, or mora-timed. At the postlexical level, a language may have various prosodic groupings, the largest of which is the Intonation Phrase (IP). An IP is often bounded by silence and may consist of an entire sentence or just one word uttered in isolation. All languages have IPs by definition. Smaller units are defined on a language-specific basis and may be called Accentual Phrases (AP) or Intermediate Phrases (iP). Finally, the Prosodic Word (PrWd) is the smallest unit.

Applying the A-M framework and ToBI to WC has several advantages. Because this framework has been used to analyze a number of typologically different languages, its use in this dissertation will enable a comparison of WC with other languages analyzed thus far and may expand the repertory of typologies represented. Such a comparison will further advance the study of intonational typology by adding data from an understudied language. It would be also interesting to compare WC and other Southeast Asian languages such as Khmer in this framework to test anecdotal assumptions by non-linguists that WC and Khmer sound ‘similar.’

As Beckman, Hirschberg, and Shattuck-Hufnagel (2005) say, ToBI is an ongoing research program. Reformulations of prosodic units or tonal inventories are ongoing for both less studied and commonly studied languages. In the same vein, the analysis presented in this work is preliminary and is subject to change.
1.4 LANGUAGE DOCUMENTATION

The subfield of language documentation, as described by Himmelmann (1998), has as its goal to produce and archive holistic descriptions of languages. The primary objective of a language documentation project entails collecting texts from a variety of speech genres, creating annotated audio and video recordings, and archiving these materials for future use in a nonproprietary format. This effort has in effect created a new subfield of linguistics and turned people’s attention to the description of languages for which there is little or no information available. A common output of this research program is a grammar, dictionary, and some annotated texts. As Himmelmann and Ladd (2008) discuss, prosodic aspects of languages are rarely described in great detail and prosodic fieldwork is uncommon compared to work on segmental phonology. The authors point out aspects of prosody that differ from segmental phonology which may create problems for the fieldworker. One is that unrelated languages may have similar prosodic characteristics at the sentence level. For instance, many languages display a rise in pitch at the ends of questions. The fact that languages have similar intonation contours does not imply genetic affiliation or even similar typological characteristics. Another point that Himmelmann and Ladd (2008) raise is that prosodic features may affect multiple levels of phonological representation. The concept of stress may be relevant at the lexical level, where lexical stress may be realized in the form of a rising pitch and loudness. At the phrasal, or postlexical, level, stress may serve to emphasize particular parts of the phrase, or distinguish between multiple possible meanings of a sentence.

The study of prosody brings up issues not necessarily encountered in segmental phonology or morphosyntax. As Himmelmann and Ladd (2008) say, intonation is “pervasive” (Himmelmann & Ladd, 2008, p. 260). There is no such thing as an utterance without intonation. Even a single word, when uttered, will be realized with an intonation contour. Moreover, intonation may be influenced by the speaker’s intentions. The same sentence may be uttered with different intonation for an entirely different meaning. In English, a sentence such as “I didn’t eat the bananas” (with emphasis on “bananas”) may indicate that the speaker may have eaten oranges, but not bananas. The same utterance, said with emphasis on the word “eat” (“I didn’t eat the bananas”) may be an indication
that the speaker may have peeled the bananas, but didn’t eat them. On the other hand, other languages may not use intonation to achieve these contrasts but may do so by changing the word order or with morphological marking. All these characteristics create potential difficulties and the need for different discovery procedures. Knowledge of segmental phonology may be relevant. Some phonological processes may occur within, but not across, certain prosodic groups, providing another cue to a prosodic boundary.

I propose to analyze WC using ToBI, which is not just a transcription convention, but one that is based on the A-M framework. In language documentation, there is recognition that even a description includes some theoretical commitment. Providing a phoneme inventory includes some theoretical decisions, as it may lead to deciding whether a sound is an allophone of another or a distinct phoneme. I believe that attempting to describe intonation without a theoretical basis will not yield insight into the relationship between a pitch contour and its phonological representation or prosodic grouping. Moreover, with the currently available software, the original data will be recoverable to future linguists. It will be possible to view the pitch track and wave forms of utterances in order to offer alternative analyses. Not using a theoretical framework, on the other hand, may prevent cross-linguistic comparisons of intonation. Without a particular viewpoint from which to survey the data, descriptions of different languages will remain a series of case studies, and insight into commonalities between prosodic types will be lost. Furthermore, using a framework will facilitate collaboration with other linguists and enrich both language documentation and intonational phonology. A study down without reference to a particular framework may actually limit its audience within linguistics, because it does not “speak to” linguists not in language documentation and intonational phonology.

In this dissertation, I examine the prosodic features and intonation of Western Cham (WC). Basic phonological and syntactic features of this language have been described (to be discussed in detail in Chapter 2). Studies of suprasegmental features in understudied languages are uncommon due to difficulties described in the previous paragraphs. This study will contribute to the study of WC and other understudied languages by widening the field of inquiry and providing an example of such a work. It will further contribute to study of language contact, especially between WC and its
contact language Khmer. Adding prosodic and intonational features to comparisons of segmental phonology and syntactic structures will provide a more holistic view of the two languages.

1.6 ORGANIZATION OF THE DISSERTATION
This dissertation is organized as follows. Chapter 2 provides some background information on WC and Chamic languages and some sociocultural information about WC communities in Cambodia. Chapter 3 gives a grammar sketch of WC. Chapter 4 discusses data collection and analysis methods used in this dissertation. Chapter Five is an examination of the interaction between lexical prominence and phonemic vowel length in WC. Chapter 6 examines the interaction of lexical prominence and phrase position. Chapter 7 describes sentential intonation. Chapter 8 summarizes this study and gives suggestions for further research.
CHAPTER 2
BACKGROUND ON CHAMIC LANGUAGES AND THE CHAM

In this chapter, I begin with an overview of the geographic distribution (Section 2.1) and genetic affiliation (Section 2.2) of Chamic languages, and I provide some history of the Cham people’s migrations (Section 2.3). These discussions are based on the existing literature on Cham, which is presented in more detail in Section 2.4, where I also discuss work on Western Cham (WC) in particular. Section 2.5 gives some sociocultural background of the WC speakers in Cambodia and includes some information about the participants in this research. In Section 2.6, I discuss the effects of language contact on Chamic languages, and I briefly introduce some information on the status of WC in terms of loss or endangerment in Section 2.7.

As Thurgood (1999, p. 2) notes, early records and scholarly works have used the term “Cham” to refer to all Chamic peoples and languages. In a narrower sense, “Cham” has been used to refer to Eastern Cham (EC), Western Cham (WC), or both. The Cham-French dictionary of 1906 includes words used in both Vietnam and Cambodia. The Bloods in their 1960s works use the term “Cham” to refer to EC, the variety spoken in Ninh Tuan Province, which includes Phan Rang, Vietnam (e.g., David Blood, 1967; Doris Blood, 1962, and several other publications by both authors). The terms “Eastern Cham” and “Western Cham” do not appear in the linguistics literature until the Friberg & Hor 1977 article on Western Cham phonology. Thurgood uses the term “Phan Rang Cham” to refer to Eastern Cham; Phan Rang is the name of the Vietnamese town around which EC is spoken. Thurgood seems to be the only one to currently to use this term for EC. The 2009 Ethnologue listing (Lewis, 2009) uses “Western Cham” and “Eastern Cham.”

2.1 GEOGRAPHIC DISTRIBUTION OF CHAMIC LANGUAGES

WC belongs to the Chamic subbranch in the Austronesian language family. Chamic is one of two subbranches of Austronesian spoken on the Southeast Asian
Ethnologue (Lewis 2009) lists eleven Chamic languages. Nine of the eleven are spoken in Vietnam: WC, EC, Haroi, Chru, Jarai, Rade, Cacgia Roglai, Northern Roglai, and Southern Roglai. The other two are Acehnese, spoken in northern Sumatra, and Tsat, spoken on Hainan Island, China. The geographical distribution of Chamic languages shows a highland-lowland dichotomy described by Enfield (2005) in his overview of mainland Southeast Asian languages. Jarai, Rade, Chru, and Roglai are highland languages whose speakers live in the highland areas of Vietnam and Cambodia; speakers of Eastern Cham, Haroi, and Western Cham live in lowlands or coastal areas.

Figure 2.1. Mainland Southeast Asia.

Hainan Island at 18 N, 108 E.

1The other is the Moklen subbranch comprising Moken and Moklen spoken on islands off the coast of Thailand and Myanmar, with some speakers on the Thai coast.
Chamic languages spoken in Cambodia are WC and Jarai. The Jarai are found in mountainous regions spanning southern Vietnam and in Rattanakiri Province in northeastern Cambodia. Rade is not known to be spoken in Cambodia, according to the 2009 edition of the Ethnologue (Lewis 2009); however, since its area of distribution is adjacent to Jarai-speaking areas, it is possible that there are some Rade speakers in Cambodia. Grant (2005), for example, assumes that the Rade live in Cambodia: “The speakers of Rade and Jarai who live in Cambodia are also in touch with Khmer” (Grant, 2005, p. 39).

2.2 CHAMIC LANGUAGES WITHIN THE AUSTRONESIAN FAMILY

The languages in the Chamic subgroup are closely related to each other, with a relatively short time span since they split off from one another (Blust, 1992). Sources differ on subgrouping of Chamic within the Austronesian family, primarily in how Chamic is related to the other branches in Malayo-Polynesian, but all reflect the dichotomy between highland and lowland languages within the Chamic subgroup. Below I briefly describe the different subgroupings presented by the Ethnologue (1) and Blust 1992 (2).

(1) Austronesian — Malayo-Polynesian — Malayo-Sumbawan — North & East — Chamic.

(2) Austronesian – Malayo-Polynesian – Western Malayo-Polynesian – Malayo-Chamic – Chamic

The Ethnologue classification as of 2009 (Lewis 2009) has a Malayo-Sumbawan branch from Malayo-Polynesian, from which the Chamic branch is a granddaughter node. In this family tree, the Chamic and Malayic sub-families do not form a single subbranch but are sister branches. Blust (1992)’s subgrouping differs from that of the Ethnologue in having a Malayo-Chamic branch which breaks off from Western Malayo-Polynesian.

Thurgood (1999)’s reconstruction of Proto-Chamic is based on Blust 1992 and reflects the order in which Chamic languages broke off from one another. Thurgood’s grouping of Chamic is similar to that of the Ethnologue, differing only in one branch.
Both Thurgood and Ethnologue divide Chamic into three: Acehnese comprises one branch on its own. Highlands Chamic is comprised of Jarai, Chru, Roglai varieties, and Tsat. Coastal Chamic has Haroi, WC, and EC. The two trees differ in how languages in Highlands Chamic are subgrouped. For instance, the Ethnologue has Jarai and Rade as separate independent branches of the Highlands node, whereas Thurgood’s has one branch that later splits into Jarai and Rade. Ethnologue lists three varieties of Roglai while Thurgood has just one. Coastal is comprised of Haroi, WC, and EC. In either subgrouping, WC’s position within the Coastal Chamic group is the same. Haroi forms one node while EC and WC form the other.

2.3 A BRIEF HISTORY OF THE CHAMIC SPEAKING PEOPLES

Austronesian speaking peoples are thought to have migrated to mainland Southeast Asia from southwest Borneo around 200 to 300 BC (Blust, 1992). These speakers initially formed a dialect chain along the coast of Vietnam that possibly extended to the Malay peninsula (see Blust, 1981). The Austronesians are thought to have immediately come into contact with Mon-Khmer speaking peoples already in the area (Thurgood, 1999, p. 17). In the north, the contact languages were probably one or more Katuic languages in the Eastern Mon-Khmer sub-branch of Mon-Khmer (Thurgood, 1999, p. 20).

A political entity called Funan appears in Chinese historical records between the third and sixth centuries, as offering tributes to the Chinese emperor (Chandler, 1983, p. 15). Blust (1992) presents the case for Funan initially being populated by Austronesian speakers. This argument is reiterated by Thurgood (1999). If the Funan residents were indeed Austronesian, they would have been the ancestors of the Chamic-speaking peoples. In fact, Blust and Thurgood argue that Funan was the first point of contact for the Austronesian migration to the Southeast Asian mainland, and that there was an unbroken dialect chain ranging from present-day Vietnam to the Malay peninsula, subsequently broken by the Khmer expansion from the north. However, the view that historians accept is that Funan to Chenla to Angkor forms a continuous political line, that is, that Funan residents were Mon-Khmer: “Postcolonial Khmer historiography has commonly depicted Cambodian history as a thread running from Funan to Angkor to the
reign of Ang Duang” (Edwards, 2007, p. 9). Chandler (1983, p. 20) describes the period of Funan’s existence as when Cambodia’s political center was located southeast of present-day Phnom Penh.

Cham historiography has undergone a revision in recent years so that traditionally held ideas about Champa and its relationships to Vietnam and Cambodia have changed (cf. Vickery 2005, Southworth 1998). In the traditional view, Champa, a nation of Chamic speakers, first appears in historical records as “Lin-yi” in 192 AD (Blust, 1992). At its peak, Champa stretched from present-day Quang-Tri (16.75° N) in the north to just above the mouth of the Mekong River in the south (Thurgood, 1999, p. 20). The current view among historians is that Linyi was not necessarily Austronesian-speaking, as Chinese historical records do not have any mention of language nor ethnicity. Vickery in fact proposes that Linyi inhabitants were Mon-Khmer speakers, and that part of its area at a certain point may have included Austronesian speakers. Mention of Linyi cannot be equated with Chams before the 5th century (Vickery 2005).

Historians now hold that “Champa” was never a unified kingdom but separate polities with shifting relationships: alliance, separation, or hostility. This view accounts for apparent contradictions in historical records; one record may tell of events in one Cham polity while another may recount a different polity. Vickery groups these Cham kingdoms, or polities, into three loose groups: the North, which includes Thu Bon valley, including My Son, Tra Kieu, and Dong Duong (Indrapura). The Northern Chams at one point expanded to Quang Tri in the mid-9th century. The Central area comprises Nha Trang. The South includes Phan Rang. Dominance shifted between these different polities at different time periods. (cf. Figure 2.2 for locations of place names)

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2 Citing Maspéro 1928; Hall 1955, p. 26
Figure 2.2 Vietnam.

Ho Chi Minh City at 10 N, 106 E. Quang Binh, Quang Tri, Quang Nam, and Binh Dinh are names of provinces; Nha Trang and Phan Rang are cities in Khanh Hoa and Ninh Thuan provinces, respectively.

The relationship of Chams to Vietnam has also been the subject of revision. The traditional view has Vietnam as the aggressor, pushing south and enlarging its territory. This southward expansion is supposed to have led to the fall of Indrapura, the northern Cham capital located near what is now Da Nang (16.04° N), in the year 982 which caused many people to migrate to other parts of Southeast Asia. Thurgood suggests that the first to break off were the ancestors of the Acehnese, who originated in the northernmost part of the Chamic dialect chain and who left for Sumatra at that time (Thurgood, 1999, p.
29). Others migrated to the Vietnamese highlands and Hainan Island. The fall of Vijaya, the southern Cham capital located around present-day Khanh Hoa (12.15° N), occurred in 1471. This event initiated another wave of Chamic migration to the Vietnamese highlands, China (Guangzhou), Malaka, Aceh, Thailand, and Cambodia. However, the view of the Vietnamese as the one-sided aggressor has been replaced by the current view that the aggression was instigated on both sides with Linyi, then the Chams provoking the Vietnamese as well as vice versa. Furthermore, the notion of “push to the south” has been rendered inaccurate (Taylor 1998). From the 15th century, the current view matches the traditional view. The turning point in Cham-Vietnamese relations occurs with the Vietnamese victory over Vijaya in 1471, which leaves the Cham with just the Southern region. Subsequently, the Chams retreat further south to Phan Rang due to several 17th century battles. Cham entities remain in Phan Rang until 1832. (Vickery 2005).

The revised historical narrative also calls for a reexamination of Chamic migration because these events in Champa history are taken to correspond to the subgrouping within Chamic. The currently held view is that Vietnam’s southern expansion displaced Chamic-speaking peoples. The northernmost point of the dialect chain broke off first, becoming Acehnese. Next to break off were the Roglai, Tsat, and Chru. Thurgood cites some shared phonological innovations as evidence that Northern Roglai and Tsat formed a single dialect before splitting off from the northern part of the dialect chain; this break came after the fall of the northern capital. Jarai and Rade form the other subbranch of Highlands Chamic. According to Thurgood, Rade and Jarai likely did not form a group before the split from the dialect chain, but rather broke off independently of one another. Finally, the fall of the southern capital prompted a break out of which formed the Coastal subbranch comprising Haroi, EC, and WC. While the order that these Chamic subgroups branched out may be valid, we cannot be certain as to the cause of movement, at least until the fall of Vijaya in 1471.

The reexamination of the historical narrative also led to a revision of ideas about Cham-Cambodian relations, in particular the Cham attack on Angkor in 1177 and the counterattack by Jayavarman VII. Vickery and others contend that there was no Cham attack on Angkor in 1177. Between 1160 and 1170, Cambodia was in turmoil and there
may have been some fighting between Chams and Khmers. Jayavarman VII was in the Cham city of Vijaya when the Angkorean king Yasovarman II was overthrown by an usurper. The major attack on Angkor was, in the historians’ revised view, led by Jayavarman VII and his Cham allies and these battles are the ones depicted on bas-reliefs of Bayon temple. Previous interpretations of the reliefs have been that they show the Cham attack of 1177. It seems that different Cham kingdoms were allied with different Khmer factions and participated on both sides of the battle. After the fall of Vijaya and the subsequent migration, the Cham in Cambodia appear sporadically in historical records. According to Thurgood (1999), the Khmer annals and Khmer royal chronicles mention the Chamic migration into Cambodia. Edwards notes, however, that many Chams served the Cambodian kings Ang Duong (reign 1845–1860) and Norodom (reign 1860–1904) as soldiers and dignitaries. Many of them followed Norodom when he moved the court to Phnom Penh in 1866 (Edwards, 2007, p. 56, citing Marcel Ner, Bulletin École Française d’Extrême-Orient, 1941).

Common linguistic innovations in Coastal languages include the breathy voice register. After the split, Haroi is thought to have come under the influence of Hre, an Eastern Mon-Khmer language in the Bahnaric group, and other highland Chamic languages. At present, EC is spoken in southern Vietnam in Binh Tuan and Ninh Thuan Provinces; Haroi is spoken slightly north of EC-speaking areas. WC is spoken in Cambodia and an area near the Cambodia – Vietnamese border. The geographic distribution of WC speakers will be described in Section 2.5.1. The language closest to WC is EC. They differ in some of the segmental correspondences; for instance, sa in WC compared with tha in EC for ‘one’. Spoken EC is more monosyllabic than WC, which is sesquisyllabic. EC is thought to have incipient tonal characteristics, whereas WC is thought to have phonemic voice quality distinctions. Details of WC voice quality are discussed in Section 2.4.2 and Chapter 3.

2.4 Previous works on Chamic and WC

2.4.1 Works of the nineteenth and early twentieth centuries

The Chamic languages and peoples have been the subject of a good deal of early scholarly inquiry. Among those mentioned by Thurgood (1999) are: Crawfurd's 1822
word lists; A. Bastian’s 1868 2-page word list and essay on the language and origin of the people; A. Morice’s 1875 800-page glossary; K.F. Holle’s 1880 replica of the Cham alphabet. Because of their similarities to Austroasiatic languages, Chamic languages were classified in early works as an intermediate link between Khmer and Malay (Aymonier, 1889) or a mixed language (Schmidt, 1906), or even Austroasiatic (Sebeok, 1942).

The late nineteenth century saw a surge of research in areas of Southeast Asia newly under French control. In 1901, the École Française d’Extrême-Orient (EFEO) was established in Saigon to gather knowledge about French Indochina, modeled on similar British and Dutch institutions, the Archaeological Department of Burma and the Dutch Colonial Antiquities Commission, respectively (Edwards, 2007, p. 36). The EFEO’s mission was to study that part of Indochina whose culture has been influenced by India (termed the “Indosphere” by Enfield 2005, p.85). The EFEO’s first president, Louis Finot, warned of “Orientalists from rival empires” infringing on French domains, as already “a Dutchman had translated the first Khmer inscription, while a German had produced the first study of Cham grammar.” (Edwards 2007, p. 36) Georges Maspéro and Georges Coèdes were part of this effort. Maspéro wrote a history of Angkor, published in 1904. Coèdes, a protégé of Finot, is known in Chamic linguistics for claiming that Chamic inscriptions dating from the fourth century AD are the earliest attested written Austronesian language (cited in Thurgood, 1999, 2005). He also played an important role in French Indochina scholarly circles. He was involved in the establishment of the École Superieur de Pali, a school that focused on Pali instruction. He was a curator at the National Library of Siam from 1918 to 1926 and finally became the director of EFEO in 1929.

Administrator-Scholar Etiénne Aymonier is known in Chamic circles for his Cham grammar published in 1889 and the Cham-French dictionary he coauthored with Antoine Cabaton (1906). Aymonier had begun his work on Indochina before the founding of EFEO and has a number of studies on the Khmer language as well. His Cham works are just one part of his total output on Indochina. In addition to the above two publications on Cham, Aymonier compiled a French-Khmer dictionary in 1878 with a Khmer collaborator, Son Diep, and produced the first translated collection of Khmer
folktales (1878) and works on Khmer history and geography (Edwards, 2007, p. 81). He returned to France in the early 1900’s and became the director of the École Coloniale, a school for students from French overseas territories. The Cham-French dictionary was subsequently published in 1906.

Aymonier and Cabaton’s Cham-French dictionary is an extensive work with over five hundred pages. It includes a grammar sketch as well as a reverse finder’s list (French to Cham). Entries are arranged according to the order of the Cham script and are labeled ‘A’ for the variety spoken in Annam, or central Vietnam, and ‘C’ for the variety spoken in Cambodia. The front matter includes a discussion of the Cham script, the grammar sketch, and cultural information, including names for the days of the week or months, and units of weights and measures that are rarely used today. The sketch grammar discusses some features that were obsolete, even at the time of writing. Most of the morphemes listed—suffixes and infixes—had fallen out of use, and the one still existing, the causative prefix pa-, had fossilized. There is a brief discussion of dialectal differences between Annam and Cambodian Cham that covers writing, pronunciation, and vocabulary. An excerpt of the same passage is provided in Annam and Cambodian Cham, from which the differences seem to be in the qualities of vowels, e.g., droh (A) vs. dreh (C), and of some consonants, e.g., cram (A) vs. srang (C).

2.4.2 Recent work: Phonology and phonetics

Doris and David W. Blood are both SIL linguists who have done much work since the 1960s on EC, which they call “Cham,” in Vietnam. Their work provides valuable input about various aspects of EC: syntax, phonology, and discourse (David Blood, 1967) language use (Doris Blood, 1961), sentential semantics (David Blood, 1977) and the importance of Cham script (Doris Blood, 1980).

Doris Blood’s (1977) study on clause and sentence-final particles and David Blood’s (1977) study on sentence types and their truth values include an impressionistic description of EC intonation. Their descriptive mechanism is to use lines drawn over the sentences to indicate flat, rising, or falling intonation. Both describe interrogative intonation as a rise on the last element. David Blood goes further and states that the rise usually falls on the final syllable or sentence-final particle. Negative imperatives have a
falling contour; positive imperatives have either a falling or rising contour, with what they term forceful imperatives having a rise. As for declaratives David Blood states that their intonation depends on the relative position of the sentence within a narrative. Non-final declaratives have a slightly rising intonation on the last word, while the final sentence has a fall on the last word. These observations will be compared with my own in Chapter 7.

Friberg and Hor, also SIL linguists, produced a body of work on Western Cham. Their work on the phonology of Western Cham (Friberg & Hor, 1977) is based on the variety spoken around Phnom Penh and describes allophonic variation for each phoneme. Other works by the same authors are a WC-Vietnamese-English phrase book (Friberg & Hor, 1976) and a vocabulary compilation (Hor & Friberg, 1978). Headley (1991) describes the phoneme inventory of WC spoken in Kompong Thom Province, which also gives the reconstructed proto-Chamic reflex for each phoneme in Kompong Thom Cham. Both Friberg and Hor (1977) and Headley (1991) remark upon the voice quality distinctions that are present in WC vowels.

Edmundson and Gregerson (1993) studied acoustic characteristics of WC voice register. The authors measured and compared several features—pitch, intensity, and first and second formants (F1 and F2)—for vowels in each register. The authors found that a First register vowel has a higher F1, or lower vowel height, and a slightly higher pitch than a Second register vowel. Second register vowels were found to have lower F1 and lower pitch. They also found that the F1 of First register vowels decreases over the duration of the vowel, while the F1 of Second register vowels is constant; they summarize this situation by saying that First register vowels have a “change of state” character and Second register vowels have a “steady state” character. Their results correspond with Headley’s (1991) impressionistic observation that First register vowels have “onglides.” Their study was limited by the small amount of data studied, and it did not provide information on what area, or even what country—Cambodia or Vietnam—the speaker population was from.

Brunelle (2005) explored the relationship between EC speakers’ exposure to Vietnamese and their realization of EC tones, finding that speakers’ familiarity or frequency of Vietnamese use does not correlate with the their use of pitch to differentiate
registers. More recently, he has started a phonetic analysis of register in three Cham varieties: EC in Phan Rang, Vietnam; WC in Chau Doc, Vietnam; and WC in Kompong Chhnang, Cambodia (Brunelle, 2009).

2.4.3 Recent work: Grammars and dictionaries

Baumgartner (1998) on Western Cham remains the sole grammar sketch of WC. At nineteen pages, it has no discussion of phonology and instead focuses entirely on syntactic structures. The grammar is based on texts collected by Timothy and Barbara Friberg in the 1970s. The exact data collection site(s) are not clearly stated, other than that it was in Southeast Asia, but several dialects of WC are represented according to Baumgartner. A recent grammar of EC written in Russian (Alieva & Thê’, 1999) was reviewed by Grant (2004). Thurgood (2005) provides a sketch grammar of EC based on data from David and Doris Blood’s papers. Gerard Moussay’s French-Vietnamese-Cham dictionary is a more recent dictionary, published in 1971. Some of my consultants told me that there is a Khmer-Cham dictionary in progress, but did not know who was involved.

2.4.4 Recent work: Historical and comparative

The relationship of Chamic to the rest of the Austronesian family is explored by Blust (1981; 1992) and Dyen (1971), among others. Reconstructions of Proto-Chamic have been proposed by Lee (1966) and Thurgood (1999). Lee (1966) suggests a reconstruction of Proto-Chamic based on four languages, namely Northern Roglai, Rade, Jarai, and EC. It lists lexical reconstructions and Proto-Chamic phonemic inventories. Thurgood (1999) gives an updated reconstruction of Proto-Chamic that includes five more languages in addition to Lee’s four; he includes WC, Written Chamic, Tsat, Haroi, Chru, and Acehnese; his WC data is taken from Hor and Friberg (1978), which is a vocabulary compilation. Doris Blood (1961) enumerates reflexes of proto MP in Eastern Cham.

The overall documentation status of WC may be thought of as fair, but with a need for updated primary data. Since existing work draws on different varieties of WC, more work on WC as spoken in Cambodia would add to a fuller description of this
language. The speech of Chams in Cambodia seems to be more variable than the papers mentioned here indicate. A dialect survey would help to elucidate the language variation situation among the Cambodian Chams. Text collection would also contribute to a more holistic view of this language.

2.5 **Sociolinguistic Background of Western Cham**

2.5.1 The Cham in Cambodia

As of 2009, the WC speaking population in Cambodia numbered approximately 290,000 people (Lewis, 2009). They are spread out over several provinces in Cambodia. Figure 2.3 below shows a map of Cambodia with the names of provinces where many of the Cham are found. The Mekong River flows into Cambodia from Laos, passing through the provinces of Stung Treng (not named on the map), Kratie, Kompong Cham, and Kandal (not named). At the capital, Phnom Penh, the Bassac River splits off from the Mekong to the south of the city. Both the Mekong and the Bassac Rivers flow into Vietnam. Also at Phnom Penh, a body of water called the Tonle Sap splits off to the north from the Mekong. The Tonle Sap flows northward through Kompong Chhnang Province and creates a lake that adjoins the provinces of Kompong Chhnang, Pursat, Battambang, Siem Reap, and Kompong Thom. During the rainy season, the Tonle Sap flows from the Mekong into the lake portion; during the dry season, its water drains into the Mekong.

The Cham population in Cambodia falls into two groups distinguished by differences in cultural practices. All are Muslims, but the two groups practice the religion differently. The largest segment of Chams follows Sunni Islamic customs in accordance with those in other predominantly Muslim countries such as Indonesia, Malaysia, and the Middle East. The majority of such Chams live in Kompong Cham Province, and to a lesser extent in neighboring Kratie Province along or close to the Mekong River. In particular, there is a high concentration of Chams in the Krouch Chmar [kroic cmaː] district of Kompong Cham. Both of these provinces are located on
the eastern side of the Tonle Sap. There are also such Cham communities in Phnom Penh, in the Boeung Kak district located in the northern part of the city, and in the nearby Ta Khmao district south of Phnom Penh.

Figure 2.3. Cambodia.

A smaller segment of Cambodian Chams, commonly called the Imam San, practices a more syncretic form of Islam and maintains some of the traditional Cham customs, including use of the Cham script. Other names for this group are Jahed, Cham

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3 Administrative units in Cambodia are: province [khaet], district [srok], commune [khum], and village [phum]. *Srok ‘district’ is also used in the sense of ‘country’ as in srok khmae ‘Cambodia’ or srok thai ‘Thailand.’
Banni, Cham Sot, and Kom Jumaat, according to Blengsli 2009. They are concentrated in Kompong Chhnang, Pursat, and Battambang Provinces and comprise 10% of the total Cham population in Cambodia (Blengsli, 2009). All three of these provinces adjoin the Tonle Sap, and these Cham communities are located to the west of the Tonle Sap (cf. Figure 2.3 above).

There are also Muslims in Cambodia who are not ethnic Chams. They are called “Chvea” [cviə], a term derived from the word “Java.” They are descendents of Muslims who immigrated in the fourteenth and fifteenth centuries from nearby areas, such as Minangkabau in Sumatra, and Kelantan and Pattani in the Malay Peninsula (Blengsli, 2009). Chvea populations are concentrated in Koh Kong, Kampot, and the town of Sihanoukville, known locally as Kompong Som, all of which are located along the Gulf of Thailand. A common perception that Khmers and other non-Chams have of Cambodia’s Muslim population is that “Cham” are Muslims who speak Cham (WC) and “Chvea” are Muslims who only speak Khmer. It is possible that this distinction is also used by the Chams themselves. For example, an ethnic ethnic Cham mentioned to me in passing that she sometimes represents herself as a “Chvea” because she cannot speak the language.

In ordinary conversation, Cambodians refer to the Cham as “Cham” [ca:m]; according to one of my consultants, the Cham ethnonym for themselves is [cam]. The term “Khmer Islam” is often used to refer to the Cham as well as other Muslims. Until recently, this term was used on the Cambodian national identification card to identify the ethnicity of Chams. Other minority peoples in highland Rattanakiri and Mondulkiri Provinces—for example, the Phnong (called “Mnong” in Ethnologue, Mon-Khmer), Jarai (Chamic), Tampuan (Mon-Khmer)—are lumped under the term “Khmer Loeu” [lə:], literally ‘upper Khmer’. (A more official term for ethnic minorities is cunciət piaktik lit. ‘race minority’.) “Khmer Kraom” is a term that is used to refer to ethnic Khmers living in parts of Vietnam that used to be part of Cambodia. This area, which includes Ho Chi Minh City and the mouth of the Mekong River, is called “Kampuchea Kraom,” literally ‘Lower Cambodia’, by the Khmers. I believe that the Chams stand out from other ethnic minorities in the eyes of the majority Khmer population for several reasons. Compared to the other minority groups, the Cham are far more visible, being more distributed
throughout the country, including urban areas. The Chams are known to have a different religion and social practices, such as not eating pork. Their modes of dress, especially for women, are visually different.

Perhaps as a reaction to the extreme nationalism espoused by the Democratic Kampuchea regime (Khmer Rouge, 1975–1979) and the People’s Republic of Kampuchea (the Vietnam-backed regime of Heng Samrin, 1980–1989), the current government is tolerant towards people of different religious and ethnic backgrounds. There is a Cham who has the honorary Khmer title okn̄a [okna] and has a high position in the government. There are no overtly discriminatory actions. Among ordinary Khmers, however, misconceptions about the Chams may exist. It was my impression of the Cham in Phnom Penh that the Cham and Khmer people each have different spheres of activity and do not interact except in necessary daily transactions. In non-urban settings, the Cham and the Khmers live in their own separate villages. A “Cham village” usually consists of only or mostly ethnic Cham. There are Islamic schools and dormitories for Muslim students only. Several halal restaurants operate in Phnom Penh, frequented by Cham and possibly other Muslims but not the Khmer.

Cham names are an example of how the people adapt to Khmer society but do not assimilate altogether. Khmer names are said with the given name last. For example, in the name Hun Sen, Sen is the given name. The other name, which is said first, is not necessarily a family name in the Western tradition. It may be the father’s or grandfather’s given name. To take an example, the name of the previous king was Norodom Sihanouk; Sihanouk is his given name and Norodom is the name of the first king in his line. A Cham name is said given name first, and is di- or polysyllabic; the second name is not a family name but one’s father’s name. Ahmad, a common Cham/Muslim male name, could be Khmerized as Math [mat], or Amat [amat]. Others may have a Khmer name that is not related to their Cham name in any way. For instance, a man named Abubakar pronounced [pka:] also had a Khmer name, Leb Ke. When telling their personal narratives, participants in this research would say their names in the Cham order. In other Khmer contexts, they would presumably reverse the order of their names. For instance, when I asked one participant for his signature, he signed his name in the Khmer order, with his Khmerized name.
2.5.2 Cambodian Cham social practices and education

During the course of my stays in Cambodia, I had the opportunity to interact with both syncretic and Sunni Chams. The syncretic, or Imam San Chams live in Orussey Village in Kompong Tralach District, Kompong Chhnang Province, approximately one and a half hours north of Phnom Penh. The village of Orussey is actually a collection of three villages: Orussey, Chan Kiek, and Srey Prey. To get there, one takes a “taxi”—a shared vehicle—to the small and dusty town of Sala Lek Pram (lit. ‘School Number Five’), which is located along National Road 5. This town is just north of Udong (also spelled Oudong), an old capital city of Cambodia during the sixteenth century. It has a market where nearby villagers go to buy goods not available in the villages. From Sala Lek Pram, one takes a moto (a motorcycle taxi) to Orussey. The livelihood of the village is based on agriculture. A number of younger people work in garment factories, a situation common to non-Cham communities throughout Cambodia.

Figure 2.4 Kroch Chmar district and Orussey village.

Phnom Penh at 11 N, 104 E

The two Chams who assisted me in 2007, 2008 and 2009 are from Kroch Chmar district in Kompong Cham Province, as are people whom I met through them. This
group are Sunni Chams. I also made short visits to two villages close to Phnom Penh to visit Sunni Chams. One was located south of Phnom Penh and its residents spoke WC. The other, nicknamed “Kilo 9” for its distance to Phnom Penh, was located north of Phnom Penh and most of its residents did not speak WC. Those from Kompong Cham Province mentioned fishing as a main source of income but noted that the harvest has decreased in recent years due to decreasing water levels in the Mekong River.

The women in Orussey cover their heads, but not all wear the traditional hijab that covers their entire head. Many younger women used what seemed like a Khmer krama\a (traditional scarf) and some wore a bandana that covered part of their head. Many young women wore t-shirts instead of a long-sleeved shirt that would cover their arms. The Cham men I encountered wore clothing that was typical of male Cambodians: long-sleeved shirt and long pants. Those in village settings were more casual, sometimes wearing T-shirts. People differed on the question of whether the physical characteristics of Cham and Khmer people were visibly distinguishable; Khmer people all say yes, and the Cham were vague on this point.

Both Sunni and Imam San villages may have their own “Cham school,” which a child may attend in addition to the Cambodian government school. Instruction in a Cham school seems to center around religious knowledge. Blengsli (2009) describes the different varieties of Islamic schools in Cambodia today. These may be broadly divided into old, traditional Sunni schools and schools operated by newer sects of Sunni Islam. Particularly since the UNTAC (United Nations Transitional Authority) took control of Cambodia in 1993, there has been a wave of foreign aid organizations commonly referred to as NGOs (non-governmental organizations) entering Cambodia. Along with the American, European, and Japanese NGOs, there have also been Middle Eastern organizations aimed at spreading their brand of Islam. Two main groups named by Blengsli are the Tablighi Jama’at, or Dakwah Tabligh, and Salafi, or Wahhabi-influenced, groups. These have strong ties to the Middle East and the Muslim world in general. A Salafi group, Umm al-Qura Charitable Organization, was shut down by the Cambodian government in 2007 after its ties to the 2002 Bali bombing suspects were exposed. The newer organizations create tensions with the “old group,” i.e., mainstream Sahfi’i Sunni Islam, due to the new groups’ disregard for local customs. Blengsli sums
up the Islamic schools as not emphasizing pluralism; since the schools do not teach their students about different varieties of Islam, students come out believing that their way is the only correct way to practice the religion. The newer schools in particular have an unfavorable view of local culture as something that taints pure Islam.

These new developments in the Muslim community have had an effect on the Imam San communities as well. There are stories about Imam San villages converting wholesale to mainstream Islam (e.g., Blensli, 2009), usually to gain access to foreign assistance. These stories may not be far from the truth, for when I visited Orussey village, I was told that a “foreign organization” had offered funds to rebuild their mosque, with the stipulation that the new building be in the “Arab style.” The village turned down the offer and the traditional mosque still stands. The exact nature of this “foreign organization” is not known.

All participants in Orussey village attended or had attended the local government school, Hun Sen High School, located in Sala Lek Pram. Their village school has two teachers. At the time of my visits in 2009, the village instruction seemed to focus heavily on English instruction so that students’ English proficiency was surprisingly good. Their futures after high school were not very clear. Many professed a wish to continue studying at a university or technical college but lacked funds to do so.

One of my Kompong Cham assistants attended what he termed an “Islamic school” in Phnom Penh. He had come from his village to Phnom Penh in his early teens because his village did not have a secondary school. According to him, the language of instruction at this school was Khmer because not all students speak Cham (WC). Nevertheless, it was my impression that most students at this school are ethnic Chams.

Both of my Kompong Cham assistants attended a university on a scholarship. According to one, approximately 300 Cham students receive a foreign scholarship to attend a university every year. Another mentioned Kuwaiti scholarships for Cham youth. Most of these students enroll at a private university where English is the language of instruction.

School attendance for both groups seemed to be ad hoc. Entering elementary school at grade two or skipping a few grades is not unusual. One of my Kompong Cham assistants, for instance, started grade one at age 10 and skipped grades three, four, five,
and six. If two students are the same age, one may be a high school student and the other a university student. It is not unusual for someone in his early twenties to be in high school. This may be a common situation for Cambodia, not limited to Chams.

All the Chams I met believed in the importance of learning English and all of them could speak some English. As previously mentioned, the Kompong Chhnang speakers practiced English in their village school. The Kompong Cham students attended a university where all the instruction is conducted in English. There are several such universities, all private, in the country. Because the Cambodian economy is heavily dependent on foreign investment and tourism, many jobs, especially in Phnom Penh, entail interactions with English-speakers. Proficiency in English is just as important as a university degree; since not many Cambodians go to a university, their degree of English ability becomes crucial in determining what jobs they may obtain.

The Imam San group in Kompong Chhnang and the Kompong Cham group in Phnom Penh do not seem to interact often, which may be partly due to geographical distance between the two. Kompong Chhnang Province is located west of Kompong Cham and the Tonle Sap, while Kompong Cham Province is to the east of the Tonle Sap. The Tonle Sap is a physical obstacle to east-west movement. In addition, the highways (called “National Roads”) north of Phnom Penh run more or less along north-south lines, which makes it difficult to move across the country. One would need to travel to Phnom Penh first to get to the other side.

Mutual attitudes between the Cham groups did not seem negative. To the Kompong Cham people, the perceived outstanding feature of the Imam San seems to be that “they only pray once a week” (Friday). Conversely, my Imam San participants refer to the others as “the ones who pray five times a day.” The mosques of the majority are in the typical Arab or Malay style that has a dome in the middle and pillars on the side. On the contrary, the mosque in Orussey village is a rectangular building without a dome (see Figures 2.7 and 2.8). Ramadan, an important time for Muslims, is also practiced differently by the two groups. In 2009, Ramadan began at sundown on Friday, August 21 for most Muslims. For Orussey village, it began on Saturday, August 22. I had visited the village earlier in the week and asked the youth when Ramadan would begin. It seemed that the villagers would not know whether Ramadan would start on Friday or
Saturday until sundown on Friday. They replied, however, that they were not sure when it starts, and explained that “If we don’t see the moon on Friday it [Ramadan] will not start.”

Figure 2.5 Main street in Orussey Village.
Figure 2.6 Sunni Mosque at Boeung Kak district, Phnom Penh.

Figure 2.7 An Imam San mosque in Orussey village (center building).
There are two scripts in use to write WC. The larger group uses Jawi, an Arabic-based script also used in Malaysia. The Imam San group maintains the traditional Cham script, which developed from Indic script, as with Khmer, Thai and Burmese scripts. Older people seem to feel that the transmission of the script, and the language in general, is threatened, and that younger people have difficulty with it or are not learning it (Ben Rabitor, personal communication, 2006). It may be that their sense of threat to the script and language is heightened due to the fact that they are minorities even among Cambodian Chams, and they see other communities converting to mainstream Sunni Islam. Eastern Cham speakers in Vietnam are taught the traditional Cham script, although the effort is largely unsuccessful in terms of getting people to habitually use it in daily life. Even so, Cham speakers in Vietnam are opposed to Romanization. (Doris Blood 1980, Brunelle 2009). My impression of the Cambodian Cham is that they are not enthusiastic about Romanization regardless of which script their community uses. Those
that use the Jawi script see it as a link to the wider Muslim community outside Cambodia. Several speakers have pointed out that “Malay people use this writing too.” On the other hand, the traditional Cham script for the Imam San is a link to their past, something that highlights their uniqueness from the other Cambodian Chams and the Khmer.

2.6 Language contact effects

Ever since the ancestors of the Chamic speakers landed on the Southeast Asian mainland, they have been in contact with non-Austronesian languages. Champa itself was an Indianized culture, as can be seen from its script and the names of its cities: Indrapura, Vijaya, Amaravati. The Cham script, like other Indic scripts such as Thai, Khmer, and Burmese, has separate consonant and vowel symbols that are combined to make a syllable.

The Mon-Khmer contact with Chamic has been extensive and probably began as soon as Chams landed on the mainland. As stated earlier, the northern part of the Chamic dialect chain was probably in contact with Katuic; the other parts of the dialect chain were probably in contact with the Bahnaric branch of Mon-Khmer (Thurgood, 1999). Since the Chamic languages began breaking off from one another, the individual daughter languages were in contact with different languages, some not Mon-Khmer. For instance, Haroi, a Coastal Chamic language, is thought to have had both Mon-Khmer and Highland Chamic influences after its break-off from other languages in its subbranch. This contact was not unidirectional; Headley (1976) discusses Chamic borrowings into Mon-Khmer.

According to Thurgood’s (1999) reconstruction, Proto-Chamic already had both phonemes inherited from Malayo-Polynesian and phonemes borrowed from Mon-Khmer (in particular, the MK monophthongs ə e ɔ; diphthongs ia, ua, uej). The stage before this contact influence, what Thurgood terms Pre-Chamic, is thought to be nontonal and nonregistral, with disyllabic canonical words and penultimate stress, five simple vowel nuclei, and four diphthongs. Its daughter languages are monosyllabic or have final stress, many with nine or more monophthongs and many diphthongs. The widely held view is that Chamic languages have developed tonal or voice quality distinctions characteristic of their immediate neighboring languages. Tsat, in contact with Chinese (Hainan) is tonal;
Eastern Cham, in contact with Vietnamese, is incipiently tonal; and Western Cham is widely held to have phonemic voice quality distinctions, as Khmer once did. These languages bear other indications of contact: phoneme inventories similar to that of Mon-Khmer and/or lexical borrowings (Thurgood, 1996, 1999).

When two languages, such as Eastern Cham and Vietnamese or Western Cham and Khmer, possess a number of common features (phoneme inventory, word shape, word stress), the similarities may be due to contact (external explanation) or convergence (internal explanation). Thurgood (1996) argues for an “external explanation,” which is that contact influenced the path of development in Chamic languages.

On the other hand, Brunelle puts forth a slightly more complex scenario of language contact and change. In his 2005 dissertation, Brunelle shows that speakers’ proficiency with Vietnamese, a tonal language, does not correlate with their realization of Eastern Cham, in their control of pitch. Some speakers who used pitch to differentiate the two registers were those who had little contact with Vietnamese in their daily lives. In follow-up studies involving Eastern Cham, Western Cham spoken in Vietnam, and Western Cham spoken in Cambodia, Brunelle shows that pitch was the most salient production mechanism in all three varieties to differentiate between the two registers. Based on his results, he argues that since not all three varieties are in contact with Vietnamese, a tonal language, the dominant role of pitch in Cham register is not due to contact. Instead, he suggests that this use of pitch may have been a property of Chamic languages before the language developed into different daughter languages.

Brunelle also points out that although WC is in contact with Khmer, a language that developed different vowel qualities from an original two-register system, such Khmer-like vowel quality has not developed in WC. He does note that EC speakers have a more pronounced difference in pitch, which may be an effect of Vietnamese. His conclusion is that contact effects and phonetic changes may be more fine-grained than previously assumed. Contact with Vietnamese may strengthen the role of pitch, which was already an inherent characteristic; however, it does not necessarily follow that this contact would cause the other language to develop into a tonal language.

As evidence against Brunelle’s view, the pattern of segmental reduction in WC mirrors the pattern in Khmer. A WC word with the canonical shape CV.CVC often
reduces to CaCVC or CCVC, where just the onset of the initial syllable is preserved, e.g., /lakaj/ -> [lkaj] ‘man, male’. The Khmer pattern of reduction is similar to that of WC in that the onset of the initial syllable often remains, e.g., /slapriə/ -> [spiə] ‘spoon’, /traku:n/ -> [təku:n] ‘morning glory/ung choi’.4 This canonical word shape is termed sesquisyllabic by Matisoff (1990). By contrast, colloquial spoken EC is for the most part monosyllabic (Brunelle, 2005); the difference between monosyllabic Vietnamese and sesquisyllabic Khmer likely had an effect on the canonical word shapes and reduction patterns of these two Chamic languages.

WC has had influences other than Mon-Khmer, namely Arabic and Malay, based on the Chams’ interactions with other Muslims. With ongoing interactions between Cambodian Chams and Muslim countries, and Malaysia in particular, this influence continues today. The influence of Malay on the majority Chams can be seen in some of the Kompong Cham speakers, especially those who attended the Islamic school. Some of these speakers consistently used Malay lexical borrowings with nativized Cham phonology. Below are some examples of such borrowed words.

<table>
<thead>
<tr>
<th>Malay word</th>
<th>Cham pronunciation</th>
<th>Cham gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>dan</td>
<td>tean</td>
<td>‘and’</td>
</tr>
<tr>
<td>hîngi</td>
<td>heŋki</td>
<td>although</td>
</tr>
<tr>
<td>binataŋ</td>
<td>pənataŋ</td>
<td>animal</td>
</tr>
</tbody>
</table>

ex. /ləkaj kəmaj nuʔneʔ/ tean oŋ tʰa: ru kɔ muʔ maj
man woman child and grfather old or grmother grmother
‘… men, women, children, and the elderly…’ (in Ramadan narrative)

Speakers seemed to be aware that these words were loanwords, but did not necessarily know that the source words were pronounced differently. Arabic words were often used for religious terminology, e.g., Ramsey, amalipadat ‘worship’, smiŋ

4 There are also words with original clusters, e.g., ekae ‘dog’, tpoal ‘cheek’.
taroveh ‘name of prayer done at night.’ Ramadan may be pronounced [ramadan] or [ramtuon] with devoicing of /d/ and an iambic reconfiguration of syllables. Depending on the nature and depth of contact, individual speakers may show signs of other cultural influences as well. One said his name in the Malay style, using bin, pronounced [pin], between the first and second name; the name X bin Y indicates that Y is the father of X. There seems to be a form of prestige associated with Malaysia, a predominantly Muslim country.

2.7 ENDANGERMENT AND THE FUTURE OF WC

With approximately 290,000 speakers according to the 16th edition of the Ethnologue (Lewis, 2009), Western Cham is not immediately endangered. This speaker number is a 30% increase compared to the previous version of the Ethnologue (Gordon, 2006), which listed 220,000 speakers. The attitude of the speakers reflects this fairly large speaker population. Most Chams I have met speak WC and do not think the language is in any danger of dying out. According to speakers I have met, the Cham are all bilingual in WC and Khmer; they say that they are more comfortable speaking Cham than Khmer. On the other hand, there do exist communities of ethnic Chams who do not speak WC such as the “Kilo villages” along National Road 5 north of Phnom Penh. The Chams in other villages believe that the situation in the Kilo villages is an exception; however, it is possible that such communities are more widespread than speakers believe, and not limited to the Kilo villages.

Divergence in the speech of Cham populations in Cambodia, in particular those living along the Mekong and those living along the Tonle Sap, may affect future vitality of WC as a whole. Divergent religious practices and geographical barriers potentially lead to a wider divergence in language. It is uncertain how speakers may interact with others whose speech is not mutually comprehensible. It is altogether possible that they may resort to Khmer. Fragmentation of language communities may in turn lead to weaker ties between WC communities. Use of WC then may become limited to a smaller number of people – those in one’s immediate family and community.
The current state of apparent equilibrium between the two languages may change if the Chams join in the flow of people from rural areas to the city, for urbanization is likely to increase in the future. There are several possible scenarios after the Chams begin moving to the city. One is that urbanization will not affect language use because Chams will mostly keep to their own communities within the city. Even now, there appear to be clearly defined domains of use: Khmer or English at school or the workplace and WC in other situations. Another possibility is that future generations of Cham born in the city will interact with the Khmer more than the current generation and speak Khmer more often. A third possibility is that there will be influence from languages other than Khmer. The influence of Malay was already seen in some speakers who attend the Islamic school, and this trend may continue, especially if the Cham begin to travel to Malaysia to study or work. This scenario is possible for the majority Sunni group, since many appear to align themselves with Malaysia.

Possible language shift situations are hard to predict. To take the EC situation for comparison, Brunelle 2005 describes an EC speaker’s occupation and education as a good indication of his/her degree of integration into Vietnamese society. He notes that white collar as opposed to agricultural jobs require a perfect command of Vietnamese, even in Cham cultural institutions. Such jobs are in towns where speakers would have more contact with the Vietnamese. Better-educated EC speakers also have a higher Vietnamese ability because higher education is conducted in Vietnamese and the majority of students at such institutions are Vietnamese.

The WC/Cambodia situation is not as straightforward as that of EC. In terms of both occupation and education, English ability plays a much more prominent role, and command of English is just as important as that of Khmer. As I discussed previously, many private universities use English as a medium of instruction. Many white collar positions also require some English ability. Depending on the nature of the company or organization, English may be used more frequently than Khmer. If the organization is a foreign one, there may be other staff members who do not speak Khmer very well or not at all. Living in Phnom Penh as opposed to a Cham village would mean more contact with Khmer speakers; however, the amount of exposure to Khmer may not be as substantial an exposure as an EC speaker would have to Vietnamese. Limited need for
Khmer in the workplace or universities may actually lead to decreased motivation for using Khmer. In the end, it may be that the Khmer language is not desirable or prestigious enough to cause Chams to shift. Even so, the Cham are not immune to loss of their native language; there are reports that there are communities of Cham immigrants in Malaysia where speakers quickly shift to Malay (Brunelle, personal communication, July 2009).
CHAPTER 3
AN OVERVIEW OF WESTERN CHAM GRAMMAR

In this chapter, I describe the basic grammar of WC, based on previous work and my own data. As mentioned in Chapter 2, there have been several scholarly works that describe some aspects of EC and WC grammar. Some areas, such as phonology, are reasonably well-studied; others such as syntax, less so. When we consider these works, there are several points to keep in mind:

1. Differences between EC and WC. To what extent do descriptions of EC grammar reflect WC grammar as well? There are more descriptions of EC than WC, and pre-1970 works do not differentiate between the two. Some authors assume that the varieties may be called dialects (see Thurgood, 2005, p. 489). Others consider them separate languages; Baumgartner writes “The Cham language … is divided into 2 major dialects, or more likely, two separate languages” (Baumgartner, 1998, p. 1). It is possible that the two varieties have diverged further since the 1970s because of borrowing from different dominant languages, Vietnamese for EC and Khmer for WC.

2. Regional variation within WC. Do descriptions of speech in one region of Cambodia reflect those of other Cambodian WC communities? For instance, Headley (1991) describes WC of Kompong Thom Province, but does not refer to other WC communities. Baumgartner (1998) refers to three main divisions within WC and says that they differ mostly in pronunciation and some vocabulary, but have few differences in grammatical structure.

3. Historical change. Does speech of current-day speakers differ systematically from that described in earlier work? Pronunciations of certain lexical items in my data differ slightly from those recorded in existing sources. These differences may be due to historical or regional variation.

These queries cannot be adequately addressed at this point due to lack of data that focuses on these issues. In this chapter, I will base my description on previous work, augmented with my own observations of phonological and syntactic phenomena.
The descriptions in this chapter are based on elicited and observed data from my 2007, 2008, and 2009 trips to Cambodia. During the 2007 and 2008 trips, I worked with one male speaker (AY) from Kompong Cham Province. During the 2009 trip, I worked with WC speakers from different regions; some were from Kompong Cham, others from Kompong Chhnang Province.

The orthographic convention in Chamic linguistics uses b, d, j, g to indicate voiceless stops that derive from voiced stops in the proto-language (*b, *d, *j, *g). Many earlier works, such as Friberg and Hor 1977 or the Bloods’ articles, follow this convention. Here, I will use the authors’ original orthographic conventions and add the phonemic transcription in parenthesis if necessary.

3.1 PHONEME INVENTORY

The phoneme inventory of WC is very similar to that of Central Khmer, the official language of Cambodia. Both consonant and vowel inventories are characteristic of languages in Mainland Southeast Asia (MSEA) as described by Enfield (2005) in that they include implosives, a full series of voiceless unaspirated and aspirated stops, three levels of vowel height, and three levels of backness.

The differences between the WC and Khmer phoneme inventories are minimal. WC has nine monophthong and four diphthong phonemes. The Khmer monophthong inventory has the same nine monophthongs and an unrounded low back vowel /a/ as well as several more diphthongs (Huffman 1970). The items in the consonant inventory are the same except for the characteristic of the rhotic; the WC rhotic is a voiced velar fricative [ɣ] where the Khmer rhotic is an alveolar trill or tap. When trying to Romanize his own speech, one of my consultants wrote /r/ as “g” as in “gay” for /raj/; it may be that he and possibly other speakers do not consider this sound as a rhotic. In Eastern Cham, /r/ has been described by Brunelle 2005 as a liquid, and as an alveolar flap or sometimes a trill by Blood (1962). Below I describe the consonant and vowel inventories in turn.
3.1.1 Consonants

Table 3.1 below shows the WC consonantal inventory. There is free variation in the realization of implosives /ɓ, ɗ/, often realized as plain voiced stops [b, d]. Voiceless unaspirated stops, which derive from earlier voiced unaspirated stops (e.g., *b > p) are sometimes realized by some speakers with slight voicing, e.g., /plaj/ [blaj] ‘buy’. I observed several instances of such variation in some speakers in my data. In the speech of one speaker, the second /p/ in /papuy/ was slightly voiced, as in [pabuj] ‘pig’ but [puj] ‘fire’. For this speaker, the initial /p/ in [plaw] ‘feather’ alternates between [p] and [b]; while the /p/ in [e₂ paaj] ‘soup’ sounds slightly like [b]. In the speech of another speaker, slight voicing was observed in words such as /talam/ [dəlam] ‘deep’, /phaaw/ [bhaaw] ‘new’, /plaan/ [blaan] ‘month’, /taj/ [daj] ‘younger sibling’. From the limited set of speakers I worked with, it was not clear if there were systematic alternations such that slight voicing may be observed with the stops derived from *d but not with those that derive from *t, e.g., /talam/ [dalam] vs. /hataj/ [taj] ‘liver’. The alternative possibility is that only a subset of words with segments deriving from *b, *d, *j, *g display slight voicing.

Table 3.1. WC consonant inventory.

<table>
<thead>
<tr>
<th></th>
<th>labial</th>
<th>alveolar</th>
<th>palatal</th>
<th>velar</th>
<th>glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>voiceless unaspirated</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td>?</td>
</tr>
<tr>
<td>plosive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiceless</td>
<td>pʰ</td>
<td>tʰ</td>
<td>cʰ</td>
<td>kʰ</td>
<td></td>
</tr>
<tr>
<td>aspirated plosive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>implosive</td>
<td>ɓ</td>
<td>ɗ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nasal</td>
<td>m</td>
<td>n</td>
<td>ŋ</td>
<td>η</td>
<td></td>
</tr>
<tr>
<td>liquid</td>
<td></td>
<td>l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fricative</td>
<td>s</td>
<td></td>
<td></td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>rhotic</td>
<td></td>
<td></td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>approximant</td>
<td></td>
<td>j</td>
<td></td>
<td>w</td>
<td></td>
</tr>
</tbody>
</table>
Many scholars (e.g., Henderson, 1952; Pinnow, 1980) do not consider voiceless aspirated stops in Khmer as distinct phonemes, instead treating them as a cluster of two segments, e.g., /p/ and /h/ for /ph/. This interpretation is based on the fact that an infix may break up these clusters, e.g., /kʰəŋ/ ‘angry’, /kʰəmhaŋ/ ‘anger’ (Henderson, 1952). Western Cham does not have productive infixation, but speakers’ realizations of aspirated stops suggest an analysis similar to Khmer. Many WC aspirated stops derive from an earlier sequence of stop + vowel + h; for example, [phaw] ‘new’ comes from *bahaw. In addition, I observed that some lexical items still retain variation between a CVhV sequence and the reduced ChV variant; for example, /tʰaː/ ‘old’ is pronounced by some speakers as [tʰaː:] while others say [tʰaː:].

3.1.2 Vowels

Previous work has presented the WC monophthong vowels as having three levels of backness and height (Friberg and Hor 1977, Enfield 2005). Figure 3.2 shows a vowel chart based on Friberg and Hor 1977. On the other hand, Headley (1991) posits five heights: high, mid-high, mid, mid-low, and low. In this scheme, /e/ is mid-high; /ə, o/ are mid; /ɛ/ is mid-low, and /a, ɔ/ are low.

Table 3.2. WC vowel inventory according to Friberg & Hor 1977, p.30.

<table>
<thead>
<tr>
<th></th>
<th>[-back]</th>
<th>[+back, -round]</th>
<th>[+back, +round]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[+high]</td>
<td>i</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>[-high, -low]</td>
<td>e</td>
<td>ə</td>
<td>o</td>
</tr>
<tr>
<td>[+low]</td>
<td>ɛ</td>
<td>a</td>
<td>ɔ</td>
</tr>
</tbody>
</table>

In this dissertation, I propose a different vowel chart (Table 3.3). The “mid,” or non-high non-low vowels are divided into tense and lax, or what may also be called a peripheral and non-peripheral distinction. English lax vowels are “shorter, lower, and slightly more centralized than the corresponding tense vowel.” (Ladefoged 1990, p. 86). While WC mid-lax vowels are not necessarily short, they are lower and slightly more centralized than the corresponding tense vowels.
Table 3.3 Proposed phonemic chart of WC monophthong vowels.

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>Mid-tense</td>
<td>ɛ</td>
<td>ə</td>
<td>o</td>
</tr>
<tr>
<td>Mid-lax</td>
<td>ɛ</td>
<td>ɔ</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>

The vowel /a/ varies in its phonetic realization between a very front [æ] as in [kæn] ‘fish’ and a back [ɑ], as in [lɑ] ‘snake’.

### 3.2 Vowel length

While scholars agree as to the number of WC monophthong vowel phonemes, they differ on the questions of vowel length distinctions and numbers of diphthongs. Headley (1991) states that /e/ only occurs long. Friberg and Hor (1977) state that the vowels /e, ə, o, i/ only occur long. The vowels on which both sources agree on the existence of phonemic length distinctions are /i, u, a, ɔ, ɛ/. Eastern Cham has two vowels /e, o/ that only occur long (Brunelle, 2005).

### 3.3 Diphthongs

Sources differ on the number of WC diphthong phonemes. Headley’s (1991) six diphthongs are /ia, iu, ea, au, ua, oɑ/. Friberg and Hor (1977) list four diphthongs, /iə, ɛə, ɔə, uə/. Brunelle (2005) and David Blood (1962) list only two for Eastern Cham, /ie, uo/ (written iə and uə by Blood [1962]). Diphthongs may be surface diphthongs, which are sequences of two vowels at the underlying level, or phonemic diphthongs, which are unitary vowels at the underlying level. I will not undertake to determine the phonetic or phonemic status of WC diphthongs here.

Table 3.3 shows Headley’s diphthongs and Table 3.4 shows the diphthongs according to Friberg and Hor.
Table 3.4. Diphthongs according to Headley (1991).5

<table>
<thead>
<tr>
<th>Diphthong</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ia/</td>
<td>/sia/ ‘near’, /plia/ ‘hail’, /mapiah/ ‘keep’</td>
</tr>
<tr>
<td>/iu/</td>
<td>/lahiu/ ‘lose’, /lamiu/ ‘put away’</td>
</tr>
<tr>
<td>/ua/</td>
<td>/suay/ ‘slow’, /luan/ ‘swallow’, /kamuan/ ‘nephew’</td>
</tr>
<tr>
<td>/oa/</td>
<td>/tōa/ ‘two’, /coah/ ‘sand’</td>
</tr>
</tbody>
</table>

Friberg and Hor (1977) note that /ɔə/ is realized as [ˈa] but posit this diphthong as /ɔə/ to preserve symmetry with the front diphthong /ea/. /ɛə/ is derived from an earlier [ˈa]. In my observations, however, I found that the first vowel quality in a diphthong was the nucleus and the second quality was the offglide, e.g. /mapiən/ [məpiˈn] ‘when’, /toa/ [to³] ‘two.’

Table 3.5. Diphthongs according to Friberg and Hor (1977).

<table>
<thead>
<tr>
<th>Diphthong</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ia/</td>
<td>[iə] _/w/, /wʔ/; /iəwʔ/ [iəʔ] ‘to see’, /iəw/ [iə] ‘to call’</td>
</tr>
<tr>
<td></td>
<td>[iə] elsewhere; /siət/ ‘slide in seat’</td>
</tr>
<tr>
<td></td>
<td>[eə] elsewhere; /heə/ ‘to cry’, /tean/ ‘stomach’</td>
</tr>
<tr>
<td>/ɔə/</td>
<td>[ˈa]; /dɔən/ [tˈan] ‘to pick’</td>
</tr>
<tr>
<td></td>
<td>/hoəʔ/ ‘to eat’</td>
</tr>
<tr>
<td></td>
<td>/thɔə/ ‘to travel’</td>
</tr>
<tr>
<td>/uə/</td>
<td>/tuəʔ/ ‘kind of tree’</td>
</tr>
</tbody>
</table>

Each of Friberg and Hor’s four diphthongs corresponds to one of Headley’s: /ia/ to /ia/; /eə/ to /ea/; /uə/ to /ua/; and /ɔə/ to /oa/. Headley’s /iu/ seems to be an allophonic

5 The phonetic transcription was not listed for all items.
variant of /iə/ seen in Friberg and Hor’s work. The crucial difference between the two inventories is the characterization of a glide before a glottal stop. For reasons of parsimony, Friberg and Hor’s analysis seems preferable, since Headley’s /iu/ and /au/ have a limited distribution; both only occur before a glottal; these could be written /vowel + glide/.

All four of Friberg and Hor’s diphthongs were found in my data. Two, namely /ɛə, ɔə/, were more commonly observed, e.g., /tɛən/ ‘stomach’, /tɔə/ ‘two’. The other two, /iə, ua/ were not as frequently observed, but were nevertheless found, e.g. /mpiən/ ‘when’ and /luən/ ‘to swallow’. Some speakers also had a diphthongal quality in the high central vowel /i/, in words listed with long /i/ in other sources, e.g., Headley /lami/ as opposed to my data [ləməi] ‘five’. Here the second quality, the one that was the original vowel quality of the nucleus, is more prominent, i.e. [i]. A few speakers also had a slight diphthongal quality in some instances of /a/, being realized as [a], e.g. /calæan/ [cəl'æn] ‘road.’ The vowel /a/ with this diphthongal quality was not common and speakers did not produce it consistently. A slower speaking style was more likely to produce [a] in speakers who did have the diphthongal quality.

3.4 REGISTER EFFECTS AND PHONATION TYPE

The term “register” in phonetics refers to the phonemic difference in voice quality. For instance, the same sequence of segments /pa/ may be realized with breathy, creaky, or modal (clear) voice quality, and each quality may be phonemically distinct. Many SEA languages have a two-way or even a three-way contrast in phonation (e.g., many Mon-Khmer languages, Hmong, Burmese). In a wider sense, “register” is understood as a collection of several acoustic features that characterize a set of allophones. According to Friberg and Hor (1977), the WC register contrast is realized as a combination of several acoustic features, called a “bundle of features” by Brunelle (2009b, p.1): vowel quality, voice quality, and pitch difference. Some features may be more prominent than others, their relative prominence being a language-specific feature.
In WC, First Register vowels have higher pitch than corresponding Second Register ones, clearer voice quality, and a lower vowel height. According to Brunelle (2009), WC’s most prominent feature is voice quality or “open quotient” (a measure of breathiness: the proportion of the time the glottis is open as opposed to closed; the acoustic correlate is the difference between the first and second harmonic of the vowel), while EC’s prominent feature is pitch.

The WC register system and its development is described in Friberg and Hor 1977 and Thurgood 1996 and 1999. The two WC registers are thought to originate from an earlier distinction in the preceding consonants:

*pa > pa (with clear, high pitch)  
*ba > pa (with breathy, low pitch)

The voiced stops eventually devoiced, but the voicing contrast developed into a contrast in the following vowels’ voice quality and pitch. First Register vowels are those that followed earlier voiceless stops; Second Register vowels followed earlier voiced stops. A similar historical change in Mon-Khmer languages is described by Huffman (1976).

Friberg and Hor (1977) describe the relationship between First and Second Register phonation type and vowel height. At each height level, there is a dichotomy between the two registers, but the exact nature of the contrasts differs. In discussions of voice quality, the terms “tense” and “lax” refer to relative voice quality, not tongue position. High vowels (i, ɨ, u) have tense voice quality in the First Register, while they have modal voice quality in the Second. Mid vowels (e, ə, o) have tense quality in the First Register and lax quality in the Second. Low vowels (ɛ, a, ɔ) have modal voice quality in the First and lax quality in the Second Register. This schema is summarized in Table 3.5. The Second Register voice qualities for any height are relatively more lax than the voice qualities for the corresponding First Register vowels.
Table 3.6. WC vowels and relative voice quality (chart modified from Friberg and Hor’s [1977, p. 31] diagram).

<table>
<thead>
<tr>
<th></th>
<th>First Register</th>
<th>Second Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (i, i, u)</td>
<td>tense</td>
<td>modal</td>
</tr>
<tr>
<td>Mid (e, ə, o)</td>
<td>tense</td>
<td>lax</td>
</tr>
<tr>
<td>Low (ɛ, a, ɔ)</td>
<td>modal</td>
<td>lax</td>
</tr>
</tbody>
</table>

In my own experience, I did not observe much breathiness in the Kompong Cham speakers, who were the first few speakers I encountered. Later, I discovered that Kompong Chhnang speakers supposedly have some breathiness in some of their speech; when I asked the Kompong Cham speakers to describe how WC speakers in other areas of Cambodia differ in their speech, one demonstrated how a Kompong Chhnang speaker would say a word, using a lower “throaty” voice. The breathiness in the Kompong Chhnang speakers is not very noticeable in isolation, although many token words that end in a vowel showed some breathiness in the spectrogram.

3.5 Vowel allophony

Friberg and Hor (1977) and Headley (1991) describe allophony due to segmental environment and/or voice register. Both mention the diphthongization of long /ɛ/, ɛɛ - > [æ]/[æɛ]. Headley describes gliding for /i/ and /u/ (Table 3.7), which I also observed among Kompong Cham speakers, but more pronounced than noted in Headley. For instance, /u/ is described by Headley as [u], but the corresponding pronunciation of speakers I worked with was best transcribed as [ou], e.g. [hou] ‘have’, [kou] ‘Khmer’, [nou] ‘3s pronoun.’ Both Thurgood 2005 and Baumgartner 1998 write /ku/ for ‘Khmer’ and Baumgartner 1998 has /nu/ for the third person pronoun. Likewise, my observations of /i/ had some diphthongization, as in [i], as in [h ‘i] ‘2s pronoun’ and [lam ‘i] ‘five.’

I should note that *ɛɛ > æ is a historical change that occurred in Khmer in the transition from Middle to Modern Khmer; a shift occurred for some other vowels in certain contexts, including *i > ij or ej; *i > ə; *u > o.
Table 3.7. Friberg and Hor’s (1977) allophones; the symbols γ and γ indicate tense and lax quality respectively. My comments are in brackets {}.

<table>
<thead>
<tr>
<th>Vowel phoneme</th>
<th>Description of voice quality and/or segmental features</th>
</tr>
</thead>
<tbody>
<tr>
<td>/i/</td>
<td>[i:] /sit/ ‘small</td>
</tr>
<tr>
<td></td>
<td>/i/ [+nas, +cor, +ant] /khım/ [khım] ‘to smile’</td>
</tr>
<tr>
<td></td>
<td>/i/ elsewhere /klik/ [klik] ‘to tickle’</td>
</tr>
<tr>
<td>/ɛ/</td>
<td>[ɛ] C[-TRA] _/ʔ/ {tense before /ʔ/}</td>
</tr>
<tr>
<td></td>
<td>[ɛ] elsewhere; [pake] ‘tomorrow’</td>
</tr>
<tr>
<td>/ɛ/</td>
<td>[ɛ:] C[+TRA] _ {after 2nd Register stops}</td>
</tr>
<tr>
<td></td>
<td>[ae] C[-TRA] _ ; /pet/ [pa’t] ‘out of shape’</td>
</tr>
<tr>
<td>/i/</td>
<td>[ɔ:] C[-TRA] _C {1st Register}</td>
</tr>
<tr>
<td></td>
<td>[i:] C[+TRA] _C {2nd Register}</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>[ʌ] C[-TRA] _[-ant, -cor] {1st Register before [-ant, -cor]}; /tɔʔ/ [tɔʔ] ‘weigh’</td>
</tr>
<tr>
<td></td>
<td>[ʊ] C[+TRA] _[-ant, -cor] {2nd Register before [-ant, -cor]}; /bʊʔ/ [pʊʔ] ‘to dam’</td>
</tr>
<tr>
<td></td>
<td>/i/ C[ + nasal] _[-ant, -cor]; /mʊʔ/ [mʊʔ] ‘to carry’</td>
</tr>
<tr>
<td></td>
<td>[ʌ:] elsewhere /ʔdʌ/ ‘to carry’</td>
</tr>
<tr>
<td>/ʊ/</td>
<td>[ʊ] _ [+ant, +cor]; /thʊn/ [thun] ‘year’</td>
</tr>
<tr>
<td></td>
<td>/u/ elsewhere; /tʊʔ/ [tuʔ] ‘ataw’</td>
</tr>
<tr>
<td>/o/</td>
<td>[ɑ] C[-TRA] _ {1st register closed syllable}</td>
</tr>
<tr>
<td></td>
<td>[ɔ] elsewhere; /lo/ [loʰ] ‘many’</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>[ɑ] C[-TRA] _ C 1st Register</td>
</tr>
<tr>
<td></td>
<td>[ɔ] C[+TRA] _ C 2nd Register</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>[ɔ] C[-TRA] _ ; /pɔʔ/ [pɔʔ] ‘to peel’ {1st Register}</td>
</tr>
<tr>
<td></td>
<td>[ɔ] C[+TRA] _ ; /bɔʔ/ [bɔʔ] ‘to rot’ {2nd Register}</td>
</tr>
</tbody>
</table>
Table 3.8 Headley’s (1991) allophones.

<table>
<thead>
<tr>
<th>vowel</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/i/</td>
<td>[iː] in 1st Register /ni/ [nːiː] ‘bee’</td>
</tr>
<tr>
<td>/e/</td>
<td>[æ]/sare/ [səɹæ] ‘debt’</td>
</tr>
<tr>
<td>/i/</td>
<td>[iː]/mi/ [mːiː] ‘field’</td>
</tr>
<tr>
<td>/a/</td>
<td>[ə] in unstressed presyllables [a] in presyllables before /m/ (no example given)</td>
</tr>
<tr>
<td>/u/</td>
<td>1st Register has onglide [u] or [u]/hu/ [hːu] ‘have’</td>
</tr>
</tbody>
</table>

Figure 3.1 below shows a vowel chart based on one speaker’s (AY)’s realization of words with long and short monophthong pairs (taken from tokens in Appendix A). It shows the long peripheral vowels /i, a, u/ and /i/ occupy distinct space and are not very dispersed in either the first formant or the second formant dimension. We can see the lowering of short /i/ in /cim/ ‘bird, animal’, short /i/ in /bin/ ‘eat.’ The lowering of these vowels is mentioned as allophonic variation by Friberg and Hor (Table 3.7). There is a lowering of the short /u/ in /camuʔ/ ‘mosquito’ even though it is not followed by a coronal, as Friberg and Hor described. The target area for both long and short /a/ is small; both are located in the front of the vowel space, approximately at the same level of backness as the mid front vowels. The mid vowels /e, ɛ, o, ɔ/ have the greatest variation; /e/ is lower than /ɛ/ and and /oː/ is at the same height as /ɔ/. 
3.6 Phonotactics and syllable structure

WC words have a shape that Matisoff (1990) calls “sesquisyllabic”: an initial syllable that is limited in its segmental inventory and often reduced called the “presyllable,” followed by a longer “main syllable” that allows for a wider range of segment and syllable shapes. Monosyllabic words are taken as having just the main syllable. I found that the most common word shapes to be CV(V)C and CV.CV(V)C. Examples follow:

kɔʔ ‘head’
tɔʔ ‘stay, at’
talang ‘tongue’
kapaaʔ ‘walk’

(data from speaker AY 2007-8)
3.6.1 Presyllable

In the presyllable, there are no implosives or aspirated stops in the onset. Most presyllables do not have cadas, having the canonical shape CV. Segments that do occur in coda position are /h/, /s/, and nasals, e.g., /somlan/ ‘nine’, /ahŋin/ ‘cloud’, /masruh/ ‘war’ (Headley, 1991), /pasru/ ‘funny’. According to Friberg and Hor (1977), of the nasal series, only /m/ occurs in the coda of the presyllable.

The presyllable vowel in most of my data is [ə], reduced from /a/. Different speakers produced different realizations of the same word, so that in many cases the presyllable was either dropped altogether or retained only its onset, resulting in a monosyllable with a consonant cluster (CV.CVC -> CCVC). Blood (1962) notes that it is difficult to distinguish between “sequences of consonants that are clusters invariably and clusters that result from loss of vocalism” (p. 22).

3.6.2 Main syllable

The shape of the main syllable can be either CV, C(C)V(V)C, or C(C)V(V)CC. The full set of consonants can occur at the onset of the main syllable. Only a subset of the consonants occurs in word-final position, e.g. glides, nasals, unaspirated stops, and /h/. Friberg and Hor (1977) and Headley (1991) also list the palatals /ɲ, ç/ as not occurring in final position. In fact, in word-final position, the palatal stop /ç/ is realized as [-iʔ]. /r/ in final position vocalizes, as in the following examples: /nakar/ [nakaɨ] ‘country’ and /sar/ [sai] ‘seed’.

In a syllable-initial cluster, the first consonant may be an unaspirated stop or /s/. The second of the cluster may be a liquid, nasal, /r/, or /s/. In a syllable-final cluster, the penultimate consonant is a glide /w, j/ and the final consonant is a glottal stop. Below are some examples of each syllable shape:

CV  
  taha [təha]  ‘old’
  mata [mata]  ‘eye’

CVC  
  poh  ‘fruit’
  puj  ‘fire’
Possible word shapes of a different type are suggested by David Blood (1962) for EC. He presents the canonical word shape CV.CVC as in \((p\varnothing)\)pan ‘plank.’ One of the non-canonical word shapes has a cluster of three consonants as in \(C(C_2)(C_3)V(C_4)\), seen in words like /blwaʔ/ ‘more than’, where /w/ and /j/ are considered consonants. Note also that David Blood writes twa ‘two’ (my transcription: [toʐ]) and hya ~ hiya ‘cry’ (my transcription: [heʐ]). Blood also discusses examples of trisyllabic words that have a full form CV(C).CV(C).CV(C) and fused form CVC.CV(C), e.g., pan.miɲ.tay ~ pa.miɲtay ~ pamtay ‘kill’. Speakers I worked with produced /pamtaj/ for this word but not \(pan.miɲ.tay\) nor \(pa.miɲtay\).
Friberg and Hor’s (1977, p. 19) possible word shape is
\[ PW = (C_2V_2)C_1(C_3)V_1(C_4); \]
where PW is a phonological word made up of one or two syllables. Here, with a sequence of two word-medial consonants, both consonants are interpreted as belonging to the main syllable. Note that both pre- and main syllable must have an onset.

I amend Friberg and Hor’s basic word shape and propose the shape
\((C)V(C).(C)CV(V)(C).\) This shape accounts for forms such as /ahŋin/ ‘wind’ and /samlan/ ‘nine’ where the first consonant in the word-medial cluster is the coda of the pre-syllable and the second consonant is the onset of the main syllable. Word-medial clusters may be derived from a reduction of CVCV sequences, e.g. samalan > samlan or pamataj > pamtaj; however, I observed that speakers rarely produced the unreduced forms, if ever. The reduced forms have become the norm for these lexical items.

### 3.7 Suprasegmentals

#### 3.7.1 Stress

Thurgood (1999, 1996) states that Chamic languages have final stress. Friberg and Hor (1977, p. 18) state that every phonological word ends with heavy stress; in a three-syllable word, the first receives “weak stress,” the second is further reduced, and the final syllable receives heavy stress.

#### 3.7.2 Intonation

There is some discussion of sentential tonal patterns in Doris Blood’s (1977) “Clause and Sentence Final Particles in Cham,” which is on EC. Blood uses lines drawn above and below the words to express relative pitch height. She states that interrogatives have a rise on the last element in the sentence. Most of the paper is devoted to describing various sentence final particles, some of which occur with a particular pitch pattern, either a rise or fall. Some sentence-final particles are preceded by a pause, as in the case of the tag question djaup lay ‘really + interrogative particle’: djaup is low, lay is accompanied by a rise. This description suggests that ends of phrases are associated with pitch, at least in some utterances.
3.8 Variation

3.8.1 Regional variation

A systematic yet not across-the-board correspondence was seen between Kompong Cham speakers and Kompong Chhnang speakers in the realization of two vowel phonemes: /i:/ and /u:/ in Kompong Chhnang correspond to [ei] and [ou] in Kompong Cham, respectively. Examples of such correspondences are: [diːh] and [dei] ‘sleep’; [tasiʔ] and [taseiʔ] ‘sea’; [ptiːh] and [ptei] ‘white’; [pdiːh] and [pdeiʔ] ‘hurt’; [patuʔ] and [patowʔ] ‘star’. From native speaker descriptions, these differences seem to broadly divide speakers into those who are “close to the Mekong”—that is, Kompong Cham—and those who are “far from the Mekong” or Kompong Chhnang. Kompong Thom, on whose data Headley (1991) is based, is located between these two provinces, somewhat closer to Kompong Cham than to Kompong Chhnang.

However, the existential and ‘have’ verb described in various sources as /hu/ was pronounced [hou] by both groups. I should also note that one Kompong Chhnang speaker had diphthongs instead of monophthongs, e.g., [taseʔ] not [tasiʔ] ‘ocean’.

Because Friberg and Hor’s work from the 1970s and Thurgood’s grammar based on 1960s EC both have monophthong forms of words, I tentatively conclude that the diphthongal forms are a relatively recent phenomenon that is also regionally limited to “close to Mekong” speakers. The diphthongal form in one Kompong Chhnang speaker indicates the possibility of this form spreading.

Other variation was observed, but it was not clear from just these examples if there was a systematic difference in vowel quality or a difference only manifest in certain lexical items; for example, there was variation between [θun] and [θon] for ‘year’.

Speakers themselves had different opinions on whether people of other regions had a different way of speaking, and what those differences were. Some speakers gave examples of certain lexical items that were pronounced differently; [haa] vs. [haʔ] ‘cake, doughy food corresponding to Khmer num’, [mɛʔ] vs. [mæʔ] ‘mother.’ Others only had a vague idea that the others were “different” in some way. I asked some Imam San speakers if they could understand the Kompong Cham speakers; they differed on this.
point also. One speaker said that he had trouble understanding them at times. It may be
that Chams do not consider the others’ speech a “different dialect” because they can
understand them; this interpretation may be due to their notion of “dialect” as a different
language or the idea that all Chams speak the same language. One thought that he would
be able to understand the “Chams on Hainan Island” i.e., the Tsat.

The degree of divergence between the different varieties is therefore not clear,
aside from the vowel quality differences described above. Mutual intelligibility may vary
from speaker to speaker, depending on the speaker’s experience with Chams outside
his/her own community. The two groups live far apart and do not interact frequently; one
Imam San speaker said he visited a Kompong Cham village once, taking approximately
seven hours to get there.

3.8.2 Individual variation

Realization of presyllables varied in particular in Kompong Chhnang speakers;
speakers had a range of onsets for the same word. Some examples are:
/kapaʔ/ ‘walk’ realized as [təpəʔ] (seen in three speakers) and [pəpəʔ] (one speaker);
/relo/ ‘meat’ as [melou] (s1, s2, s3, s5, s6), [relou] (seen in two speakers), and [nelou]
(one speaker); /kapaw/ ‘buffalo’ as [təpaw] (seen in two speakers) and [paw] (two
speakers); /mata/ ‘eye’ as [muta] (one speaker).

Some speakers (e.g., speaker #3) had a greater tendency than others to drop the
presyllable altogether. The same speaker may produce a different variant on different
occasions. This pattern of variation was similar to that described by Brunelle (2005) for
what he describes as hypercorrection in the EC Formal Low variety, a speech style
situated between the High (formal, written) and Low (colloquial) varieties. According to
Brunelle, the EC Formal Low style is often observed when speakers interact with
linguists, trying to produce what they believe to be the “correct” polysyllabic forms.
Because polysyllabic forms are rarely used in colloquial speech (the Low variety), some
speakers produce the wrong presyllable (e.g., [larmj] for /kamǎj/ ‘woman’). The Formal
Low forms had the most variation (Brunelle, 2005, p. 117). My own data also has much
variation in presyllable realization; however, it was not clear whether this was due to an
effort to produce the “correct” form or a kind of free variation. As mentioned earlier, some speakers consistently produced monosyllabic forms of words while others in the same village produced sesquisyllabic forms.

3.9 MORPHOSYNTAX

Enfield (2005) calls MSEA languages “the closest we have to what Sapir (1921) dubbed isolating and analytic,” that is, most words have only one morpheme. WC morphosyntax has characteristics that are typical of MSEA languages. Most WC words are monomorphemic. Verbs and nouns lack case marking and markers for agreement, tense, number, and gender. Tense may not be marked at all; speakers may use time expressions to express tense and aspect, or such details are understood from discourse context. Another areal feature seen in WC is the use of open-class items such as nouns and verbs to express grammatical functions, e.g., toʔ ‘stay, live’ may be used as a preposition ‘at’; praj ‘to give’ is used as the dative preposition ‘for’, as in the sentence lin paʔ puʔ praj jah ‘I made porridge for my father’.

There is very little affixation in WC; what little is left seems to be fossilized and not productive. Aymonier and Cabaton 1906 lists several functions for the pa– prefix: causative, making verbs transitive, and making a verb out of a noun. Other morphemes listed are ta–/da– ‘frequentatives’, mo’ (mo)– ‘causative, expresses state, reciprocality’; infix –n– and suffixes –kan, –i, and –an. Baumgartner (1998) has no discussion of word-level morphology. Thurgood (2005) only mentions the pa– causative prefix, which he says “may still be marginally productive” (Thurgood, 2005, p. 495).

In my own data, only two affixes occurred naturally in speakers’ narratives or sentence translations. The first is pa– [pa] ‘causative’. This prefix is seen in pairs such as plaj ‘buy’, paplaj ‘sell’; mataj ‘die’, and pomtaj ‘kill’ (reduced form of pamataj). The second is pa– ‘possessive’, as in pajo ‘his’. This morpheme was seen only in one utterance, which was a sentence translation:
A possible indication of some vestigial morphology was seen in the phrase for ‘tonight’. The word for ‘night’ is *malam*, but some speakers used *maklam ni*. Neither they nor I could explain why the [k] appears in the phrase.

Reduplication is described in Baumgartner and Thurgood (2005); however, I did not come across any reduplicated words. Some common words are compounds: *ha.ploh* ‘ten’, *ha.ripaw* ‘one thousand’, *nuʔne*? ‘child’. Some speakers do not recognize these words as polymorphemic.

### 3.9.1 Basic sentential order

WC sentences have SVO word order, according to Baumgartner (1998, p. 1, “Sec 2.1: Basic Clauses”) and this is also confirmed by my data.

(3.2) hlun mayai ha rung

1SG.LORESP to.say one story

‘I tell a story’ (Baumgartner, p.2)

Another sentential order I observed in declaratives is the topic-comment construction, where the phrase containing new information is fronted before the verb, as Example (3.3) shows.

(3.3) la:n ni kaw rang raw

car this 1s CL wash

‘This car, I wash.’ (AY)

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6 For the morphsyntax sections, I will use a non-IPA orthography with “r” for /r/ [ɣ] and the digraph “ng” for [ŋ].
3.9.2 Existentials and ‘have’: hou and mata

Speakers I worked with used hou in existential expressions and as the verb ‘to have’. Headley’s form of the word is /hu/ [h'u] ‘have’ (1991, p. 118). Example (3.3) demonstrates this use of hou:

(3.4) kruusaa roboh lin hou samaceh haploh rang
family POSS 1s have member one.ten CL
‘My family has ten members / there are ten people in my family’ (AY)

Thurgood (2005) has an example of hu as an existential (Examples 6 and 7, p. 496):

(3.5) tha hray nan hu tha muu? tɔha
one day DIST have one grandmother old
“One day there was an old woman…” (Ex. 6)

Baumgartner (1998) uses mada for the existential expression. In his Section 3.2, on verb phrases, he discusses a tense marker hu ‘past’, which may be analogous to Thurgood’s hu and my hou:

(3.6) … mada ha sa koh rang iau Koh Gok Dalok
there.be one CL island people to.call island Gok Dalok
‘… there was an island the Khmers call Gok Dalok.’
(Baumgartner, p. 12, ex. 41)

(3.7) nhu hu majai laik mong saman dahlau tanuh.ea
3 PAST to.say that from time in.the.past territory

di plaj Ku ni set ta tasik
in country Cambodian this entirely sea
‘they say that formerly the territory of Cambodia here was entirely sea.’
(Baumgartner, p. 13, ex. 44)
In Thurgood (2005), *məta* is used in the sense of ‘ever’:

(3.8) \( \text{min muu? oh məta dih wal} \)

but grandmother NEG ever sleep sound

“but grandmother never completely fell asleep”

(Thurgood, p. 504, examples 48 and 51)

My 2008 assistant AY used both *hōu* and *mata* as existential and as past tense markers. He seemed to have a clear notion of when to use *hōu* and when to use *mata*, but I was not able to determine the rules governing his usage. He and other speakers I encountered used *de:l* (Khmer *dael*, Northern Khmer *de:l*) for ‘ever’ instead of *mata*.

*Hōu* as past can be observed in my data in some of the sentence translations by the Kompong Chhnang speakers. Considering the fact that Thurgood’s description is based on EC data from the 1960s, Baumgartner’s grammar is based on WC data from the 1970s, and AY is in his early 20s, I tentatively formed the hypothesis that *mata* in the sense of ‘ever’ was supplanted by the Khmer *de:l* among some WC speakers, or Cambodian WC speakers in general, acquiring a new meaning ‘have’. In the meantime, both *hōu* and *mata* are being used to mark past tense, a development perhaps limited to Cambodia or just to WC, and not occurring in EC. Below are *hōu* and *mata* constructions from speaker AY:

(3.9) \( \text{hōi mata mit saw kroh raj} \)

\[ \text{2s have hear dog bark Q} \]

‘Did you hear the dog bark?’

(3.10) \( \text{kit hōu pai? aŋklej} \)

\[ \text{3s have study English} \]

‘He studied English.’
(3.11) saŋ ni mata masin tracek
      house DEM have machine cold
‘This house has air conditioning.’

(3.12) həi hou aj lakaj hatom raŋ
      2s have older.sibling male how.many CL
‘How many older brothers do you have?’

3.9.3 Focus particle
In some of the elicited sentences containing narrow focus, I observed a word min, which is not mentioned in either Thurgood or Baumgartner. According to the speaker (AY), this word is distinct from nin, the distal demonstrative ‘that’, as seen in Example 3.13. AY could not explain the meaning or function of min. Based on its limited distribution, it is very possible that min is a focus marker. The Kompong Chhnang cohort used mii in the place of min. Examples 3.14a and 3.14b form a question and answer pair where the particle is used in the answer 3.14b. The word teh is a demonstrative that indicates a location farther away than nin.

(3.13)
      hay rang praj pataj nin naaw kit
      who give banana DEM go 3ps
‘Who gave that (not so far) banana to him?’

(3.14a) Question:
      həi plaj siəwpiw ni
      2ps buy book DEM
‘Did you buy this book?’
3.9.4 Questions

According to Baumgartner, there are at least three ways to form a yes/no question. One is by adding a question word raj to the end of a clause, as in Example 3.15.

(3.15) Boh raj?
To.see YN.QM
‘See?’ (Baumgartner 1998, p. 16)

The second method is to add a word mĩn to the end of a clause. This word may also be used in statements as an “affirmative particle.” (p. 17). The third method is to add a phrase ray ha soh mĩn as a kind of tag. (p. 17). I observed the question word among some speakers but not the tag phrase. Baumgartner’s mĩn may be what I termed the focus particle in Section 3.9.3 above; however, I did not observe this word in a question. In addition to the three question formation processes above, there is a fourth: to use a declarative as a question without changing any of the words. Example 3.16 below may be either a declarative or a question, depending on the intonation that accompanies it.

(3.16) hiə plaj siəpəw ni
2s buy book this
‘You bought this book/ Did you buy this book?’

Wh-questions may be formed by replacing a content word or phrase with the corresponding wh-word. The wh-phrase may remain in its original location or be moved to the front (Baumgartner, 1998, p. 17).
(3.17) haj rang plaj prah
       who CL buy banana
‘Who bought the banana(s)?’

(3.18) hɨə naw mpen məpiən
       2s go PP when
‘When are you going to Phnom Penh?’

3.9.5 Imperatives

Baumgartner has the form lakau ... wek for what he calls a mild command or
request (p. 18), where the sentence begins with lakau ‘to ask’ and ends with wek ‘mild
imperative.’ Negative imperatives were described as having the word di between the
subject and verb and the word juai at the end of the clause. Both kinds of imperatives I
collected did not take the exact form described by Baumgartner. Positive imperatives
were formed by starting the phrase with the verb.

(3.19) naw sa:ng
       go house
‘Go home’

Negative imperatives also begin with the verb; the word cuuj is added to the end of the
clause. All examples began with the verb, without a subject specified.

(3.20) toʔ tang taj cuuj
       stay hit brotherNEG
‘Don’t hit (your) brother’

3.9.6 The noun phrase

WC phrases are head-initial. The head noun is followed by the modifier(s).
Number is expressed with a numeral classifier. The number and classifier follow the
head noun. I found the typical word order to be: Noun Modifier Number Classifier.
When both the number and classifier are present, they were always at the end of the noun phrase. Aside from numeral classifiers that co-occur with numbers, certain nouns often co-occur with a classifier. In example 3.21 below, ‘green’ is expressed by the combination of the word for color and the word for green. Likewise, ‘apple’ is expressed by ‘fruit’ and ‘apple.’ Speakers rarely used the words for fruit or color by themselves; most of the time, speakers used the phrase *poh pataaj* for ‘banana,’ not *pataaj*.

(3.21) poh pɔɔm poa caaw toa poh

   CL apple color green two CL
   ‘two green apples’

Other numeral classifiers I observed were: *poh* ‘fruit, bag, bottle’; *traj* ‘animals’; *bej?* ‘pen, pencil, knife, spoon’ (Khmer); *pʰon* ‘tree’; *la* ‘pages of a book, pieces of paper’; *ʈʰang* ‘branches of a tree’; *srow* ‘bicycle, oxcart’, *ku* ‘pair’ (Khmer); *plah* ‘shirt, pants, cloth.’ The word *poh* means fruit but it is used as a classifier for fruit and other objects that are fairly small. The word *la* means leaf.

Baumgartner’s canonical order, (Noun Pronoun Adjective Number Classifier), is equivalent to mine above:

(3.22) Nhu boh sang hlun prung klau boh

   3s to.see house 1SG.RESP big three CL
   “He saw my three big houses”

   (Baumgartner, 1998, p. 11, Ex. 37)

Thurgood’s ordering of phrases that have classifiers is slightly different; he puts the number and classifier at the beginning of the phrase instead of at the end: (Num) CLF (Head (Mod) (Demonstrative). However, I never encountered this word order in noun phrases.

(3.23) tha plah ｐәpaan lipth

   one CLF board thin
   “a thin piece of wood”
(Thurgood, 2005, p. 500, originally from. Blood, 6.2.5. In Blood 1962, ‘thin’ is spelled \textit{lopilh})

\begin{equation}
\text{(3.24) poh mokya nan}
\end{equation}

<table>
<thead>
<tr>
<th>CLF ebony DIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>“that kya (persimmon-like fruit)”</td>
</tr>
</tbody>
</table>

(Thurgood, p. 500, orig. Blood, 6.1.131)

3.9.7 The verb phrase

WC verbs are not inflected for tense, mood, and aspect. Speakers use lexical items to express tense or aspect. The Khmer borrowing \textit{haej} ‘already’ is used for past actions, \textit{kompung}, another Khmer borrowing meaning ‘will’ is used for future actions. Even without any time expressions, temporal relations are understood by context.

Baumgartner discusses tense markers \textit{hu} ‘past’ and \textit{hi} ‘future’, which precede the verb (1998, p. 13). I believe that \textit{hu} is a form of \textit{hou}, discussed in Section 3.9.2 on existentials. I did not observe \textit{hi} used for the future in my data, as the speakers used the borrowed word.

The word [ploh] ‘already’ often occurred in narratives of the Kompong Chhnang speakers. In these narratives, it had a function similar to ‘… and then’ with [ploh] occurring at the end of the previous phrase instead of at the beginning of the new phrase. Thurgood (2005) discusses \textit{tɔɔʔ} ‘stay’ and \textit{plɔh} glossed as ‘finish’ to mark progressive and completive aspects, respectively. In Thurgood’s examples, \textit{plɔh} may occur either at the beginning or end of a phrase. Baumgartner (1998, p. 14, ex. 12) glosses the word as a sentence final particle indicating ‘finished’, but he also has an example of \textit{bloh} in clause initial position glossed as ‘then’ (p. 4, ex. 10): \textit{bloh patao Cham laik} ‘then the Cham king said…’

As noted by Thurgood and Baumgartner (as “directionals” p. 14), WC has serial verb constructions; in particular, the words \textit{naaw} ‘go’ and \textit{maay} ‘come’ are used to indicate motion towards or away from the subject:
Negation is marked by the word /o/, occurring after the verb and its object.

(3.26) lin boh la:n ni o
1s see car DEM NEG
‘I don’t see the car.’

(3.27) lin maj pa:? o
1s come walk NEG
‘I didn’t walk.’

Thurgood (2005) cites examples from Blood (1977) where the negation occurs before the verb. This pre-verbal negation is described by Blood as a more formal style. I did not observe any instances of pre-verbal negation in my data.

3.9.8 Relative clauses

I found the relativizer to be kɔŋ as in the following example. Baumgartner presents kung as a relativizer. (Baumgartner 1998, p. 6)

(3.28) lakaj kɔŋ lin boh maproj ja? pru? tɔɔ? presni
man REL 1s see yesterday do work LOC post.office
‘the man that I saw yesterday works at the post office’

Although the speaker AY was able to give examples of sentences with relative clauses when prompted, such constructions are not commonly observed in elicited narratives. The speaker AY also commented that these constructions are not usually seen in conversation.
3.9.9 Possession

Baumgartner states that in possessive clauses, the noun phrase is placed after the noun that is possessed.

(3.29) sang hlun prung klau
house 1s big three
‘my three big houses’
(Baumgartner, 1998, p. 13, ex. 42)

The order of the personal pronoun hlun and adjective prung can be reversed with no effect on the meaning.

Some of my speakers used the Khmer possessive roboh to mark possession.

(3.29) kruusaa roboh lin hou samaceh haploh rang
family POSS 1s have member one. ten CL
‘My family has ten members / there are ten people in my family.’ (AY)

3.9.10 Pronouns

Those pronouns that did appear in my data are the same pronouns listed in other sources, albeit with slightly different pronunciations. In my data, speakers commonly used kit for the third person singular, which is a Khmer borrowing (from Khmer kuat ‘s/he’). The second person pronoun is rarely used in conversation. Instead, speakers generally use personal names or words designating kinship relations, such as /va/ ‘aunt’ or ‘uncle’ to address people older than them, and /nin/ ‘nephew’ or ‘niece’ to address younger people.
Table 3.9. Pronouns in my data, Baumgartner [B], and Thurgood [Th].

<table>
<thead>
<tr>
<th>Person</th>
<th>My data</th>
<th>Other sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1s</td>
<td>lin*, kaw</td>
<td>hlun, kau [B]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>halun (polite), təhla?, kaw</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(familiar) [Th]</td>
</tr>
<tr>
<td>2s</td>
<td>hiә, hәi</td>
<td>hu [B ‘lowresp’]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hi [Th, ‘you, thou’]</td>
</tr>
<tr>
<td>3s</td>
<td>kit (from Khmer kuat?)</td>
<td>nhu [B, also plural]</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>ȵu [Th]</td>
</tr>
<tr>
<td>1p</td>
<td>traj; no exclusive/inclusive distinctions found</td>
<td>dray [B] tray (reflexive), kami (exclusive), ita (inclusive) [Th]</td>
</tr>
<tr>
<td>Plurals</td>
<td>kɔn ȵo (kɔn ‘group’) 3p</td>
<td>kaw? (group) hı kaw? (2p), khɔl ȵu (3p, calque from Viet) [B]</td>
</tr>
</tbody>
</table>

*a One speaker said houlɨn, which is probably a very deliberate version of hlun; his cohort had the /u:/ to /ou/ shift: hlun > hulun > houlun.
CHAPTER 4
METHODS AND MATERIALS

In this chapter, I discuss the equipment and methods used to obtain data for this dissertation: the field sites; the materials used for data collection and some problems encountered during data collection; tools used for analysis; and the statistical methods used in the analysis.

4.1 DATA COLLECTION
4.1.1 Field sites and data collection

I collected data for this study during two fieldtrips, each of which had a different primary focus. The first dissertation trip took place in 2008. I worked with one male speaker, AY, who had been my assistant during a preliminary trip in 2007. The work took place over three weeks in Phnom Penh. AY assisted me in creating tokens and sentence frames in addition to recording them. AY grew up in Kompong Cham Province and had lived in Phnom Penh for approximately six years at the time of recording. I recorded him at a friend’s house in Phnom Penh.

Here, I will note a word about recording in Phnom Penh. It is a noisy place. Even though the recording took place indoors, street noise was so loud that it was clearly audible in the recordings. Street noise was a constant presence, a never ending flow of street vendors and trash collectors, who all have their own calls or music to announce their presence, but also motorcycles, automobiles, and dogs. At one point, a neighbor down the street from my friend’s house (pteah levang, a row of attached multi-story houses) held a party. A large tent covered the neighbor’s part of the street, completely obstructing traffic, and many chairs and tables were laid out underneath. There was either a live band or karaoke music playing for many hours during the day. Fortunately, the Marantz-dynamic microphone set-up I used overcame such obstacles.

My second dissertation trip took place in 2009. I had the assistance of a male speaker from Kompong Cham Province to check tokens and sentence frames; however, he did not accompany me during data collection, which took place in the village of Orussey, Kompong Tralach District, Kompong Chhnang Province. I recorded two male
and four female native speakers of WC who lived in Orussey, which is actually a collection of three smaller villages: Orussey, Chan Kiek, and Srey Prey. Five of the speakers live in Srey Prey village. One lives in Chan Kiek village. The speakers were aged between 19 and 24 years old.

I should note here that a number of foreign researchers, including the linguist Marc Brunelle and the anthropologist Alberto Perez Pereiro, have visited this group of villages, and the people seemed more accustomed to receiving foreign people than the people of other small villages in Cambodia. One speaker also told me about a visit by a group of high school students from New Jersey that occurred in the previous year. They could not keep in touch, however, because the village youth do not have email access, texting via mobile phones being their only mode of digital communication. I do not think that the speakers’ exposure to English speakers had a direct effect on the outcome of this project. The village setting was quieter than the city, with only occasional cars, people, and animals in the background. The recording took place outdoors, at the back of the village mosque in the space used as the village school.

4.1.2 Speaker profiles

In this section, I describe the sociolinguistic background of speakers who participated in this study. Speaker AY, whom I have mentioned in previous chapters, was the speaker for the pilot work in Chapter 5 as well as the language consultant for the grammar section of Chapter 3. He also introduced and accompanied me to the “Kilo villages” north of Phnom Penh and the Cham community located south of Phnom Penh. He grew up in Kroch Chamar district, Kompong Cham province and is one of the Sunni majority. He left his village when he was 18 years old to attend a university in Phnom Penh where he majored in business. This university is private and uses English as the medium of instruction. After graduation, he worked at a non-profit organization where he had an opportunity to work alongside foreign professionals. At the time of the recording, he was in his mid-twenties and was interviewing for a permanent position with some foreign corporations. His eventual goal is to own his own business.

The six speakers in Orussey village, Kompong Tralach district, Kompong Chhnang province belong to the Imam San minority Cham. Five were students at a local
government high school at the time of the recording. One had graduated from this high school and was not employed at the time of the recording. His future goal was to become a tour guide (cf. Appendix C). One female villager who was in their age cohort but was not a participant in this study was living in Phnom Penh at the time to attend an university. As far as I can tell, she was the only one in her cohort in post-secondary education.

4.2 Equipment and Recording

For all my recordings, I used a Marantz PMD 660 solid-state recorder connected to a Sony F-112 dynamic microphone with an XLR cable. The recorder used four AA batteries at a time, so I brought ten rechargeable AA batteries. The recordings were made to the Marantz, then were transferred to my computer (MacBook) with a USB cable. All equipment except for the batteries was checked out from the Phonetics Laboratory at the University of Hawai‘i. I chose to use a dynamic microphone over a condenser microphone because I supposed from previous experience in Cambodia that the recording environment would have much background noise. Although condenser microphones have greater sensitivity, they might be too sensitive and also pick up unwanted background noise. A pre-test in Hawai‘i comparing the two types of microphones indicated that such would be the case. As a back-up recorder, I also brought my Zoom H2 recorder, but did not use it for this project.

All recordings were made in mono WAV format with a quantization of 16 bits and a sampling rate of 44.1 kHz. Each repetition of the word list or sentence lists was recorded in one uninterrupted sound file.

4.3 Materials

Below, I describe the sets of materials used for each portion of this study. The first, described in Section 4.3.1, corresponds to work presented in Chapter 5. Material described in Section 4.3.2 was used in analyses presented in Chapters 6 and 7.
4.3.1 Materials: Phonemic vowel length

The goal of this set of materials was to provide data to examine how phonemic vowel length and phrase position affect the following phonetic variables of a syllable: duration, pitch, and intensity. I predicted that the variables will have different values depending on the position of the target word in a sentence; therefore, I prepared several sentence frames in which the target words may be placed in different positions: the beginning, middle, and the end of the sentence.

With AY’s assistance, I devised a list of minimal pairs that differ in phonemic vowel length and coda consonant. The vowel nucleus was /a/ in the minimal pairs. This is because minimal pairs seemed to occur most with this vowel, and all scholars are in agreement that /a/ has a phonemic length distinction. Some examples of minimal pairs are:

<table>
<thead>
<tr>
<th>word</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>paʔ</td>
</tr>
<tr>
<td></td>
<td>paaʔ</td>
</tr>
<tr>
<td>(2)</td>
<td>maj</td>
</tr>
<tr>
<td></td>
<td>maaj</td>
</tr>
<tr>
<td>(3)</td>
<td>cam</td>
</tr>
<tr>
<td></td>
<td>caam</td>
</tr>
<tr>
<td>(4)</td>
<td>can</td>
</tr>
<tr>
<td></td>
<td>caan</td>
</tr>
</tbody>
</table>

In addition to the vowel length minimal pairs, I also devised pairs of words with other vowel nuclei. These are not minimal or near-minimal pairs:
The full list is in Appendix A.

The minimal pairs were said in various sentence frames, in which the target words were placed in sentence-initial, sentence-medial, and sentence-final position. Because I had envisioned these sessions as pilot sessions, I only recorded one iteration of the words in each frame. Frames 1, 2, and 3 were tests, so I used only a subset of the words in recording them. Frames 3 and 4 are the same sentence.

Initial position (Frame 8)

___ kɨ πiék ptəp
___ COP word next
‘___ is the next word.’

Medial position (Frames 7, 6, 1, 2)

7 lîn deːl paiʔ piék ___ habaŋ yaj
1s ever study word ___ once time
‘I said ___ one more time.’
I collected data to meet two objectives:

1. To show that Western Cham is iambic, and to determine the acoustic correlates of stress in this language; and

2. To examine this language in terms of intonational typology, and determine what sorts of prosodic patterns co-occur with each utterance type, such as demonstratives, questions, and imperatives.
The elicitation methods I used were: word list, sentence frames with different target words in three possible sentence positions, sentence translations, and narratives. The order of elicitation methods was the following: personal narrative, sentence translation, sentence frames, and word list. This order was designed to have the speaker begin from a genre that was least conscious of speech to most conscious or guarded speech in a style similar to the sociolinguistic interview. The result was fairly naturalistic speech for the narratives and sentence translations. The sentence frames were smooth for only some of the speakers. One technique I did not use was to be a participant observer at a somewhat naturally occurring conversation between two or more speakers. This may have yielded the most unguarded type of speech; however, I did not collect such a conversation for several reasons. Because the Cham do not speak the language in the presence of a non-Cham speaking person, my presence might have rendered the resulting data unnatural. Neither did I did use picture story-telling and description. When I collected the personal narratives, I realized that transcriptions and translations would take more time than expected. Using an additional method would have yielded more data than I would have been able to transcribe within the time I was in Cambodia, and therefore I decided to limit my data. Below, I describe each of the data types I collected.

4.3.2.1 Word list

I selected forty-seven disyllabic words or phrases consisting of two monosyllabic words. Words and phrases had these phonemic shapes: CVCV, CVCV(V)N, CVCV(V)G, CVCV(V)C, C(V)VC.C(V)VC. Open syllables are always long; /h/ always follows a short vowel.

To determine the vowel lengths of main syllables in the token words, I compared my own judgments with records of the words documented in other sources, and with native speaker AY’s impressions. The works I consulted were Friberg and Hor 1977 based on Phnom Penh Cham, Headley 1991 on Kompong Thom Cham, and Thurgood’s 1999 appendix of proto-Chamic and cognates in daughter languages. In Chamic linguistics, long vowels are unmarked, as in /dagay/ [dagaay] ‘tooth’ (Friberg & Hor, 1978), while short vowels are marked with a caret, e.g., /tabâw/ [tabaw] ‘sugarcane’ (Friberg & Hor, 1978). For some words, there was complete agreement between my
transcription, AY’s judgment, and what previous scholars had recorded. For instance, I transcribed the word for sky as [laŋiʔ]; AY confirmed the length. Headley (1991) and Thurgood (1999) both listed this word as /laŋi/ signifying a long /i/; I transcribed ‘drunk’ as [mapuʔ], confirmed by AY; Friberg and Hor (1978) listed this word as /mabûʔ/.

On the other hand, for many words there were discrepancies among previous scholars’ transcriptions. In particular, Thurgood (1999) lists WC forms with long vowels and the corresponding EC forms with short vowels, for example: takay, tak̩̩y ‘tooth’, paplay, papl̩̩y ‘sell’, hray, h̩̩ry ‘day’, katau, kat̩̩w ‘louse’.

In such cases, I followed the native speaker judgment on vowel length. The form for ‘mosquito’ was listed as /camuʔ/ by Headley and /cam̩ʔ/ by Thurgood (and Brunelle for EC). I transcribed AY’s pronunciation of this word with a short final vowel, [camuʔ]], contrasting with [cuuʔ] ‘black’. Other discrepancies include the word for ‘rough’, which I transcribed as [karaʔ] but which is transcribed by Headley as /karaʔ/ without the caret on the final vowel. In this instance, I followed my own transcription because the word was never pronounced with a long second vowel by any of the speakers. I treated other words in a similar fashion: whenever there were discrepancies between the speakers and sources, I followed the speakers’ and AY’s judgment: [raj] ‘day’, [laa kjau] ‘leaf’, [sau sit] ‘small dog’ (both short). Words with glides were the most uncertain set, because a word ending in a glide sounds similar with either a long or short vowel. A full list of token words is included in Appendix B-1.

4.3.2.2 Sentence frames

Each of the words on the word list was placed in three different sentence frames. Each frame placed the target word in one of three sentence positions: initial, medial, or final.
Initial

“____ is the first word.”

(1) _____ ciɔ pnoj? talaw ɣañ
    _____ COP word    first one

(2) _____ piɔk talaw ɣañ
    _____ COP word    first one

(3) _____ piɔk tamip ɣañ
    _____ COP word    first one

Medial

(1) pyaj lai? poh pnoj? _____ habaŋ ɣaj
    give say word_____ again
    “Please say the word ____ again”

(2) mijæj lai? _____ habaŋ ɣaj
    speak say _____again
    “Say ____ again”

Final

(1) poh pnoj? talaw ɣañ nin _____
    word _____ first one DEM ____
    “The first word is ____”

(2) piɔk hataj mej ɣae _____
    word after come _____
    “The next word is ____”
The purpose of using sentence frames was to standardize as much as possible the sentential context for all target words. In a best-case scenario, the frames would provide both a segmental and prosodic context that would be uniform for each of the three positions. The uniformity would enable an analysis of how changing phrase positions affect the target word in various acoustic features. Moreover, any effects of segmental shape of target words (e.g., ending in a consonant or vowel) could be seen.

I initially devised the sentences numbered (1) above with the help of AY. Upon starting data collection in the Kompong Chhnang village, however, I discovered that the speakers were not completely at ease with saying these sentence frames. The reason for this was unclear, but it may have had to do with whether the speakers were comfortable using the Cham word poh pnoiʔ ‘word’. (2) and (3) indicate the modified versions of the sentence frames used by some Kompong Chhnang speakers. The Cham word is replaced by the Khmer word piak ‘word’. One Kompong Chhnang speaker changed piak back to poh pnoiʔ because she thought this was the genuine Cham word.

In both final and initial frames, there is a clause break that coincides with the blank, either before or after the target word. In initial frames, the target word is the subject of the sentence, followed by an overt copula ciə or zero copula. The final frames are equative sentences, where the sentence up to the target word is the subject and the target word is the predicate.

4.3.2.3 Sentence translations

I devised six to seven sentences for each of five utterance types: declaratives, yes/no questions, wh-questions, imperatives, narrow focus. These were then translated into Khmer. Each speaker was presented with the Khmer sentence orally, and asked to say the sentence in Cham. Due to the nature of the elicitation, each speaker had a slightly different version of the Cham sentences. The full list of sentences appears in Appendix B-2.

The procedure for the word list, sentence frames, and sentence list was: In the first iteration, I started at the beginning of the list; in the second iteration, I reversed the order,
working backwards starting with the last section; in the third iteration, I began at the beginning of the list.

4.3.2.4 Narratives

Each speaker was asked to describe him or herself into the recorder at the start of the recording session. This procedure was designed to give a more naturalistic speech sample; yet most speakers only spoke for an average of thirty seconds. This brief narrative usually included their name and age, number of family members, and grade level in school. Because these narratives were short, I then asked four speakers to give a longer monologue on a topic of their choice. Four speakers, two male and two female, spoke either on personal topics such as, for one, what job he wanted in the future, or they produced procedural texts, for example, on how to make bamboo coconut soup (curry) and how to make a type of hao ([ha:] for Kompong Cham); a type of dessert. The length of these texts was approximately two minutes. I also recorded one Kompong Cham speaker who spoke for approximately five minutes on how his community celebrates Ramadan. All narratives were transcribed and translated.

4.3.3 Metalinguistic awareness

All the WC speakers I encountered were fluent in both WC and Khmer. Everyone was aware that I was researching WC. There were instances during the data collection when I observed some speakers making an effort to use WC words instead of the corresponding Khmer words. For instance, my 2008 consultant began using the word soput ‘friend’ after an initial use of mit, the Khmer word. When asked what the difference between the two words was, he replied that mit sounds more modern, yet persisted in his use of soput. The Kompong Chhnang speakers had a number of instances in their translation task in which they would use a Khmer word, then stop and correct themselves, or say the entire utterance again with the WC word. I noted these self-corrections for words such as WC hla for Khmer psa ‘market’, cal for somneang ‘net’, and ha(w) posang for kruusaa ‘family’. The context of this interaction was a situation in which the speakers were aware of the importance of using WC over Khmer and tried to
tailor their speech to a specific audience—a researcher of their language. Being exposed to other researchers before me may have heightened the village speakers’ awareness of using or not using Khmer vocabulary. I was not certain if they would self-correct when they were talking among themselves. Speakers seemed to have different levels of such metalinguistic awareness. While such self-corrections were seen in some speakers, others used the Khmer versions of these words without any hesitation.

Speakers did not seem to have interference from WC phonology in saying Khmer words. Because the phoneme inventories of the two languages are so similar, the most salient example was in the rhotic phoneme /r/. All the speakers who used kruusaa pronounced /r/ with a trill or tap instead of the WC rhotic [ɣ]. Most Khmer words containing /r/ were pronounced with a tap or trill, with the sole exception, /ruup/ ‘body’, pronounced [yu:p]. It may be that most Khmer loans have been unconsciously adopted by WC speakers with their original pronunciation intact. Another possibility is that speakers are conscious of the origins of some of the borrowings and keep the Khmer pronunciation.

4.4 ANALYSIS
4.4.1 Analysis tools

The steps from recording to analysis were as follows:

Files were opened and labeled in Praat (version 4.5.08); each file consisted of one iteration of a word list or sentence list for one speaker. Target words were segmented into syllables using Praat textgrids accompanying each sound file. Then acoustic features such as pitch maxima, pitch minima, duration of segmented portions, and root mean square intensity were extracted from each segmented syllable using a script. The resulting file was converted into an Excel spreadsheet, where each data point was labeled for such features as vowel length, vowel quality, and consonant; this file was then exported for statistical analysis.

Sound files used in Chapter 7 were also segmented and marked for tonal contours in Praat textgrids.

7 This word is originally from Sanskrit.
Statistical analysis was done using the R statistical package (http://www.r-project.org/). To compare acoustic measurements such as syllable duration and pitch difference over a syllable, I used linear regression and linear mixed effects models, which are explained in detail in Section 4.5.

4.4.2 Segmentation rules

Each syllable of the target word was segmented from the onset consonant to the coda consonant. That is, a segmented syllable included, where possible, the closure of the onset consonant and the release of the coda consonant. Furthermore, I made various decisions on guidelines for segmentation as detailed below.

Words ending in glides and vowels sometimes did not have a clearly defined end, but instead had a very gradual trailing off of amplitude. In such cases, I took the end of the voice bar (F0) and second formant (F2) as well as a sudden decrease in amplitude of the sound wave, if there was one, to be the boundary of the word (Figure 4.1).

Figure 4.1 Target word /pataaw/ ‘king’ ending in a glide. Speaker 4, first iteration of a phrase-final frame.
If the target word occurred at the very beginning of a phrase—either utterance initial, or after a noticeable pause—I took the syllable boundary to be at the beginning of the vowel or aspiration, i.e. at release of the onset consonant. Similarly, if the target word ending in a stop occurred at the very end of the utterance, or if the speaker inserted a pause after the target word, I put the syllable boundary at the end of the vowel, i.e. before evidence of the stop closure. This is because neither the wave form nor spectrogram shows a boundary between an unreleased stop and a following pause, or the closure of a stop and a preceding silence. In Figure 4.2 below, the target word /laŋiiʔ/ ends in a glottal stop, and the sentence frame places the targets in phrase-final position. The segmentation of the second syllable /ŋiiʔ/ extends from the beginning of the velar nasal to the end of the vowel /i/. This vowel shows some glottalization towards the end due to the effect of the coda glottal. The segmentation includes the glottalization, putting the syllable boundary at the end of the last glottal pulse.

Figure 4.2 Target word with glottal stop coda in phrase-final position.
Syllables were coded as to whether they were preceded or followed by an unexpected pause. For example, a phrase-medial word preceded by a pause or followed by a pause was marked as such so that it could be distinguished from those without a pause, because the word is then not part of the same intonational phrase as the phrase before or after the pause. Figure 4.3 below shows the target word /karaʔ/ ‘rough’ in phrase-medial position. There is a long pause before the target word, so the segmentation begins at the release of the stop.

Figure 4.3 Target word in phrase-medial position preceded by a pause.

If the target word began with a stop and the preceding word ended in an unreleased consonant, I took half the closure to belong to the target word and the other half to the preceding word. In Figure 4.4, the first syllable of the target word /kataw/ ‘louse’ begins with a voiceless plosive, while the preceding word /lajʔ/ ‘say’ ends in a glottal stop. The syllable boundary between the two words is taken to be the midpoint of
the duration of the closure between the end of the /ai/ in /laiʔ/ and the burst of the /k/ in /kataw/. I used a similar method to segment target words that ended in a nasal followed by a word with an initial nasal, e.g., /blaan nam/ ‘June.’ As in Figure 4.5, the coda nasal of /blaan/ and onset nasal of /nam/ appears as one long nasal sound with no apparent boundary. The boundary between the two words is taken to be the midpoint of the nasal sound.

Figure 4.4 Target word onset splitting a stop closure.
“Voiceless syllables” and syllabic nasals were coded differently from syllables adjacent to a pause. Voiceless syllables are visible and audible consonant releases that are not followed by a vowel component. These releases may sometimes be accompanied by aspiration. For example, /takaj/ ‘tooth’ was often realized as [tkaj] where the [t] release was audible and showed up on a wave form and spectrogram as a burst. The second syllable [kaj] was segmented from the beginning of the closure following the [t] burst. Figure 4.4 above illustrates a voiceless syllable. The only remnant of the initial syllable /ka/ is the burst of the onset /k/. As discussed in the preceding paragraph, the beginning of the first segment is taken to be the midpoint of the closure preceding the burst.

Syllabic nasals are syllables with nasal onsets that did not have a visible formant transition from nasal to vowel. Auditory cues were also used to mark syllabic nasals as opposed to nasal-vowel sequences, e.g., /mata/ realized as [m̥ta] instead of [mḁta]. Both syllables of words with syllabic nasals and voiceless syllables were marked with an asterisk so that they could be omitted from the analysis if necessary. Figure 4.6 shows an example of the target word /relo/ ‘meat’ which this particular speaker pronounced with a
syllabic nasal instead of the /r/ [ŋlo]. Finally, there were many instances in which the initial syllable of the target word was dropped altogether. Second syllables of words without initial syllables were segmented and marked as not having an initial syllable. Figure 4.7 shows such an example. The speaker has dropped the first syllable of the target word /kapaaʔ/ altogether so that the word is realized as [paʔ]. The syllable is marked “NI” in the textgrid label for “no initial.” Because this target word is in a phrase-initial sentence frame and begins with a voiceless plosive, the segmentation boundary is at the onset of the vowel /a/. 

Figure 4.6 Target word with syllabic nasal in initial syllable.
4.5 Statistical methods in R

To analyze the data in this dissertation, I used linear regression models (Chapter 5) and linear mixed effects models (Chapter 6) with the R software. These methods offer advantages over the *t*-tests and ANOVAs commonly used in linguistics. Most pertinent is that these methods can be used with “unbalanced data sets,” those in which the number of observations are not equal for all conditions. My data has uneven numbers of phonemically short and long vowels, and some items do not occur the same number of times. Rather than throw out some observations to balance the data, it is preferable to make use of as many observations as possible.

4.5.1 Linear regression

In linear regression modeling, the goal is to find an equation of the form below to fit the data set.

\[ y = a_1x_1 + a_2x_2 + a_3x_3 + \ldots + a_nx_n \]

To obtain the coefficients \( a_1, a_2, \ldots, a_n \) that characterize an equation, one builds a linear regression model that fits the data set. A model may include all or only some of the factors depending on analysis goals. One can build several models with different
combinations of factors included and compare the models to see which one is a better representation of the data. Table 4.1 below shows the results of a comparison of two models named “dur.lm2” and “dur.lm1.” The top half of the table shows that “dur.lm2” called here “Model 1” has three factors: Length, Pposition, i.e. Phrase position, and CodaC, i.e. Coda consonant. The other model “dur.lm1” called “Model 2” has four factors, the three in Model 1 and an additional factor called Vnucleus, for vowel nucleus. The result of the comparison is listed in the bottom of Table 4.1. Line 2 shows that Model 2 (i.e. dur.lm1) is not significantly a better fit to the data compared with Model 1 (dur.lm2) from the p-value \( p = 0.5 \), at the rightmost column, leading to the conclusion that adding this extra factor “Vnucleus” will not significantly improve the model’s fit. More than two models may be compared in this manner at a time.

Table 4.1 Results of comparing two linear regression models.

```r
> anova(dur.lm2,dur.lm1)
Analysis of Variance Table

Model 1: duration ~ Length + Pposition + CodaC
Model 2: duration ~ Length + Pposition + CodaC + Vnucleus

             Res.Df RSS Df Sum of Sq      F Pr(>F)
Model 1:     1  2373410
Model 2:     2  2327980 8    45430 0.8635 0.5475
```

A summary table for a particular model can be generated in order to examine each of the coefficients and their respective p-values. Table 4.2 below is an example of such a summary. The model has the same factors as in “Model 1” from Table 4.1: Length, Pposition, and CodaC.
Table 4.2. Sample summary table for a linear regression model.

Call:
`lm(formula = duration ~ Length + Pposition + CodaC, data = ch5durnodiph)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-196.3913</td>
<td>-50.5430</td>
<td>0.3499</td>
<td>44.8203</td>
<td>380.1547</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|----------|
| (Intercept)         | 555.565  | 12.012     | 46.249  | <2e-16 *** |
| LengthShort         | -54.961  | 9.378      | -5.861  | 1.05e-08 *** |
| PpositionIni        | -72.454  | 11.910     | -6.083  | 3.03e-09 *** |
| PpositionMed        | -9.546   | 9.401      | -1.015  | 0.31060 |
| CodaCH              | -123.398 | 18.863     | -6.542  | 2.11e-10 *** |
| CodaCLiq            | -38.426  | 19.736     | -1.947  | 0.05232 . |
| CodaCNas            | -49.153  | 11.645     | -4.221  | 3.09e-05 *** |
| CodaCOpen           | -58.172  | 19.532     | -2.978  | 0.00310 ** |
| CodaCStop           | -131.213 | 13.085     | -10.028 | <2e-16 *** |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 81.07 on 357 degrees of freedom
Multiple R-squared: 0.3773, Adjusted R-squared: 0.3633
F-statistic: 27.04 on 8 and 357 DF,  p-value: < 2.2e-16

Here, the coefficients, listed in the Estimate column, correspond to the $a_1, a_2, ... a_n$ in the linear regression equation. The Estimate of the Intercept is the average value for the dependent variable “duration” with each factor at the default level. The R program takes the default level to be the one that comes first alphabetically in the factor. In Table 4.1, the level “Long” is the default for the factor “Length”; likewise, the levels “Final” and “Glide” are the defaults for “Phrase Position,” abbreviated “Pposition,” and “Coda Consonant,” abbreviated “CodaC,” respectively. A negative coefficient shows that the factor is negative correlated with the dependent variable. Length = Short has a coefficient of -54.961; this indicates that having a “Short” vowel decreases duration. The table shows that Length is a significant factor because of its $p$-value for “Short” listed in the rightmost column ($p < 1 \times \exp(-8)$). Similarly, a Position = Ini(tial) is significant and negatively correlated, meaning that words in Initial position have shorter duration compared to words in the Final position. It is possible to change the default values for each factor; in subsequent analyses in Chapter 5 and 6, I change the defaults so that
“Short” is the default for factor “Length”; in a similar fashion, “Initial” will be the default for “Phrase Position.” I did not change the default of the “Coda Consonant” factor.

The above model only had main effects and no interactions. Table 4.3 below is a summary table of a model with both main effects and interactions. This model only included an interaction between Phrase position and Coda consonant; one may also include multiple interactions. Interactions are designated by a colon and listed underneath the main effects; below, the listing of interactions begins at “PpositionIni:CodaH” which stands for the interaction of Initial phrase position and h coda. Since the ordering of levels has not been changed, the default interaction is Final position and Glide coda.

Table 4.3. Sample output for a linear regression model.

```
> summary(dur.lm5)
Call:
  lm(formula = duration ~ Length + Pposition + CodaC +
      Pposition:CodaC, data = ch5durnodiph)
Residuals:          Min       1Q   Median       3Q      Max
  -223.71061 -51.98056   0.03283  46.46890 320.28939
Coefficients:                Estimate Std. Error t value Pr(>|t|)
(Intercept)                579.237     14.888  38.905  < 2e-16 ***
LengthShort            -52.712      8.887 -5.931  7.27e-09 ***
PpositionIni            -98.024     23.757 -4.126  4.62e-05 ***
PpositionMed            -60.071     19.990 -3.005   0.002849 **
CodaCH                 -151.525     28.285 -5.357  1.54e-07 ***
CodaCLiq                -50.461     29.226 -1.727   0.085137 .
CodaCNas               -63.863     29.226 -2.170   0.031240 *
CodaCOpen              -88.137     39.037 -2.268   0.024365 *
CodaCStop              -199.842     39.037 -5.111  < 2e-16 ***
PpositionIni:CodaCH    -4.976      51.240 -0.097   0.922691
PpositionMed:CodaCH    63.487      38.461  1.670   0.095230
PpositionIni:CodaCLiq  -8.718      51.875 -0.168   0.866633
PpositionMed:CodaCLiq  33.071      41.332  0.800   0.424181
PpositionIni:CodaCNas  41.003      30.089  1.363   0.173850
PpositionMed:CodaCNas  19.641      24.619  0.798   0.425515
PpositionIni:CodaCOpen 79.424      51.240  1.550   0.122046
PpositionMed:CodaCOpen 45.243      39.037  1.159   0.247258
PpositionIni:CodaCStop 29.037      33.867  0.857   0.391831
PpositionMed:CodaCStop 153.099     27.715  5.524  6.51e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 76.74 on 347 degrees of freedom
Multiple R-squared: 0.4577, Adjusted R-squared: 0.4295
F-statistic: 16.27 on 18 and 347 DF,  p-value: < 2.2e-16
```
The coefficients for the interaction effect shows that it is driven by only one interaction, namely between Pposition = Medial and CodaC = Stop, which has a $p$-value of $6.51 \times \exp(-08)$. All the other interaction effects have $p$-values ranging from 0.08 to 0.9 and are not significant.

4.5.2 Mixed effects models

Linear mixed effects (LME) models have two types of factors, fixed and random. Random factors are those that have been randomly sampled from a larger population. In linguistics research, the factor “subject” or “participant” is often modeled as a random factor. Fixed effects are those in which conditions are repeatable. Model building with specifications for main and interaction effects is done as in linear regression models, with the random factor(s) specified separately from fixed factors. The output tables are similar to those in Tables 4.2 and 4.3.

I use linear regression modeling in Chapter Five to analyze data from one speaker. I use LME modeling in Chapter Six because it uses data from multiple speakers. Speaker identity is the random factor; all other factors are fixed.
CHAPTER 5
EFFECTS OF PHONEMIC VOWEL LENGTH, CODA CONSONANT, AND PHRASAL POSITION ON SYLLABLES

The goals of this chapter are twofold. My first goal is to look at three acoustic features that may indicate syllable prominence at the phrase level: 1) changes in fundamental frequency (F0) which correlate to pitch; 2) duration, and 3) intensity or loudness. Pitch often indicates phrasal prominence, as in the English H* nuclear pitch accent, as well as word level prominence, e.g. pitch accent in Serbo-Croatian and Japanese. Duration has been discussed as an indicator of both phrasal prominence and iambicity (Hayes 1992). Loudness may be an indicator of prominence, as claimed for English by Kochanski et al. 2005. I examine indications of phrasal prominence by using the same set of words in sentence frames to control the surrounding segmental environment.

My pre-analysis hypotheses were as follows:
1. Because WC words show an iambic tendency, I expect that disyllabic words occur in patterns of short-long syllables.
2. I expect longer durations to correlate with greater amounts of either pitch movement or loudness. From a purely physical standpoint, a longer duration provides more opportunities for greater pitch movement or intensity.
3. I expect word-final phenomena to be amplified by phrase-final phenomena; durations will be longer in final position than in other positions.

My second goal is to examine how and whether phonemic vowel length has an effect on the above three variables. WC is described as having phonemic vowel length in various sources (Friberg and Hor 1977, Headley 1991, Thurgood 1999); therefore, syllables with long vowels are expected to have longer durations than syllables with short vowels. At the same time, syllables in a WC word are arranged in a short – long sequence. Moreover, at phrase level, there may be effects of phrase-final lengthening on word-final syllables. These three phonological levels have potentially conflicting effects on syllable duration. In particular, I expect duration, as the acoustic correlate of length, to be affected. Impressionistically, final ‘main’ syllables of disyllabic words seem
lengthened, presumably from the words’ iambic nature. Would then phonemic length be retained in these syllables? I observed casually that some WC speakers did not recognize some pairs of words as a minimal pair in length. Therefore, there is a possibility that duration measurements may reflect length neutralization in certain environments.

In this Chapter, I use speaker AY’s speech as a baseline for later comparison with other speakers; AY was one who had a clear conception of vowel length. I examine differences in duration and in the ratio of long and short syllables in minimal pairs. This chapter uses recordings of AY made in 2008, as described in Chapter 4, Section 3.

5.1 Data Overview

83 words were recorded as target words. 72 words were actually used in the analysis. I omitted diphthongs and words ending in –wʔ from analysis, e.g. taniwʔ, ‘cook rice’, vəo ‘forget’. The following items were also excluded: /rap/ ‘level’, /pah/ ‘hand’, /baw/ ‘ash’, /baʔʔ/ ‘contagious’ due to AY alternating between and /baʔʔ/, /kaʔʔ/, and /paaʔ; one observation of /laʔaj/ for ‘rice’ instead of /prah/. Of the remaining 72 words, 38 had phonemically long vowel nuclei; 34 had a phonemically short vowel nuclei. 56 words had a nucleus vowel /a/. 16 words had vowels other than /a/. Word-final glides, /-j/ and /-w/ were taken to be consonants. Words had syllable shape C(C)VC, C(C)VVC, CVCVV, or CVCVC, where the final consonant of the word was a stop, nasal, liquid, -h, or a glide. Many words formed minimal or near-minimal pairs in vowel length. Some pairs were monosyllabic, as in (1), or disyllabic, as in (2). I laid emphasis on matching codas and having minimal pairs in vowel length, rather than on the number of syllables in the word. Words with vowels other than /a/ formed minimal pairs or near minimal pairs in vowel length, as in (3).

(1) paʔ ‘to string’
    paaʔ ‘four’

(2) tapaj ‘shake rice’
    tapaaj ‘rabbit’
(3)  kɔʔ ‘head’

tɔɔʔ ‘stay, live’

Table 5.1 Item and token number breakdown.

<table>
<thead>
<tr>
<th>Item count</th>
<th>Long nuclei</th>
<th>Short nuclei</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vowel nucleus</td>
<td>/a/</td>
<td>not /a/</td>
</tr>
<tr>
<td>Number</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Token count</th>
<th>Long nuclei</th>
<th>Short nuclei</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vowel nucleus</td>
<td>/a/</td>
<td>not /a/</td>
</tr>
<tr>
<td>Number</td>
<td>118</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>214</td>
</tr>
</tbody>
</table>

There were at least five repetitions of each item. Each item was placed in various sentence frames, as explained in Chapter 4 Section 3.1; items were measured at least once in each of the three phrase positions: once in initial position, twice in medial position, twice in final position. I also had three test frames with which I tested a small subset of words; these were two medial and one final position.

To summarize Chapter 4 Section 4, the following measurements were taken from each syllable in a token word: duration; mean intensity (in decibels); pitch excursion (maximum minus minimum frequency of the syllable in Hertz); pitch at one-fourth, one-half, three-fourths of the duration of a syllable, and average pitch over the syllable. The pitch measurements at quarter points through the syllable duration were taken in order to track the direction of pitch movement. Pitch at the beginning and end of a syllable was often not available because many tokens had voiceless stops as the onset consonant, or the end of the vowel nucleus showed glottalization. In such cases, the script was not able to track the pitch at the designated points for all syllables.

Below, I discuss results for each of the three acoustic measures in terms of various contributing factors. As mentioned in Chapter 4, I used linear regression modeling for statistical analysis. The analysis will focus on monosyllabic words and the last syllable of disyllabic words. These two syllable types are considered to be the ‘main syllable’ and have similar prosodic qualities. In the following discussion, factor names
will be capitalized to indicate that they are related to the statistical model. For example, Length is the factor for phonemic vowel length, which can be either Short or Long. Phrase position may be Initial, Medial, or Final; Coda consonants may be Glide, Nasal, Stop, Open, i.e. no coda, or /h/.

5.2. Duration

Table 5.2 below shows the items’ mean syllable durations grouped by phonemic vowel length. I calculated mean durations and standard deviations for 1) all vowel nuclei; 2) only syllables containing vowel /a/; 3) syllables containing vowel /a/ in closed syllables. The ratio of Short to Long syllables was approximately 1.2 in all three calculations. Inclusion of vowels other than /a/ only slightly affected the long to short ratio.

Table 5.2. Mean and standard deviation of syllable duration, milliseconds.

<table>
<thead>
<tr>
<th>Type of nuclei</th>
<th>Long nuclei (SD)</th>
<th>Short nuclei (SD)</th>
<th>Long to Short ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>all vowel nuclei</td>
<td>482.3 (88.3)</td>
<td>417.5 (101.8)</td>
<td>1.16</td>
</tr>
<tr>
<td>just /a/</td>
<td>495.6 (89.0)</td>
<td>424.2 (98.9)</td>
<td>1.17</td>
</tr>
<tr>
<td>just /a/, excluding open syllables</td>
<td>499.1 (88.6)</td>
<td>424.3 (99.2)</td>
<td>1.18</td>
</tr>
</tbody>
</table>

For all subsequent analyses, I use only tokens with the vowel nucleus /a/. One basis for this decision is that the data set is not evenly distributed with respect to vowel quality. There are many more tokens with /a/ nuclei than all other nuclei combined. The other is that the exclusion of non-/a/ tokens causes a change of less than 1% in mean duration. Exclusion of tokens that do not have /a/ nuclei resulted in exclusion of Liquid coda items with Long vowels; in the analysis below, Liquid codas are limited to those with Short vowels.
5.2.1. Data overview

The distribution of syllable durations is normal, as can be seen in the distribution density graph (Figure 5.1). The density plot shows how measurements are distributed with respect to each other. The x-axis of Figure 5.1 is duration in milliseconds and the y-axis is relative density of data points. Figure 5.1 indicates that the number of measurements is highest at a point slightly less than 500 ms, approximately 480 ms.

Figure 5.1 Density plot for duration measurements, non-a tokens excluded.

5.2.2 Statistical results

My hypothesis regarding this data set was that those syllables in phrase-final position would be statistically longer than those in the two other positions due to phrase-final lengthening. Table 5.3 below shows the results of the linear regression model for duration. The factors are Length, Phrase position (abbreviated Pposition) and Coda consonant (abbreviated CodaC). I changed the default levels for each factor to be Length=Short, Pposition = Initial, and CodaC = glide. The default value of duration is indicated in the Estimate column on the “(Intercept)” line (440.10). Each line in the “(Intercept)” column shows how much a different level of a factor affects the default value and whether the difference is significant, shown in the rightmost column (Pr>|t|). For example, “PpositionMed” stands for medial phrase position. It has an increasing effect on the default duration, by 52.30 ms and the difference is significant ($p = 6.94 \times 10^{-5}$). Interactions are indicated by colons. “LengthLong:CodaNas” indicates the interaction between Length = Long and nasal coda.
Table 5.3 shows a strong main effect of phrase position on duration; initial position syllables are the shortest and final position ones are the longest. Of the possible coda consonants – stops, nasals, liquids, /h/, and glides – nasals, stops, and /h/ have a strong effect on duration. Syllables closed by stop in particular have shorter duration than open syllables or those closed by other consonants. The effect of /h/ is related to WC phonotactics; /h/ only occurs after short vowels.

Notable here is that there is no main effect of Length \((p = 0.17)\). Length does have an interaction effect with Coda consonant, due only to the interactions between two levels. One is between Length and Nasal coda, and the other between Length and Stop coda. These results indicate that phonemic vowel length does not have an effect on syllable durations, while phrase position and some coda consonants have a strong effect. This speaker’s realization of these words does not show statistically significant phonemic length contrasts.

Table 5.3 Results of linear regression modeling for syllable duration.

Coefficients: (3 not defined because of singularities)

|                  | Estimate | Std.Error | t value | Pr(>|t|)     |
|------------------|----------|-----------|---------|-------------|
| (Intercept)      | 440.10   | 15.14     | 29.077  | < 2e-16 *** |
| LengthLong       | 25.31    | 18.24     | 1.388   | 0.1663      |
| PpositionMed     | 52.30    | 12.93     | 4.044   | 6.94e-05 ***|
| PpositionFin     | 86.00    | 13.56     | 6.345   | 9.90e-10 ***|
| CodaCH           | -134.10  | 20.62     | -6.503  | 4.04e-10 ***|
| CodaCLiq         | -34.99   | 22.19     | -1.576  | 0.1162      |
| CodaCNas         | -68.75   | 15.55     | -4.422  | 1.44e-05 ***|
| CodaCOpen        | 44.74    | 22.31     | -2.005  | 0.0460 *    |
| CodaCStop        | -130.76  | 22.06     | -5.928  | 9.76e-09 ***|
| LengthLong:CodaCH| NA       | NA        | NA      | NA          |
| LengthLong:CodaCLiq| NA    | NA        | NA      | NA          |
| LengthLong:CodaCNas| 48.32  | 23.46     | 2.060   | 0.0404 *    |
| LengthLong:CodaCOpen| NA    | NA        | NA      | NA          |
| LengthLong:CodaCStop| 89.00 | 37.72     | 2.359   | 0.0191 *    |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

A comparison of models with and without the factor Length indicates that a model with Length is a much better fit to the data. \((p < 6.63e-08)\).
5.2.3. Duration and phrase position

Table 5.4 and Figure 5.2 show syllable durations grouped according to phonemic length and position of the target syllable in the sentence frame. Figure 5.2 shows boxplots of syllable durations with respect to their phrase position. The boxed areas in the boxplots cover the first and third quantiles of each distribution (Johnson 2009, p. 120). The notch and dark band indicate the median value of the distribution. Outlier values that lie beyond 1.5 times the length of the box are represented by unfilled circles. In the subsequent discussions, all boxplots have this basic format.

Figure 5.2 shows that both Short and Long syllables are shortest in initial position, and longest in final position. However, we can also see that there is some amount of overlap between the Short and Long categories for all three positions when we look at the entire distribution of measurements (between the two horizontal bars above and below a box plot).

Table 5.4. Mean syllable duration with respect to phrase position, milliseconds.

<table>
<thead>
<tr>
<th>Position in phrase</th>
<th>Short nuclei, mean</th>
<th>Long nuclei, mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>377</td>
<td>447</td>
</tr>
<tr>
<td>Medial</td>
<td>429</td>
<td>488</td>
</tr>
<tr>
<td>Final</td>
<td>467</td>
<td>539</td>
</tr>
</tbody>
</table>
5.2.4. Duration and coda consonant

Table 5.5 and Figure 5.3 show syllable duration breakdowns by coda consonant and vowel length. Not all coda consonants occur with both Long and Short vowel nuclei due to WC phonotactics. The consonant /h/ can only follow a short vowel, while all vowels in open word-final syllables are long. In this study, Liquid codas are limited to Short syllables due to exclusion of non-/a/ vowels from the analysis. Figure 5.3 shows that Long syllables that end in a glide or nasal, or have no coda, have similar medians. Comparing across Length, we can see that the median value for syllables with Short vowel + glide is almost equal to that of Long vowel + glide; the difference of means is only 26 ms. Among the Long nuclei syllables, stop coda syllables have the smallest mean (Table 5.5) and median (dark bands in Figure 5.3), and have a more dispersed distribution, with longer boxplots. The differences between mean durations of Short and Long syllables are smallest for Glides (26ms), and the greatest for Stops (116 ms), with
Nasals in between the two values (71ms). These results suggest that if phonemic length neutralization were to take place, it would occur in syllables with sonorant codas first, and in particular, glides. Syllables with stop codas may be the most resistant to neutralization.

Table 5.5. Mean syllable durations with respect to coda consonant (ms).

<table>
<thead>
<tr>
<th>Coda Consonant</th>
<th>Short nuclei, mean</th>
<th>Long nuclei, mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>-</td>
<td>479</td>
</tr>
<tr>
<td>Glide</td>
<td>494</td>
<td>520</td>
</tr>
<tr>
<td>Liquid</td>
<td>462</td>
<td>-</td>
</tr>
<tr>
<td>Nasal</td>
<td>429</td>
<td>500</td>
</tr>
<tr>
<td>H</td>
<td>367</td>
<td>-</td>
</tr>
<tr>
<td>Stop</td>
<td>347</td>
<td>463</td>
</tr>
</tbody>
</table>

Figure 5.3. Durations by coda consonant; Long=wide, Short=narrow.
5.2.5 Phrase position and coda

Figure 5.4 below shows the distribution of durations by phrase position and coda consonant, conflating Long and Short nuclei. Here, values for stop codas in Final position were omitted because such syllables were segmented at the end of the vocalic portion, unless there was a visible release. The overall trend is an increase from Initial to Final position. For all syllable types except Open ones, the mean durations increase in this order: Initial < Medial < Final. Means of Open syllables decrease by 3 ms from Initial to Medial, but increase by 20 ms in Final position. /h/ coda durations increase by 99 ms from Initial to Medial position; the Final mean is 1 ms less than the Medial mean. The overall distribution of the three positions overlaps for Glide and Nasal codas and for Open syllables; in Liquid codas, only Medial and Final positions overlap. As in Figure 5.3, Stop coda durations for Short syllables have a large range of values. Glide and zero-coda (Open) syllables in final position have a wider range of durations compared to Liquid and Nasals; these codas are also more vocalic. This is likely due to the fact that speakers’ voices can trail off at the end of a word if the word final segment is a glide or vowel.

Table 5.6. Mean syllable durations with respect to coda and phrase position (ms).

<table>
<thead>
<tr>
<th>Coda Consonant</th>
<th>Phrase-initial</th>
<th>Phrase-medial</th>
<th>Phrase-final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>473</td>
<td>470</td>
<td>490</td>
</tr>
<tr>
<td>Glide</td>
<td>452</td>
<td>486</td>
<td>553</td>
</tr>
<tr>
<td>Liquid</td>
<td>390</td>
<td>463</td>
<td>492</td>
</tr>
<tr>
<td>Nasal</td>
<td>437</td>
<td>450</td>
<td>488</td>
</tr>
<tr>
<td>H</td>
<td>277</td>
<td>378</td>
<td>377</td>
</tr>
<tr>
<td>Stop</td>
<td>266</td>
<td>425</td>
<td>NA</td>
</tr>
</tbody>
</table>
5.2.6 On Length and Duration

For this speaker, durations of syllables with phonemically long vowels were approximately 1.2 times longer than those with short nuclei, a difference of approximately 70 ms. Kozasa 2005 showed that the ratios between long and short vowels are 1.6 to 1 and 1.4 to 1 in Japanese and Pohnpeian, respectively. A ratio of 1.2 is small compared to either of those two languages. Impressionistic observations show that some speakers do not differentiate some pairs by length, instead using a periphrastic construction or a different vowel quality.

(1)  maj ‘grandmother’
    maaj ‘come’ > mej
(2) pataw ‘stone’ > poh ptaw ‘stone’, lit. CL⁹ + stone
   pataaw ‘king’

(3) can ‘hit’
    caan ‘rain’ > cēan

(4) tapaj ‘shake rice’ > tpaj
    tapaaj ‘rabbit’ > paaj

The above results, showing that phonemic length is not a main factor in the prediction of duration, support these observations that the vowel length distinction may be weakening or being neutralized. The raw difference between the durations of Short and Long syllables were especially small in sonorant codas; in particular, in glides. The word pairs for which I observed a lack of distinction in vowel length in some speakers had sonorant codas, complementing the duration measurements.

However, to test the claim that length distinctions are being lost in this language, we would need to compare differences of other speakers, not only of duration but also other acoustic measures, such as pitch and vowel quality to see whether and how speakers compensate for a lack of duration difference. Finally, perception tests would clarify whether speakers perceive length contrasts and whether all minimal pairs are differentiated.

5.3. PITCH DIFFERENTIAL

5.3.1 Data Overview

The pitch differential of a syllable is the absolute value of the difference between the pitch maximum and pitch minimum for that syllable; all values are positive and hence this value shows only the amount of movement, not the direction. The initial result set showed that the distribution of pitch movements was skewed to the low end of the scale. The measurements centered between 20 and 40 Hz, and the right tail of the density

⁹ The word poh means fruit but is also used as a classifier for all fruit and small round objects.
distribution trailed off beyond 100 Hz (Figure 5.5). Therefore, I excluded or manually corrected those values greater than 80 Hz. Most of these outliers were instances of pitch halving or doubling, or other incorrect pitch tracking by Praat. Calculations of means indicate that the amount of pitch excursion does not differ by phonemic vowel length (Table 5.7).

Figure 5.5. Density plot of pitch excursion measurements.

Table 5.7: Mean pitch excursion and standard deviation by Position and Length, in Hz.

<table>
<thead>
<tr>
<th>Position</th>
<th>Short nuclei, mean (SD)</th>
<th>Long nuclei, mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>29.6 (13.6)</td>
<td>37.9 (17.9)</td>
</tr>
<tr>
<td>Medial</td>
<td>32.2 (14.6)</td>
<td>33.3 (11.6)</td>
</tr>
<tr>
<td>Final</td>
<td>23.1 (13.0)</td>
<td>22.9 (11.5)</td>
</tr>
<tr>
<td>Overall</td>
<td>28.2 (14.4)</td>
<td>30.0 (11.6)</td>
</tr>
</tbody>
</table>

5.3.2 Statistical results

I predicted that pitch movement in final syllables would be greatest, that initial syllables would show less pitch movement, and that medial syllables would show minimal differences because I expected pitch movement to occur at phrase edges. I also expected more pitch movement in syllables with long nuclei because there is a possibility for more movement in a longer time span.
The resulting regression model had two main effects, Coda consonant and Phrase position, and one interaction between Phrase position and Coda (Table 5.8). Here, the defaults are Initial phrase position and Glide coda. A comparison of models with and without Length as a factor showed that it was not a significant factor and hence was not included in the final model. A look at the coefficients for Position in the model shows that pitch movement in medial position is not significantly different than pitch movement in initial position, but final position is significantly different. Numerically, both medial and final positions show decreasing amounts of pitch movement as compared with the (Initial) default value, shown by the negative values under the “Estimate” column in the Table. In particular, this model predicts final position syllables to have the smallest pitch excursion, which is the opposite of my hypothesis. We should keep in mind, however, that the model is based on one speaker and that the model’s predictions may not be valid for this language as a whole.

Looking closely at the interaction effect, the coefficients which were significant were Initial position and Coda=h; Initial position and Coda=stop. Whereas the majority of coda excursions were ordered Final < Medial < Initial, stops and /h/ coda syllables showed a reverse pattern from the other codas, Initial < Medial < Final. Initial position for /h/ has the smallest excursion while initial position for Open, Nasal, and Glides have the largest. It is not clear why /h/ and Stop coda syllables would behave differently. These coefficients make the model a better representation of the data, but do not add explanatory power.

In sum, the model indicates that phonemic Length is not a significant factor in predicting a syllable’s pitch excursion; phrase position and the syllable’s coda are the factors that affect the amount of excursion.
Table 5.8 Results for pitch excursion linear regression model.

Coefficients:

|                        | Estimate | Std. Error | t value | Pr(>|t|)  |
|------------------------|----------|------------|---------|-----------|
| (Intercept)            | 36.7200  | 3.1253     | 11.749  | < 2e-16 *** |
| PpositionMed           | -4.8876  | 3.8932     | -1.255  | 0.210424  |
| PpositionFin           | -14.7457 | 3.8700     | -3.810  | 0.000172 *** |
| CodaCH                 | -25.2900 | 7.8653     | -3.215  | 0.001463 ** |
| CodaCLiq               | -7.3133  | 7.8653     | -0.930  | 0.353302  |
| CodaCNas               | -0.4121  | 4.2418     | -0.097  | 0.922678  |
| CodaCOpen              | -1.0367  | 7.8653     | -0.132  | 0.895239  |
| CodaCStop              | -10.3129 | 5.6652     | -1.820  | 0.069818 . |
| PpositionMed:CodaCH    | 18.1966  | 9.1039     | 1.999   | 0.046646 * |
| PpositionFin:CodaCH    | 25.5219  | 9.3063     | 2.742   | 0.006511 ** |
| PpositionMed:CodaCLiq  | -0.3377  | 9.4646     | -0.036  | 0.971568  |
| PpositionFin:CodaCLiq  | 6.1390   | 9.4551     | 0.649   | 0.516715  |
| PpositionMed:CodaCNas  | -0.6660  | 5.1749     | -0.129  | 0.897700  |
| PpositionFin:CodaCNas  | -1.9713  | 5.1649     | -0.382  | 0.703000  |
| PpositionMed:CodaCOpen | -1.4746  | 9.1987     | -0.160  | 0.872759  |
| PpositionFin:CodaCOpen | 11.7536  | 9.3063     | 1.263   | 0.207703  |
| PpositionMed:CodaCStop | 25.5320  | 6.7608     | 3.776   | 0.000196 *** |
| PpositionFin:CodaCStop | 19.6760  | 6.8609     | 2.868   | 0.004462 ** |

---

How can we account for Medial position having the same amount of pitch movement as Initial position? This was unexpected, as I hypothesized more pitch movement at the phrase edges rather than the middle of a phrase. One possibility is that such behavior is idiosyncratic to the speaker. It may be the case that this speaker’s pitch range decreases markedly towards the end of a phrase, resulting in smaller movement in Final position. As the utterance progresses, the speaker’s pitch level and pitch range also decreases. Towards the ends of phrases, the pitch range is already small so any possible movement is smaller than at other positions. We should also take into account that these utterances were sentence frames, not questions or naturally occurring discourse which may have more emotional content. It is possible that the speaker was less animated than he would have been in a more naturalistic speaking situation and employed a monotonic speaking style with a fixed intonational contour beginning in a high pitch and falling throughout the utterance.
5.3.3 Discussion of the effect of each factor on pitch excursion

Figure 5.6 and Table 5.8 show results broken down by Length and Phrase position. Figure 5.6 shows that for each position, there is much overlap in pitch excursion values of Short and Long nuclei. The median values for the two Lengths are very close to each other, as are the mean values. A comparison by Position also shows overlap; Final excursions are smaller and Initial and Medial excursions are greater than Final and roughly equal to each other. The range of values is the smallest for Final position excursions.

Figure 5.6. Pitch excursion by Length and Position; Long=wide, Short=narrow.

Excursions with respect to coda (Figure 5.7, below) vary only slightly for all codas except /h/, which has a smaller excursion compared to others. The Coda by Position graph in Figure 5.8 shows a similar pattern for sonorant codas; Initial position syllables have the greatest amount of excursion, then Medial second greatest, and Final position least. On the other hand, Stop and /h/ coda syllables had the least amount of excursion in Initial position. In both the Length x Coda plot (Figure 5.7) and Coda x
Position plot (Figure 5.8), Stop codas display a great range of excursion values, ranging from approximately 20 Hz to 60 Hz. The smaller excursion for /h/ codas may be due to /h/ syllables having a relatively short syllable duration compared with sonorant codas.

Table 5.9: Mean excursion by Vowel Length and Coda Consonant, Hz.

<table>
<thead>
<tr>
<th></th>
<th>Short, mean</th>
<th>Long, mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean overall</td>
<td>29.4</td>
<td>31.9</td>
</tr>
<tr>
<td>Open</td>
<td>-</td>
<td>32.0</td>
</tr>
<tr>
<td>Glides</td>
<td>28.2</td>
<td>30.2</td>
</tr>
<tr>
<td>Liquid</td>
<td>23.7</td>
<td>31.2</td>
</tr>
<tr>
<td>Nasal</td>
<td>28.0</td>
<td>29.0</td>
</tr>
<tr>
<td>H</td>
<td>22.6</td>
<td>-</td>
</tr>
<tr>
<td>Stop</td>
<td>37.6</td>
<td>40.9</td>
</tr>
</tbody>
</table>

Figure 5.7: Pitch excursion by Length and Coda; Long=wide, Short=narrow.
Table 5.10: Excursion by Position and Coda Consonant, Hz.

<table>
<thead>
<tr>
<th></th>
<th>Phrase-initial, mean (SD)</th>
<th>Phrase-medial, mean (SD)</th>
<th>Phrase-final, mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean overall</td>
<td>33.2 (16.0)</td>
<td>32.6 (13.5)</td>
<td>23.0 (12.4)</td>
</tr>
<tr>
<td>Open</td>
<td>32.7 (20.4)</td>
<td>35.7 (10.9)</td>
<td>29.3 (11.2)</td>
</tr>
<tr>
<td>Glides</td>
<td>36.7 (15.1)</td>
<td>31.8 (10.2)</td>
<td>22.0 (8.0)</td>
</tr>
<tr>
<td>Liquid</td>
<td>29.4 (6.6)</td>
<td>24.2 (9.7)</td>
<td>20.8 (7.7)</td>
</tr>
<tr>
<td>Nasal</td>
<td>36.3 (14.6)</td>
<td>30.8 (11.4)</td>
<td>20.0 (9.4)</td>
</tr>
<tr>
<td>H</td>
<td>11.4 (4.5)</td>
<td>24.7 (9.6)</td>
<td>22.2 (10.7)</td>
</tr>
<tr>
<td>Stop</td>
<td>26.4 (19.9)</td>
<td>47.1 (17.0)</td>
<td>31.3 (21.7)</td>
</tr>
</tbody>
</table>

Figure 5.8: Pitch excursion by Coda and Position; initial = wide, medial = medium, final = narrow.
5.3.3 Direction of pitch movement

I also examined the direction of pitch movement, or whether pitch was increasing or decreasing throughout the syllable, by using pitch measurements at a quarter, half, and three-quarters through the duration of the syllable. As previously mentioned, not all points yielded recordable results. Of the measurable tokens overall, most of the syllables had a net decrease in pitch over the course of the syllable; 145 downward compared with 66 upward.

A more fine-grained look at pitch contours by breaking down the pitch measurements into quarter to midpoint and midpoint to three-quarters vectors, shows a similar behavior for Initial and Medial positions in that there were more overall falls than rises throughout the syllable. In Final positions, there were also more falls than rises, but the numbers of falling and rising contours are not as unbalanced. The second quarters of syllables, i.e., quarter to midpoint, have a balanced number of falling and rising contours. In the third quarter, i.e., midpoint to three-quarters, there are many more falls than rises. This result matches that of the overall picture of pitch movement through the syllable that there were more downward movements than upward. There was also a difference in the magnitude of movement values for rises and falls. Rises ranged from 0 to approximately 15 Hz, with one rise of 50 Hz. Falls ranged from 0 to 30 Hz. Therefore, although there were some contours, rise-fall and fall-rise, there were more falls in terms of net movement.

5.4. Intensity

My initial prediction regarding intensity was that it would be greatest at Final position and least at Medial position because I hypothesized a realization of prominence in Final position. In Medial position, I expected the least intensity since I expected prominence at phrasal edges. Actual results show that the intensity over a syllable was greatest at Initial position and least at Final position. Length had no effect on mean intensity of a syllable. Coda consonant affects intensity somewhat, with /h/ having a decreasing effect.
The distribution of intensity measurements is normal, as can be seen from Figure 5.9. A calculation of means and standard deviations of intensity over a syllable (Table 5.12) indicates that there is very little difference in mean intensity between phonemically Long and Short syllables, the differences ranging from 0 to 1 dB.

Figure 5.9. Density plot for mean intensity.

The best fit linear regression model includes main effects of Phrase position and Coda consonant. As in the case of the pitch excursion model, Length was not a significant contributing factor either for a main effect or interaction effect and was not included in the model. There were only three significant factors (Table 5.11). Both Medial and Final positions have strong decreasing effect on mean intensity, as indicated by the p-values ($p = 2.71 \times 10^{-4}$ for Medial, $1.73 \times 10^{-8}$ for Final). There is one significant interaction effect, that between Medial position and Stop coda ($p = 8.57 \times 10^{-6}$); Stop codas in Medial position have a much smaller mean intensity than do the default values, Initial and Glide.
Table 5.11 Coefficients for linear regression model, mean intensity (final stops excluded).

Coefficients: (1 not defined because of singularities)

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 69.5470  | 0.883      | 78.756  | < 2e-16 *** |
| PpositionMed     | -4.0392  | 1.0935     | -3.694  | 0.000271 *** |
| PpositionFin     | -6.4072  | 1.1000     | -5.825  | 1.73e-08 *** |
| CodaCH           | -1.4117  | 2.2223     | -0.635  | 0.525861 |
| CodaCLiq         | 2.3357   | 2.2223     | 1.051   | 0.294263 |
| CodaCNas         | -1.6889  | 1.1848     | -1.426  | 0.155227 |
| CodaCOpen        | -2.4483  | 2.2223     | -1.102  | 0.271642 |
| CodaCStop        | 1.6397   | 1.6007     | 1.024   | 0.306636 |
| PpositionMed:CodaCH | -3.6019  | 2.5695     | -1.402  | 0.162201 |
| PpositionFin:CodaCH | -2.3790  | 2.6322     | -0.904  | 0.366956 |
| PpositionMed:CodaCLiq | -1.5310  | 2.6715     | -0.573  | 0.567091 |
| PpositionFin:CodaCLiq | -0.3412  | 2.6742     | -0.128  | 0.898573 |
| PpositionMed:CodaCNas | -0.6134  | 1.4460     | -0.424  | 0.671760 |
| PpositionFin:CodaCNas | 0.1621   | 1.4530     | 0.112   | 0.911246 |
| PpositionMed:CodaCOpen | 2.8463   | 2.5963     | 1.096   | 0.274000 |
| PpositionFin:CodaCOpen | 2.5665   | 2.6322     | 0.975   | 0.330476 |
| PpositionMed:CodaCStop | -8.6623  | 1.9065     | -4.544  | 8.57e-06 *** |
| PpositionFin:CodaCStop | NA       | NA         | NA      | NA       |

Table 5.12 Mean Intensity by Vowel Length and Phrase Position, dB.

<table>
<thead>
<tr>
<th></th>
<th>Short nuclei, mean</th>
<th>Long nuclei, mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>62 (3)</td>
<td>62 (2)</td>
</tr>
<tr>
<td>Medial</td>
<td>69 (5)</td>
<td>69 (4)</td>
</tr>
<tr>
<td>Final</td>
<td>63 (4)</td>
<td>64 (4)</td>
</tr>
<tr>
<td>Overall</td>
<td>64 (5)</td>
<td>64 (4)</td>
</tr>
</tbody>
</table>
When we look at the breakdown by Coda and Length (Figure 5.11 and Table 5.14) we can see a visualization of the above results. The differences in mean Intensity between the two Lengths are minimal. The boxplots in Figure 5.11 show a fair amount of overlap in Short and Long distributions for Glides, Nasals, and Stops. The mean values in Table 5.14 also show just a 0.1 to 1.3 dB difference between Short and Long means. In fact, the median values for Short nuclei mean intensities are slightly greater than the respective Long nuclei values for Initial and Final positions.

Table 5.13: Mean Intensity by Length and Coda, dB.

<table>
<thead>
<tr>
<th></th>
<th>Short, mean</th>
<th>Long, mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>63.7</td>
<td>64.3</td>
</tr>
<tr>
<td>Open</td>
<td>-</td>
<td>65.1</td>
</tr>
<tr>
<td>Glides</td>
<td>66.8</td>
<td>65.2</td>
</tr>
<tr>
<td>Liquid</td>
<td>66.8</td>
<td>65.9</td>
</tr>
<tr>
<td>Nasal</td>
<td>63.7</td>
<td>63.8</td>
</tr>
<tr>
<td>H</td>
<td>61.2</td>
<td>-</td>
</tr>
<tr>
<td>Stop</td>
<td>61.2</td>
<td>63.4</td>
</tr>
</tbody>
</table>
Figure 5.11: Mean intensity x Coda; Long=wide, Short=narrow.

A breakdown by phrase position (Figure 5.12) shows a significantly greater intensity in Initial position syllables than that of the other two positions. This may be due to the fact that speakers have more energy at the beginning of the utterance, then lose energy towards the end. Intensity of all codas falls in the 55 to 70 dB range. A Position by Coda plot (Figure 5.12) shows again that Initial position syllables had the greatest intensity compared to the other positions.

Table 5.14. Mean Intensity by Position and Coda, dB.

<table>
<thead>
<tr>
<th></th>
<th>Phrase-initial</th>
<th>Phrase-medial</th>
<th>Phrase-final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>69</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>Open</td>
<td>67</td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>Glides</td>
<td>70</td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>Liquid</td>
<td>72</td>
<td>66</td>
<td>65</td>
</tr>
<tr>
<td>Nasal</td>
<td>68</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>H</td>
<td>68</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>Stop</td>
<td>71</td>
<td>58</td>
<td>62</td>
</tr>
</tbody>
</table>
5.5. SUMMARY

The results of this chapter show that a WC syllable’s phrase position and to a lesser extent coda consonant had an effect on its acoustic features, for this speaker. Phonemic vowel length did not play a role in predicting the amount of pitch excursion, intensity, or duration; mean durations of Long syllables were only 1.2 times those of Short ones. Instead, phrase position affected syllable durations. Duration of final position syllables was longer than those in other positions, indicating phrase-final lengthening. Contrary to my predictions, pitch excursion at phrase-initial position was the greatest and was least in phrase-final position. Mean intensity results were also contra expectations, with intensities greatest in initial and least in final position. These results can be interpreted as an effect of physiology rather than an intonational edge effect. Initial position syllables likely had significantly greater intensity because the speaker had more
energy at the start of a phrase, while final position syllables having smaller pitch movement due to gradual declination throughout the utterance.

The absence of phonemic Length as a predictive factor in all three variables lends support to the hypothesis that vowel length is neutralizing in WC. In particular, Length’s lack of influence on duration is suggestive, since duration is the phonetic correlate of phonemic Length. If there is a neutralization in progress, the above results indicate that the order of the change would affect syllables with sonorant codas first, and stop codas last. Codas with /h/ are already limited in their distribution and may not be affected. When we consider that all open ‘main’ syllables are long – vowel being the most sonorant segment – this order of change seems to be a reasonable hypothesis.
In this chapter, I examine a set of acoustic variables to see if their measurements over a syllable correlate with the iambicity of WC words. I also examine how these variables vary when the syllables are located in different positions within a phrase. The three variables I examine are duration, pitch excursion, and mean intensity. By using a set of disyllabic words and phrases as test items, I compare these three variables for the first and second syllable of disyllabic words – the pre- and main syllable.

There are three objectives of this chapter. First, I will examine whether the three acoustic variables reflect iambicity in disyllabic words. Because the language is hypothesized to be iambic, I expect these variables to have significantly different values in the pre- and main syllables. As iambs are realized as a series of short-long units, durations of pre-syllables will be significantly shorter than main syllables. I also expect more pitch movement on the main syllable and the net pitch change to increase on the main syllable. Loudness may be correlated with syllable position as well; I predict main syllables to have greater intensity than pre-syllables.

Second, I examine the effect of phrase position on the above three variables. In Chapter 5, we saw that phrase position was a significant factor in predicting all three variables. This result will be tested with multiple speakers in this chapter. I expect to replicate Chapter 5’s results for duration, where phrase-final durations were longer than those for initial or medial positions. The one-speaker results showed that pitch movement and intensity were both significantly affected by position, but not in a way that confirms my original hypotheses, which was that those values would be greatest in final and least in medial positions. Chapter 5’s results showed the opposite result; intensity was highest in phrase-initial position; pitch excursion and mean intensity were lowest in phrase final position. In addition to the three phrase positions, I also have the target items said in isolation without any sentence frame. I predict that these tokens will behave in a similar fashion as those in phrase-final positions for this set of speakers. Since a word in isolation forms a phrasal unit by itself, it is both phrase-initial and phrase-final at the same time.
Because there is no material following the target item, I predict phrase-final effects, if any, to result from words in isolation.

Third, I will probe the effect of phonemic length on the three variables, and in particular, its acoustic correlate, duration, in order to see whether the results of Chapter 5 hold for multiple speakers. In Chapter 5, the analysis showed that phonemic length was not a significant predictive factor for any of the three variables. In particular, phonemic vowel length was found not to play a role in predicting duration, contrary to expectations. A multi-speaker analysis will determine if Chapter 5’s results may be generalized to a greater speaker population.

6.1. DATA OVERVIEW

I analyzed the speech of six Kompong Chhnang speakers using their recordings of Word List B (Appendix B), as outlined in Chapter Four. There were two male and four female speakers, aged 18 to 24. I used the same Praat scripts as in Chapter Five. For each syllable in a target word, the following were measured: duration, pitch maximum, pitch minimum, pitch at one-quarter, one-half, and three-quarters of syllable duration, average intensity throughout the syllable.

There were 45 target items (Table 6.1). The target items for this chapter were either disyllabic words or a phrases consisting of two monosyllabic words. Target items have several possible word shapes: open main syllable CVCV; closed main syllable CVCV(V)C; or medial cluster (C)VCCV(V)C. The coda consonant in closed syllables is a glide, nasal, or stop. Inclusion of two-word phrases increased the variety of word shapes by adding syllables with phonologically long nuclei in pre-syllable position: CV(V)C.CV(V)C.
Table 6.1 Chapter 6 items.

<table>
<thead>
<tr>
<th>Word Shape</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCV (open coda)</td>
<td>8</td>
</tr>
<tr>
<td>CVCV(V)? (glottal coda)</td>
<td>8</td>
</tr>
<tr>
<td>CVCV(V)N (nasal coda)</td>
<td>8</td>
</tr>
<tr>
<td>CVCV(V)G (glide coda)</td>
<td>7</td>
</tr>
<tr>
<td>(C)V.C.V(V)C (medial cluster)</td>
<td>7</td>
</tr>
<tr>
<td>Phrases</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

In this chapter, I have four phrase conditions: phrase-initial, -medial, -final, and isolation. In the Isolation condition, the speakers spoke the words in isolation and not in any sentential context.

The factors to be examined in this chapter are Length, indicating phonemic vowel length (Short, Long); Syllable Position indicating whether the syllable is a pre- or main syllable (1, 2); and Phrase position, indicating what position in the sentence frame the token word was placed in (Initial, Medial, Final), or if it was not in a frame (Isolation). Another relevant factor was Coda consonant, the identity of syllable coda (Glide, Nasal, h, Open, Stop). As in Chapter 5, I will use capital letters when discussing factors and their levels in the analysis, e.g. Length, Short, Initial, Nasal (Table 6.2).
Table 6.2 Factors in Chapter 6 analyses.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Levels</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllable Position</td>
<td>1, 2</td>
<td>Syllable 1 is the first syllable, Syllable 2 is the second syllable; in disyllabic words, Syllable 1 is the ‘pre-syllable’, Syllable 2 is the ‘main syllable.’</td>
</tr>
<tr>
<td>Length</td>
<td>Short, Long</td>
<td>Phonemic length of vowel</td>
</tr>
<tr>
<td>Phrase Position</td>
<td>Initial, Medial, Final, Isolation</td>
<td>Position of target word in frame sentence; Isolation refers to target words without frame</td>
</tr>
<tr>
<td>Coda Consonant</td>
<td>Open, Glide, Nasal, /h/, Stop</td>
<td>Identity of coda consonant; /h/ only occurs after Short vowels and all vowels in Open syllables are Long.</td>
</tr>
</tbody>
</table>

In addition, each data point was also coded with other information. The factor Shape was designed to indicate the overall word shape of the token; whether it has a coda, medial cluster, or whether it is a two-word phrase instead of a disyllabic word. The factor Vowel refers to the realization of the vowel: realized in full, reduced, or entire syllable dropped. Here, I made the distinction between syllabic consonants, as in /mata/ ‘eye’ reduced to [m̩ta], and cases like /takaj/ ‘tooth’ reduced to [tkaj], where only the stop release of the [t] was audible and visible on the spectrogram and wave form. If the token was realized without the initial syllable, e.g., /kataw/ ‘louse’ realized as [taw], I coded “No Initial” on its second syllable. The factor Segment codes for whether the speaker’s realization of the particular syllable was different from its phonemic form: e.g. a different onset, as in /takaj/ realized as [pkaj], or a different vowel, as in /mataaj/ ‘die’ realized as [mutaaj]. If a syllable was dropped, it was not included in the analysis.

For purposes of analysis, I excluded all tokens that were realized as trisyllabic phrases, e.g. /pʰon tanoot/ instead of /tanoot/ ‘sugar palm’ and /kun kumsuup/ instead of /kumsuup/ ‘morning’. Two items were excluded altogether: /ćkawʔ/ ‘heavy’ and /trawʔ/
‘cut with scissors’ because these words had shapes that differed from the others. Table 6.3 shows the numbers of tokens used in the analysis.

Table 6.3 Token counts for Chapter 6.

<table>
<thead>
<tr>
<th></th>
<th>Short</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>3032</td>
<td>1593</td>
</tr>
</tbody>
</table>

In analyzing data for each of the three variables – duration, pitch excursion, and intensity – I divided the data into two subsets; one a set with only Short nuclei syllables (i.e., Short Syllable 1’s and Short Syllable 2’s, and another set with only main syllables, i.e., either Short or Long Syllable 2’s. The set of Short nuclei was designed to test for iambicity. Including Long nuclei in this analysis would naturally yield a longer mean duration for Syllable 2 than Syllable 1, exaggerating any iambicity effects while confounding Syllable Position with Length. Likewise, the set of Syllable 2’s is designed to test for phonemic Length. Here, Syllable 1’s were excluded because most have Short nuclei, which would result in a very strong effect that would skew the results. The statistical model used was linear mixed effects modeling with “Subject”, i.e. speaker, as a random effect. All other factors were fixed effects.

6.2 Duration
6.2.1. Iambicity and duration

The raw means show that words of all shapes have second syllables that are twice as long as first syllables (Table 6.4). The overall ratio of Syllable 1 to Syllable 2 is 1:2.4. Words that have an initial syllable with a coda (-VCCV) have a longer Syllable 1 duration compared with that in other word shapes, but they are still iambic; the ratio of Syllable 1 to Syllable 2 for this word shape is 1:1.65. The Shape “Phrase” has a longer Syllable 1 duration compared with disyllabic words due to the fact that some of the Phrases have words in Syllable 1 position that have long vowels, e.g. /blaan/ ‘month’, whereas disyllabic words always have short vowels in Syllable 1 position. Nevertheless, the mean Syllable 1 durations of Phrases are also shorter than durations of Syllable 2’s, with a ratio of 1:1.55.
The results support impressionistic observations of iambicity in this language. Moreover, not only are pre-syllables impressionistically much shorter than main syllables, but many disyllabic words are realized with the pre-syllable severely reduced to just a syllabic onset consonant or dropped altogether. There were 433 Syllable 2’s realized without their corresponding Syllable 1’s in this data set.

Table 6.4. Comparison of mean durations, first syllable vs. second syllable in milliseconds.

<table>
<thead>
<tr>
<th>Word shape</th>
<th>Overall</th>
<th>CVCV</th>
<th>CVCVC</th>
<th>-VCCV-</th>
<th>Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syl 1</td>
<td>149</td>
<td>117</td>
<td>108</td>
<td>204</td>
<td>236</td>
</tr>
<tr>
<td>Syl 2</td>
<td>355</td>
<td>360</td>
<td>355</td>
<td>337</td>
<td>366</td>
</tr>
</tbody>
</table>

Table 6.5. Mean durations of Syllable 1 and 2, grouped by Length of Syllable 2 vowels and phrase position.

<table>
<thead>
<tr>
<th>Short vowel in Syl 2</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syl 1</td>
<td>127</td>
<td>156</td>
<td>143</td>
<td>132</td>
</tr>
<tr>
<td>Syl 2</td>
<td>323</td>
<td>310</td>
<td>327</td>
<td>359</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>466</td>
<td>470</td>
<td>491</td>
</tr>
<tr>
<td>Long vowel in Syl 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syl 1</td>
<td>249</td>
<td>330</td>
<td>275</td>
<td>263</td>
</tr>
<tr>
<td>Syl 2</td>
<td>358</td>
<td>335</td>
<td>391</td>
<td>419</td>
</tr>
<tr>
<td>Total</td>
<td>607</td>
<td>665</td>
<td>666</td>
<td>682</td>
</tr>
</tbody>
</table>

Statistical results for short vowel nuclei indicate that durations of main syllables are significantly longer than those of pre-syllables (Figure 6.1 and Table 6.6). The statistical model shows main effects of Syllable Position and Phrase position. Position 2 durations are 200 ms longer than Position 1 syllables, as shown in Table 6.6. Medial and Final syllables overall are longer than those in Initial position. There are two significant
interaction effects: between Position 2 and Medial position, and Position 2 and Isolation. Syllable 2’s in Medial position were significantly shorter than in Initial position, while Syllable 2’s in Isolation were longer than those in Initial position.

Table 6.6. LME results for duration: Short nuclei only, Syllable Position and Phrase position as factors.

Fixed effects:

|                          | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------------------|----------|------------|---------|----------|
| (Intercept)              | 122.906  | 12.340     | 9.96    | 0.0000   |
| SylPosition2             | 200.193  | 5.395      | 37.11   | 0.0000   |
| PpositionMed             | 29.799   | 4.610      | 6.46    | 0.0000   |
| PpositionFin             | 17.879   | 4.554      | 3.93    | 0.0001   |
| PpositionIso             | 8.950    | 5.051      | 1.77    | 0.0765   |
| SylPosition2:PpositionMed| -41.783  | 7.636      | -5.47   | 0.0000   |
| SylPosition2:PpositionFin| -4.865   | 7.590      | -0.64   | 0.5216   |
| SylPosition2:PpositionIso| 25.684   | 8.433      | 3.05    | 0.0023   |

Figure 6.1 Durations grouped by Syllable Position and Phrase Position; Short nuclei only; Syl 2=wide, Syl 1=narrow.
Phrase position effects were seen in part of the results. Although raw results show a slight increase in Syllable 2 mean durations in Final position, the Syllable 2 and Final position interaction was not statistically significant. The effect of Syllable 2 and Isolation position is stronger. In addition to these general phrase effects, we can see from raw results that while Syllable 1 durations do not vary greatly by phrase position, Syllable 2 durations do. A breakdown by coda consonant (Figure 6.2) indicates a result similar to that of Chapter 5 durations. Syllables with Stop codas have medians and distributions that vary only slightly by position; all of them cluster around 300 ms for all four positions. Sonorant codas, Glides and Nasals, have medians that are more dispersed; medians for Final position and Isolation are much higher than those for Initial and Medial positions. Chapter 5 results for duration also showed a greater dispersion in Glides and with Final position being greater than in Initial position.

The interaction effect between Syllable position and Medial phrase position is significant ($p=0.0$) compared with Initial position. In Medial position, the token words and phrases appear to be “less iambic,” that is, the ratio of Syllable 1 to Syllable 2 durations is smaller. The “less iambic” nature of Medial position syllables can be seen from the mean values in Table 6.5. Specifically, the Syllable 1 measurements are slightly greater than in other positions, while Syllable 2 measurements are shorter.
6.2.2 Iambicity analysis of *blaan*

To examine the effect of syllable position on one word, I examined durations of the item *blaan* ‘month’ in both Syllable 1 and Syllable 2 positions. The word *blaan* is in Syllable 1 position in two phrases: *blaan nam* ‘June, lit. month six’ and *blaan caan* ‘rainy season, lit. month rain’. It is in Syllable 2 position in a third phrase, *ea blaan* ‘moon.’ These three pairs exhibit the same trend as with aggregate results for overall data (Table 6.7), namely that words in Syllable 2 position have a greater duration than in Syllable 1 position. Durations of *blaan* in Syllable 2 position are much greater – 1.5 times its duration in Syllable 1 position. Moreover, the mean duration of *nam* in the phrase *blaan nam*, is greater than *blaan* in three out of four positions, even though *nam* has a short vowel nucleus. Furthermore, *blaan* in Syllable 2 position is more “elastic” in that durations are more variable; durations in Final and in Isolation positions are much longer than in the other positions. This suggests that in WC, word durations shift according to
how words are positioned within a phrase. The notion of an iambic template that Hayes 1992 suggests for Khmer also seems to apply to WC; the word durations conform to the template, hence in Syllable 2 position, a word is longer than when it is in Syllable 1 position.

Table 6.7. Mean durations of syllables in phrases with *blaan* (milliseconds). Values are for the syllable in italics.

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>blaan caan</em></td>
<td>243</td>
<td>293</td>
<td>262</td>
<td>267</td>
</tr>
<tr>
<td><em>blaan caan</em></td>
<td>409</td>
<td>330</td>
<td>428</td>
<td>453</td>
</tr>
<tr>
<td><em>blaan nam</em></td>
<td>256</td>
<td>374</td>
<td>287</td>
<td>259</td>
</tr>
<tr>
<td><em>blaan nam</em></td>
<td>340</td>
<td>308</td>
<td>350</td>
<td>376</td>
</tr>
<tr>
<td><em>ea blaan</em></td>
<td>155</td>
<td>164</td>
<td>142</td>
<td>178</td>
</tr>
<tr>
<td><em>ea blaan</em></td>
<td>404</td>
<td>393</td>
<td>472</td>
<td>525</td>
</tr>
</tbody>
</table>

Although I omitted trisyllables from this analysis, informal observation gives a suggestion of what occurs when trisyllables are confronted with the iambic template. The second, or middle, syllable is reduced. This second syllable dropping was seen in items such as /ea tasiiʔ ‘sea’ being realized as [ea siʔ], /pʰon tanoot/ as [pʰon tnoːt], and alternations between /saw sit/ and /saw dusit/ for ‘small dog.’ The item /kumsuup/ ‘morning’ is itself a reduced form of /kun masuup/ ‘in the morning.’ Some speakers have reanalyzed this form so that they say /kun kumsuup/, re-adding the preposition to the reduced and merged form; for these speakers, /kumsuup/ is the lexical item for ‘morning.’ These reduced forms suggest that the words change to conform to the iambic template.

### 6.2.3 Phonemic length and phrase position

To examine the effect of phonemic length on duration, I examined a subset of data consisting of just main syllables, that is, just those in Syllable 2 position. The resulting model for this subset shows main effects of Length, Phrase positions, and Coda
consonant but no interaction effect of Length and Phrase position (Table 6.8). To simplify the output, I omitted the Coda consonant and Phrase position interaction. In terms of raw durations, the overall ratio of Short to Long vowel nucleus durations is 1:1.4. “Long” syllables are on average 57.9 ms longer than “Short” syllables.

The effect of Phrase position was seen in Final and Isolation positions but not Medial position, in which Phrase position was not significant. These results for phrase position effects are similar to those for the Short nuclei set in the previous section. Medial position durations show a different pattern from those in Final and in Isolation positions. Figure 6.3 visualizes this trend. Short and Long measurements that are closest to each other and overlap the most for Medial position syllables, while those of Final and Isolation positions are further apart.

As with the Short nuclei comparison, the breakdown by coda consonant shows that syllables with sonorant codas tend to be longer as phrase position is further back, a trend seen in Chapter Five and the Short nuclei subset (Figure 6.4). Again, syllables with Stop codas have a similar range of durations in all four positions.

Table 6.8 Mixed effects model of Syllable 2 durations, Length, Phrase, and Coda consonant.

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|---------|
| (Intercept)      | 344.217  | 27.822     | 12.372  | 0.0000  |
| LengthLong       | 57.883   | 6.378      | 9.075   | 0.0000  |
| PpositionMed     | -6.456   | 6.710      | -0.962  | 0.3361  |
| PpositionFin     | 35.361   | 6.700      | 5.278   | 0.0000  |
| PpositionIso     | 63.491   | 7.443      | 8.531   | 0.0000  |
| CodaCNas         | -35.392  | 3.782      | -9.358  | 0.0000  |
| CodaCOpen        | -40.844  | 4.776      | -8.552  | 0.0000  |
| CodaCStop        | -73.182  | 6.162      | -11.876 | 0.0000  |
| LengthLong:PpositionMed | -18.941  | 8.748      | -2.165  | 0.0305  |
| LengthLong:PpositionFin | 7.164    | 8.755      | 0.818   | 0.4133  |
| LengthLong:PpositionIso | 9.108    | 9.755      | 0.934   | 0.3507  |
Figure 6.3 Duration by Length and Phrase position, Syl 2’s only; wide = Long vowels, narrow = Short vowels.
To summarize the duration results for this group of speakers, phonemic vowel length was found to have a significant effect on the duration of the corresponding syllable. The same result was obtained from linear regression models for each individual speaker in the Kompong Chhnang cohort, although one speaker (s2) had a p-value on a greater order of magnitude: $10^{-4}$ compared with $10^{-8}$ for the others. While the result that phonemic vowel length has a significant effect on syllable duration is not surprising, it is contrary to the results obtained in Chapter 5. Some phrase positions and some Coda consonants were found to affect duration.

There are several possible explanations for why phonemic length had a significant effect on duration for this group of speakers but not for the speaker in Chapter Five. One is that Length was not a significant factor in the speech of AY, the Chapter Five speaker, but it is for the general speaker population. Another possibility is that the difference is due to different token words used for the group as opposed to the one speaker. More than half of the token words in Chapter Five were monosyllabic while those in Chapter Six
were disyllabic, and it may be that length neutralization, if it indeed exists, is more likely in monosyllabic words. Chapter 6 tokens have a more varied syllable shape; in particular, they include words whose pre-syllables have a coda. Chapter 6’s word list includes 2-word phrases, which may behave differently from disyllabic words.\(^\text{10}\) There are also paralinguistic factors to consider. Overall, the Kompong Chhnang speakers had a slower speech rate than the WC speakers I met in Phnom Penh, including AY. A faster speaking rate may produce some neutralization of length contrasts in syllable durations. The recording setting was not the same for AY as for the others. The Chapter Six speakers were recorded in a quiet outdoor setting; AY’s recording setting was indoors, but at times had much background noise. Finally, AY grew up in Kompong Cham province while the six speakers are in Kompong Chhnang. It is also a possibility that length neutralization is a local innovation in Kompong Cham and therefore such neutralization was not seen in the six speakers.

6.3. Pitch Excursion

Prior to analysis, I normalized the pitch excursion data to account for differences in speakers’ pitch ranges. For each speaker, I calculated the z-score \(x_{zn}=(x-\mu_n)/\sigma_n\) where \(x\) is a measurement of excursion, \(\mu_n\) is the mean, and \(\sigma_n\) is the standard deviation of speaker n’s pitch. The resulting z-scores were then tested for normality. The density plot showed that the distribution of excursions were skewed to the left centered around \(z=1.0\) with a long tail extending until \(z=6\). Therefore, I excluded all z-scores greater than 4 for all speakers. As with the duration analysis, I tested a subset of Short nuclei and a subset of Main syllables separately. A glance at Table 6.9 of z-scores by Length and Phrase position shows that Syllable 2 excursions are greater than Syllable 1’s in both Short and Long vowels. The excursions are also greater at Phrase-final position and Isolation, except in Long Syllable 1’s.

\(^\text{10}\) A trial with two-word phrases excluded and another with medial clusters excluded also gave a main effect of Length.
Figure 6.5 Data distributions for pitch excursion with z-scores.

Table 6.9. Z-score pitch difference over a syllable.

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Syl 1</td>
<td>0.8</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Short Syl 2</td>
<td>1.5</td>
<td>1.2</td>
<td>1.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Long Syl 1</td>
<td>1.0</td>
<td>1.0</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Long Syl 2</td>
<td>1.4</td>
<td>1.3</td>
<td>1.6</td>
<td>1.9</td>
</tr>
</tbody>
</table>

6.3.1 Short nuclei excursions

To examine the effect of Syllable position on amount of pitch excursion, I took the subset limited to Short nuclei syllables. The mixed model for Short nuclei showed main effects of Syllable position, Phrase position, and Coda, but no interactions (Table 6.10). As predicted, Syllable 2 excursions are significantly greater than Syllable 1 excursions ($p=0.00$, coefficient = 0.3). The effect of Phrase position was seen in only Final and in Isolation positions. Medial position had no effect. Figure 6.6 shows medians and distributions by phrase position. Initial and Medial positions pattern similarly; Syllable 1 and 2 distributions overlap, with the respective medians close to each other. In contrast, the distributions of Final and Isolation positions are further apart. In particular, the distributions of Isolation positions are the furthest apart. The variation in
medians and range of excursions is greater in the main syllable, while those of the pre-syllable remain around the same value (median ~ \(z=0.7\)).

Table 6.10 LME results for Pitch excursion, Short nuclei only; factors are Syllable Position, Phrase Position, Coda Consonant.

Fixed effects:

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 1.060742 | 0.054653   | 19.409  | 0.0000   |
| SylPosition2     | 0.305032 | 0.033798   | 9.025   | 0.0000   |
| PpositionMed     | -0.149510| 0.028530   | -5.241  | 0.0000   |
| PpositionFin     | 0.007998 | 0.028508   | 0.281   | 0.7791   |
| PpositionIso     | 0.149446 | 0.031716   | 4.712   | 0.0000   |
| CodaCH           | -0.154642| 0.049166   | -3.145  | 0.0017   |
| CodaCNas         | -0.030194| 0.034701   | -0.870  | 0.3843   |
| CodaCOpen        | -0.337670| 0.038280   | -8.821  | 0.0000   |
| CodaCStop        | 0.257839 | 0.041538   | 6.207   | 0.0000   |

Figure 6.5. Z-excursion of Short nuclei by Syllable position and Phrase position, narrow=Syllable 1, wide=Syllable 2.
6.3.2 Syllable 2 excursions

To examine the effect of phonemic vowel length on pitch excursion, I took the subset of Syllable 2’s. In the resulting model, there were main effects of Phrase positions and Codas, and a Length by Phrase position interaction (Table 6.11). In this model, Length is not a significant factor (p=0.55). Figure 6.7 shows that for each of the four Positions, median values for Short and Long are similar, and their distributions overlap. With respect to phrase position, Medial and Isolation are significantly different from Initial, but Final position is not. This is the same result as with the Short vowel subset. Final, and in particular, Isolation position values are higher. Only the stop coda had a main effect; the other codas had no significant difference between Short and Long syllables. The Length and Phrase position interaction was significant in all three positions. Figure 6.7 shows that the medians for the two Lengths in Initial position are very close and their distributions overlap. In other positions, the two Lengths are situated further apart. As we can see in Figure 6.7, the excursion values for Final and Isolation positions are greater than those in Initial or Medial positions. This result is unlike Chapter 5 results in which Final position excursions were the lowest of the three positions. The current result corresponds to the original hypothesis that phrase-final pitch excursion will be the highest.

Table 6.11 LME results for Syllable 2 excursion.

Fixed effects:

|                         | Estimate | Std. Error | t value | Pr(>|t|) |
|-------------------------|----------|------------|---------|----------|
| (Intercept)             | 1.385888 | 0.051177   | 27.080  | 0.0000   |
| LengthLong              | -0.029461| 0.049935   | -0.590  | 0.5553   |
| PpositionMed            | -0.288614| 0.051290   | -5.627  | 0.0000   |
| PpositionFin            | -0.052404| 0.050880   | -1.030  | 0.3031   |
| PpositionIso            | 0.223773 | 0.057556   | 3.888   | 0.0001   |
| CodaCH                  | -0.137466| 0.082504   | -1.666  | 0.0958   |
| CodaCNas                | 0.025865 | 0.034095   | 0.759   | 0.4482   |
| CodaCOpen               | 0.004569 | 0.039967   | 0.114   | 0.9090   |
| CodaCStop               | 0.257096 | 0.037294   | 6.894   | 0.0000   |
| LengthLong:PpositionMed | 0.158049 | 0.067898   | 2.328   | 0.0200   |
| LengthLong:PpositionFin | 0.232513 | 0.067332   | 3.453   | 0.0006   |
| LengthLong:PpositionIso | 0.203122 | 0.076708   | 2.648   | 0.0081   |
6.4. **Mean Intensity**

In Chapter 5, mean intensity was greatest in initial position and least in Final position. This data set exhibits the same trend. Both means and median values of Final and Isolation positions are less than the respective values in Initial position. This is true of both Syllable 1 and 2. Both the Short nuclei subset and Syllable 2 subset exhibit the same trend as the results of Chapter Five. That is, mean intensities decrease in Final and in Isolation positions.

Table 6.12 and 6.13 show that mean intensity values for all Syllable 1’s and Syllable 2’s fall between 55 and 65 dB.
Table 6.12. Mean intensity over a syllable in decibels.

<table>
<thead>
<tr>
<th>Word shape</th>
<th>Overall</th>
<th>CVCV</th>
<th>CVCVC</th>
<th>-VCCV-</th>
<th>Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syl 1</td>
<td>57</td>
<td>56</td>
<td>55</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td>Syl 2</td>
<td>62</td>
<td>63</td>
<td>62</td>
<td>62</td>
<td>59</td>
</tr>
</tbody>
</table>

Table 6.12. Mean Intensity, grouped by Length and Phrase position (dB).

<table>
<thead>
<tr>
<th>Short V</th>
<th>Initial</th>
<th>Medial</th>
<th>Final</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syl 1</td>
<td>58</td>
<td>57</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>Syl 2</td>
<td>62</td>
<td>62</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Long V</td>
<td>Initial</td>
<td>Medial</td>
<td>Final</td>
<td>Isolation</td>
</tr>
<tr>
<td>Syl 1</td>
<td>64</td>
<td>60</td>
<td>58</td>
<td>63</td>
</tr>
<tr>
<td>Syl 2</td>
<td>63</td>
<td>63</td>
<td>61</td>
<td>61</td>
</tr>
</tbody>
</table>

6.4.1. Syllable mean intensity and iambicity

As with the duration model, the intensity data was subdivided into Short nuclei and Main syllable subsets. To examine iambicity, I generated a mixed effects model for the Short nuclei set. The Short nuclei model, comparing Syllable 1 and Syllable 2 values for iambic effects, showed main effects of Syllable position, Phrase position, and Coda consonant, but no interaction of Length and Phrase position. Mean intensity of Syllable 2’s are significantly greater than Syllable 1’s, i.e. second syllables are louder. This is shown also in Figure 6.8, where Syllable 2 intensity values are greater than those of respective Syllable 1, although there is some overlap. The distribution of Syllable 1 and Syllable 2 mean intensities are closer together than those of duration or pitch excursions. The means of the two categories are very close, with a difference of approximately 5 dB. In terms of phrase position, medians and distributions are slightly lower in Final position and in Isolation than elsewhere (Figure 6.8). This pattern matches that of my Chapter Five intensity analysis in which syllable intensities were found to be highest in Initial and lowest in Final position. The main effect of coda consonant is due only to two codas,
Stop and Open. The interaction is due also to Stop codas and the different phrase positions.

Figure 6.8. Mean intensity (dB) of Short nuclei syllables grouped by Syllable Position and Phrase Position, wide=Syllable 2, narrow=Syllable 1.

Table 6.14 LME Model for mean intensity of Short syllables only, (dB).

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 61.566   | 2.0172     | 30.520  | 0.0000   |
| SylPosition2     | 2.3379   | 0.3835     | 6.096   | 0.0000   |
| PpositionMed     | -0.6502  | 0.2964     | -2.194  | 0.0283   |
| PpositionFin     | -2.5917  | 0.2936     | -8.829  | 0.0000   |
| PpositionIso     | -1.6547  | 0.3259     | -5.077  | 0.0000   |
| CodaCH           | -1.6038  | 0.6358     | -2.522  | 0.0117   |
| CodaCNas         | -0.4029  | 0.3641     | -1.107  | 0.2685   |
| CodaCOpen        | -4.8177  | 0.4025     | -11.969 | 0.0000   |
| CodaCStop        | -3.9053  | 0.4305     | -9.072  | 0.0000   |
6.4.2 Length and intensity

The mixed model for mean intensity of Syllable 2’s, to examine the effects of phonemic vowel length, shows main effects of all three factors, Length, Phrase position, and Coda consonant. The effect of Length ($p=0.03$, coefficient = 0.44) is not as strong as those of Phrase position or Coda consonant; the coefficients were -1.9 and 1.2 for Final phrase positions and Nasal coda, respectively. Figure 6.9 shows that mean intensities for Short and Long syllables overlap to a large extent for each phrase position. To see if a breakdown of results by Coda consonant would be enlightening, I also generated a plot of Syllable 2 intensities by Coda consonant (Figure 6.10). Median values of mean intensity for Stop codas are slightly less than other coda types. This is corroborated by results in Table 6.15; Coda=Stop has a significant negative effect on mean intensity. Because Stops are silence, and the mean intensity is calculated over the entire syllable, the lower mean intensity for Stop coda is understandable. Figure 6.10 shows mean intensity distributions of Syllable 2’s divided by Coda consonant with bars of different widths representing different Phrase positions. It, too, shows that mean intensity distributions and medians cluster around the same values, and that the distributions vary little for each Phrase position.

Table 6.15 Results of LME model for mean intensities in Syllable 2.

| Fixed effects:          | Estimate | Std. Error | t value | Pr(>|t|) |
|-------------------------|----------|------------|---------|---------|
| (Intercept)             | 62.3508  | 2.0737     | 30.067  | 0.0000  |
| LengthLong              | 0.4477   | 0.2104     | 2.127   | 0.0335  |
| PpositionMed            | 0.1200   | 0.2484     | 0.483   | 0.6290  |
| PpositionFin            | -1.9132  | 0.2477     | -7.723  | 0.0000  |
| PpositionIso            | -1.6930  | 0.2765     | -6.123  | 0.0000  |
| CodaCNas                | 1.1994   | 0.2522     | 4.756   | 0.0000  |
| CodaCOpen               | 0.2969   | 0.2947     | 1.007   | 0.3138  |
| CodaCStop               | -2.1650  | 0.2690     | -8.049  | 0.0000  |
Figure 6.9. Mean Intensity (dB) grouped by Length and Phrase position. Wide=Long, narrow=Short.

Figure 6.10. Mean intensity (dB) grouped by Coda and Phrase position, just Syllable 2’s. from widest to narrowest, Initial, medial, final, and isolation.
6.5 Summary

All three variables, duration, pitch excursion, and mean intensity, showed a main effect of Syllable position. In each case, Syllable 2 – the main syllable – had a significantly greater value compared to that of Syllable 1, or the pre-syllable. Syllable 2 durations were more than twice those of Syllable 1, indicating that WC words are indeed iambic. Pitch excursion and mean syllable intensity values were also significantly greater for main syllables. These results suggest that for this language, iambicity is accompanied by salient pitch movement and loudness in the stressed syllable.

Results with respect to Phrase position show a pattern that confirms my hypothesis on two out of three variables. As predicted, syllable durations are longer in phrase-final position than in initial position. This pattern is the same one obtained in Chapter Five and suggests that WC does exhibit phrase-final lengthening. Pitch excursion over a syllable was found to be greatest in phrase-final position and in Isolation, but least in phrase-medial position. This is different from Chapter 5 where pitch excursion was the least in Final position; however, the results match my hypothesis that medial position would have the least amount of pitch movement. Because Chapter 5 is based on just one speaker, Chapter 6 results are likely to reflect habits of the speech community more accurately. The different results of Chapters 5 and 6 may be due to several factors: differences in individual speaking styles; the data of Chapter 5 being based on one speaker compared with an aggregate in Chapter 6 different recording environments possibly producing different speaking styles; the different nature of the two data sets, and/or possible dialectal differences between AY and the six Kompong Chhnang speakers.

Lastly, mean intensity over a syllable was greatest at phrase-initial position and least in Final position and in Isolation. This result is unlike my prediction that mean intensity will be greatest at Final and least in Initial position. Similar results were obtained in Chapter Five. From these two results, I conclude that my original hypothesis regarding intensity was unsubstantiated. The pattern seen in the results is probably due to physiology; one starts off an utterance with a certain amount of energy which then decreases over the course of the utterance.
Medial position values exhibited slightly different behavior from the other positions for all three variables. Duration measurements for Syllable 1 and 2 had the smallest difference in medial position; in other words, the pre- to main syllable ratio was the smallest. Pitch excursion of Syllable 2 was smallest in medial position and also had the least difference with Syllable 1. Having some speech material before and after the target may have limited any pitch movement over the syllable. Conversely, initial position values did not behave similarly to medial ones, even though tokens in initial position are followed by more speech material. This phenomenon may be due to the nature of the sentence frame. In initial position frames, the token word is the subject phrase. As we will see in the following chapter, subject phrases are often set apart tonally; this may have resulted in the differences between Initial and Medial positions.

The effect of phonemic vowel length varied among the three variables. In this chapter, vowel length was found to have a significant effect on syllable duration; the Short to Long duration ratio was 1:1.4. This ratio is slightly greater than the value 1:1.2 obtained in Chapter 5, in which Length was found to not be significant in predicting duration. The discrepancy may be due to a host of reasons: the neutralization effect may be limited to a geographical region; or it may be only seen in some, or even a single speaker. There were differences in token words used in the two Chapters; Chapter Five had more monosyllabic items while Chapter Six had a wider range of word shapes and also included two-word phrases. On the other hand, Length was found not to have a significant effect on pitch excursion. Mean intensity over a syllable was significantly affected by Length, but the effect of Length was smaller than other factors such as Phrase position or Coda consonant. The results for pitch excursion and intensity with regard to phonemic length is the same or similar to that of Chapter Five, where length was significant in neither pitch nor mean intensity.
CHAPTER 7
WESTERN CHAM INTONATIONAL PHONOLOGY

7.1 INTRODUCTION

This chapter will discuss the intonational phonology of WC. I will use the ToBI conventions to analyze the data, adopting the basic concepts and terminology of the A-M framework and ToBI. As discussed in Chapter 1, ToBI has been applied to the description of typologically different prosodic systems. The use of ToBI in describing WC will test its flexibility and applicability. As the following sections show, the framework can describe the intonation of WC, with some caveats discussed in Section 7.4.

The data for this chapter is taken from sentence translations by the Kompong Chhnang cohort and some of their short personal narratives. The sentence translations included five types of utterances: declaratives, yes/no questions, wh-questions, imperatives, and narrow focus sentences. Personal narratives from each of the six speakers are under one minute. Four additional narratives are longer and discuss a specific topic. The longer narratives were collected from two male and two female speakers. Two of the longer narratives discuss how to do something, and involved a time sequence. The other two were descriptive narratives; one participant spoke on his life goals and the other spoke on how he learned English. Transcriptions of narratives are included in Appendix C.

In terms of prosodic typology, WC lexical prominence is expressed by metrical stress. As we have seen in Chapter 6, WC words have iambic stress; that is, words have fixed stress on the main, or final, syllable. The stress is realized by relative syllable duration; word-final syllables have more than twice the duration of initial syllables. Loudness and the amount of pitch excursion were also found to be greater for word-final syllables. WC’s rhythmic unit at lexical levels is the foot. The WC prototypical word is a disyllable and forms a foot. The WC foot shows characteristics similar to those of Hayes’s description of the prosodic foot in Khmer, another iambic language. Hayes describes the Khmer foot as a template for word shape. Its initial and final syllables are shaped in a way that reflects the iambicity of the word. Initial syllables have a limited
inventory of possible phonemes and their vowels are often reduced to schwa. Final syllables have the full inventory of phonemes. This description also fits the word shape of WC.

This chapter is organized as follows. Section 7.2 describes the inventory of boundary tones and pitch accents in this language. Section 7.3 will describe the prosodic structure of WC based on the Autosegmental-Metrical model, with discussion of constituent units. Lastly, I suggest a labeling schema for WC intonation based on ToBI conventions.

7.2 INTONATIONAL PHONOLOGY

WC has three types of phonological tone, which I will describe in turn: boundary tones, pitch accent, and phrase tone. Boundary tones occur at the edges of the largest prosodic unit, the Intonation Phrase (IP). The pitch accent occurs on phrasally prominent word-final syllables. Here, pitch accent refers not to lexical pitch accent such as that in Japanese, but to a phrase-level prominence. The phrase accent demarcates an Accentual Phrase (AP), an intonation unit smaller than an IP.

In the following discussion, I present examples that illustrate the different tonal types. These examples are waveforms that have been segmented into words and labeled for tones and disjunctures. In labeling disjuncture, I use 1 for word boundaries, 2 for AP boundaries, and 3 for IP boundaries.

7.2.1 Boundary tones

In this section, I describe and exemplify each of the five boundary tones. %L and %H are simple tones that occur at the beginning of the Intonation Phrase (IP). The end of the IP may be marked by simple tones L% or H%, or by a complex tone HL%. In the discussion below, I take the boundary of the IP to be a pause.

7.2.2 Initial tones %L and %H

Prototypical declaratives and questions begin on a low tone %L. This tone may begin in the middle of a speaker’s pitch range or in the lower part of the range. Figures 7.1 and 7.2 show utterance-initial %L. The %L in Figure 7.1 is in the lower half of the
overall pitch range. The utterance in Figure 7.2 starts at around the middle of this speaker’s pitch range; however, with respect to the IP, it is a local low.

Utterances may begin with a high tone %H. A %H edge tone was observed in many utterances that begin with the second person pronoun hәɨ. The latter halves of both utterances in Figures 7.1 and 7.2 start with a %H. As I will discuss in the section to follow 7.3.4, it is common for utterances to be broken into multiple IPs, where the non-initial IP starts with a %H. Figure 7.3 shows an example of a utterance that starts on a high pitch, a yes/no question starting with the second person pronoun /hәɨ/. Here, /hәɨ/ had a high level contour; the pitch began on a high tone and remained high until the end of the word. The slight pitch fall at the end of the word /peaʔ/ (transcribed in the figure as peaʔ) is due to the effect of glottal stop pulling down the pitch.

Figure 7.1 A %L in a declarative.

![Waveform and pitch contour](image)

<table>
<thead>
<tr>
<th>%L</th>
<th>%H</th>
<th>%H</th>
</tr>
</thead>
<tbody>
<tr>
<td>va</td>
<td>Fah</td>
<td>pdih</td>
</tr>
</tbody>
</table>

(1) va Fah pdih mata  
  aunt Fah hurt eye  
  ‘Aunt Fah hurt (her) eye.’ (s4 1-1)
Figure 7.2 Another example of %L.

(2) ləm kruusaali houn menuih somlan raŋ
in family 1s person nine CL
‘There are nine people in my family’ (s6 1-6)

Figure 7.3 An example of %H.

(3) hai plaj(le)mou toa traj peaʔ o
2s buy cow two CL true NEG
‘Did you buy two cows?’ (s6 5-3)
(4) (ka)paa? blaan caan cuuj
walk month rain NEG.IMP
‘Don’t go during rainy season.’ (s6 4-6)

7.2.2 Final low L%
A prototypical statement or imperative ends in a low tone, L%. This low tone is realized as a fall that occurs on the last syllable of the phrase. Figures 7.1, 7.2 and 7.4 above end in a L%.

7.2.3 Final high H%
Questions and some non-final statements end on a simple high rise, the H%. The prototypical H% occurs in the last syllable of the IP. Figures 7.5 and 7.6. Figure 7.5 has the H% on the last word of the sentence /e/, a sentence final particle seen in questions.

Unlike the sudden rise on the last syllable in Figure 7.5, the H% is a gradual rise spanning at least two syllables /bəŋ e/. I should note here that most instances of H% involved a sudden rise and in fact, the utterance shown in Figure 7.6 is one of the rare examples of a gradual rise. One may hypothesize that there is an underlying tonal specification in a sudden-H% utterance that suppresses the pitch from rising until the final syllable. At this moment, there is not enough data to determine what factors distinguish the two types of rises.
Figure 7.5 H% in a yes/no question.

(5) hou nuseh kamaj prolong e

have student female pass SFP

‘Did the female student pass (an exam)?’ (s2 5-5a)

Figure 7.6 H% in another yes/no question.

(6) raj ni praj kap (ma)nuq boŋ e
day this give? chicken eat SFP

‘Did you feed the chickens today?’ (s5 2-2)

Some utterances take the form of a series of short IPs, of which non-final ones may end in a H% followed by a pause. This phenomenon was noted in EC intonation by
Doris Blood (Blood 1977). These H% non-final IPs may be subject clauses or prepositional phrases. In my data, sequences of non-final units set off by pauses were seen in both translations, where the IPs are shorter, and in narratives, where the IPs may be entire sentences. Because I take the boundary of an IP to be a pause, a relatively short utterance with only four words may consist of two IPs if there is a pause after the subject. Some declaratives in discourse may end in H%. Figure 7.1 and 7.2 above exemplify the phenomenon of the utterance as a set of multiple IPs. In Figure 7.1, the subject phrase /va Fah/ ‘Aunt Fah’ is its own IP, while the predicate /pdih mata/ ‘hurt (her) eye’ is another IP. The first IP in Figure 7.2 is the prepositional phrase /ləm kruusaa lin / ‘in my family’; the second begins with the existential /hou/ ‘there is/are’ to complete the utterance, ‘there are nine people.’ In both cases, a pause separates the two IPs of the utterance. The first IP ends on a high tone from which the second IP begins.

A sequence of such declaratives display an intonational pattern similar to American English “uptalk” or “Valley girl talk” where non-final declaratives each end in H%. This “uptalk” phenomenon, formally called high rising terminals (HRT), is not uncommon; HRTs have been described for Australian English (Fletcher, et.a. 2002), British English (Shobbrook & House 2003) and Japanese (Ueki 2005). These works all describe HRTs in terms of discourse context and discuss its role in conversation – turn taking or floor-holding.

The HRT phenomenon can be seen in Figure 7.7, which shows such a rise in an excerpt from a narrative. There are two chunks of speech separated by a pause, each comprising an utterance ending in a H% tone. These two utterances form the initial portion of the speaker’s narrative. After the portion shown in the Figure, there were two subsequent declarative utterances ending with H%. The example suggests that the use of H% in WC narrative signals non-finality. Because all of my examples are monologues and not dialogues or conversations between two or more speakers, it is difficult to determine from this data set precisely what the nature of the HRT phenomenon in WC is.
Figure 7.7 H% as “uptalk” in narrative text.

(7)  
ln jin ajsa  lin mo? haploh somlan thɔn
lp name Aysa  lp age one.ten nine year
‘My name is Aysa. I am nineteen years old.’

7.2.4 Contour tone HL%

A contour edge tone, HL% occurs at the end of some questions and declaratives. Most wh-questions that end with a wh-word, and some yes/no questions ending in the tag phrase /peaʔ ej/ ‘right? lit. true + sentence final particle’, displayed this contour. Figure 7.8 shows a yes/no question containing the tag /peaʔ ej/, with HL% placed on the final syllable /ej/. The pitch decreases during the word /peaʔ/ (the rapid fall at the end of the word is due to the microprosodic effect of glottal stop, as in Figure 7.3.) The pitch then rises and falls again during the final word /ej/ ‘emphatic particle’. While this contour in wh-questions was observed in multiple speakers, the realization of the contour in /peaʔ ej/ may be a speaker-specific phenomenon, since it was limited to one person. Other speakers realized /peaʔ ej/ questions with a simple H%. In wh-questions, this HL% tone accompanies the wh-phrase at the end of the sentence. Figure 7.9 shows one example of a wh-question with HL%. The pitch falls during the penultimate word /peel/, then rises and falls during the wh-word /naj/ ‘which.’
Figure 7.8 A yes/no question with HL%.

(8) vaSolleh maaj mong (ma)lam ni pea? ej
uncle Solleh come time night this true SFP
‘Did Uncle Solleh come at night?’ (s5 2-3)

Figure 7.9 A wh-question with HL%.

(9) va Fah pdih mta peel naj
aunt Fah hurt eye time which
“When did Aunt Fah hurt her eye?” (s5, 3-1)

7.3 PITCH ACCENT $H^*$

I posit a pitch accent, denoted $H^*$. This tone is postlexical; it marks a prominent syllable in a phrase. A pitch accent is not necessarily present in every IP. This pitch accent may only fall on stressed (main) syllables, and is realized with a fall that
immediately follows the peak. Both the rise and fall occur within the stressed syllable and not over the longer phrase.

Figure 7.10 shows an utterance with a pitch accent occurring on the second syllable of /moʔan/ ‘outside.’ The accent occurs at the beginning of the vowel /a/, with the pitch jumping from a lower pitch on /m/.

Figure 7.10. An imperative with H*.

(10) (ka)paaʔ mʔan (ma)lam cuuj

walk outside night NEG.IMP

‘Don’t walk outside’ (s5 4-3)

An utterance may have multiple pitch accents, as in Figure 7.11. The first word of the utterance, /boh/ ‘see’ and the second syllables of /lakaj/ ‘man’ and /haran/ ‘one person’ have pitch accents.
Figure 7.11 Multiple pitch accents in one IP.

(11) boh lakaj harang muh vah maj e
     see male one.CL net come SFP

[.%LH* H* H* H%]

‘Did you see the man who brought the nets?’ (s5, 2-4)

Figure 7.12 and 7.13 below are excerpts from two speakers’ personal narratives. In Figure 7.12, the last IP /lakaj haraŋ‘one male’ begins with a %L on the first syllable of /lakaj/ and jumps to a high falling tone on the second syllable at /kaj/. The second IP, /kamaj haraŋ/ looks as though the initial pitch is high, but auditorily, it sounds like it starts at a low point then jumps up, as in the following IP. Therefore, I interpret the second syllable of /kamaj/ as having a pitch accent. Figure 7.13, from another speaker’s narrative, shows a similar construction /maj raŋ kaj raŋ/ but with all initial syllables dropped.
Figure 7.12 Series of high tones in a narrative (s4).

![Waveform diagram]

(12) klaw raŋ kamaj haraŋ lakaj haraŋ
three CL female one.CL male one.CL
[\text{%L H\%}] [\text{%L H* H\%}] [\text{%L H* H\%}]
‘… three people, one female, one male’

Figure 7.13. H\% and H* in a narrative (s3, narr).

![Waveform diagram]

(13) hou taʔaj toa raŋ maj raŋ kaj raŋ
have sibling two CL female CL male CL
[\text{%L H\%}] [\text{%L H* H* H\%}]
‘I have two siblings, one female and one male’

Figure 7.13 shows a portion of a narrative containing two IPs. Unlike in Figure 7.12, the phrase /maj raŋ kaj raŋ/, a reduced form of /kamaj haraŋ lakaj haraŋ/, has no pause after
the first /raŋ/ so that the four words comprises an IP. The IP sounds as though there is a
rise from a low, so I labeled a pitch accent on the syllables /maj, raŋ, kaj/ with a boundary
rise on the second /raŋ/. Each pitch accent is followed by a fall, including the first /raŋ/.

Another possible way to analyze the two phrases in Figures 7.12 and 7.13 is with
defining phrase accents, L- and H-. Two possibilities for 7.13 are shown in (i) and (ii)
below.

(i)  [ maj   rang   kaj   rang]
     %H  L-    H- L-   H- L-   H%

(ii) [ maj   rang   kaj   rang]
     %L H* L-  H* L-  H* L-   H%

However, the use of phrase tones here is problematic. An analysis based solely on phrase
tones as in (i) requires many more tones than the pitch accent analysis to specify the
peaks and valleys. Furthermore, the phrase tone analysis does not capture the fact that
the syllables are stressed, i.e. that the peaks and falls coincide with prominent final
syllables. It lacks consistency in what is marked, since the low phrase tone marks word
edges and the high phrase tone marks the middle of syllables. Another possible analysis
is to mark the valleys with a low phrase tone L- as in (ii). While (ii) is entirely possible, I
prefer the analysis using only H* for the sake of simplicity; (ii) needs more tonal
specifications. We would need a specification for a low phrase tone if there were two
kinds of pitch falls after a H*: one in which the fall is sudden, and another where the fall
is gradual over multiple words. So far, all examples of the H* pitch accent have quick,
falls contained within the prominent syllable. Thus, defining the H* so as to specify that
it is always followed by an immediate fall is enough to cover the facts.
7.3.1 Issues with the realization of H*

There is one situation in which a pitch accent is indistinguishable from a contour edge tone. This is the case in which a pitch peak followed by a rapid fall occurs on the last syllable of the utterance. Such a contour may be analyzed as H* followed by L%, or as the contour edge tone HL%. Figures 7.14 through 7.17 below all have a similar rise-fall on the last syllable. In all cases, the maximum point of pitch is at the approximate midpoint of the vowel. The rise occurs in the first half of the syllables in question and the fall occurs in the second half. For example, Figure 7.14 below shows a rapid rise and fall on the last syllable of the last word /mi/ ‘focus marker.’ The other three examples show this same pattern on the last word of the utterance. In Figure 7.15, the pitch track on /mata/ [mta] ‘eye’ is broken by the voiceless stop [t]; nevertheless, the peak occurs at the onset of the vowel. Note that the peak occurs around the midpoint of this word. The shape of the pitch track does not vary with the utterance meaning. Figure 7.14 is a utterance with narrow focus on /somlan poh/ ‘nine eggs’; the peak here co-occurs with the focus marker /mi/. The contours in 7.16 and 7.17 are wh-questions ending in the wh-word. Figure 7.15 is a declarative. Nor does the amount of excursion vary systematically by type of utterance. Figure 7.15 has a fall of 100 Hz, the wh-question utterance in Figure 7.17 has an excursion of 80 Hz, while the narrow focus excursion in Figure 7.14 is 70 Hz. The rise, peak, and fall all occur at the same point of the syllable.

Figure 7.14 HL% in narrow focus.
(14) kin o lin plaj tæ somlan poh mi
EMP NEG ls buy only nine egg FCS
‘No, I only bought nine eggs’ (s6 5-4b)

Figure 7.15 HL% in a declarative.

(15) va Fah (pause) pdih mta
aunt Fah (pause) hurt eye
‘Aunt Fah hurt (her) eye.’ (s6 1-1)

Figure 7.16 HL% in a wh-question.

(16) va Fah pdih mata peel naj
aunt Fah hurt eye time WH
‘When did Aunt Fah hurt (her) eye?’ (s6 3-1)
A look at narrow focus constructions does not resolve this ambiguity between a pitch accent and a complex edge tone in final position. The focus particle /mi/ was used by some, but not all, speakers in narrow focus constructions. The particle /mi/ occurs in utterance-final position after the object noun phrase, as in Figure 7.14 where /somlan poh/ ‘nine eggs’ is the object followed by the particle /mi/. This particle often co-occurs with a pitch excursion. The highest point of pitch is around the onset of the vowel; the rise and fall both occur within the word. The amount of excursion on /mi/ compared with other pitch peaks on other words does not vary systematically.

Not all narrow focus utterances have tonal contours that distinguish them from other declaratives. When the verb or predicate is in focus, there is no outstanding tonal contour accompanying the verb in question. There may be a pitch excursion around the negation of the preceding clause; for example, in Figure 7.18.
7.18. Highlight on negation /o/.

(18) lɨn hou paaʔ o lɨn dih moto maaj

I didn’t walk, I took a moto’ (s6 5-1)

The verb being negated in the first clause, /paaʔ/ displays a pitch trough. The second high tone may appear on or at the end of the negation, /o/ and fall at around the second instance of the first person pronoun, /lɨn/, giving the impression that the negation marker /o/ is being highlighted with a pitch accent.

Labeling these utterance-final excursions a combination of the pitch accent followed by an edge tone H*L% would fit the contour just as well as a contour edge tone HL%. Rather than distinguish these contours on the basis of their meaning, for the time being I conflate them into examples of the contour edge tone HL% to make the tonal system simpler. On the other hand, the H*L% offers its own advantage, that it reduces the inventory of edge tones by limiting it to just H% and L%. At the moment, the data set does not provide enough evidence to support one analysis over the other.

7.4. PHRASE ACCENTS

Some utterances display a tonal high at IP-internal word edges which I will define as a phrase accent H-. The phrase accent H- and the pitch accent H* are two distinct
tones that can be distinguished on the basis of their timing and the alignment of the H peak to the word. The peak of a pitch accent occurs on the middle of a syllable. Both the rise and fall are fairly rapid and contained within the stressed syllable. The phrase accent, on the other hand, occurs at the end of a word. The pitch peak is at the word boundary, with the rise spanning the previous word and the fall on the following word.

Figure 7.19 below shows an utterance with both phrase and pitch accent. The phrase accent occurs after the first word /mijɛj/. The pitch peak is at the end of the word. A pitch accent occurs on the second syllable of /lakaj/ ‘man’. The jump from low of the first syllable to the high on the second is obscured by the [k] but is nevertheless auditorily salient. Crucially, unlike the H-rise at the end of /jej/, the syllable /kaj/ contains both a rise and a fall.

Figure 7.19 H- and H* in one IP (s6 4-5).

(19) mijɛj lakaj haranɡ nin cuuj

speak man one.CL DEM NEG.IMP
‘Don’t speak to that man’

Figures 7.20 and 7.21 below show realizations of the same utterance by two different speakers. The two utterances form a near minimal pair in terms of words and tones used. The first phrase, a prepositional phrase /talam blaan caan/ ‘in rainy season’ ends at a high tone in both utterances. The phrase in Figure 7.20 is its own IP, marked by
an edge tone H%. The second peak in both utterances is a phrase tone H- that occurs after the subject /taj lin/ ‘my elder sibling’. Both have peaks at the end of the subject phrase; the peaks align with the end of /lin/ ‘1s pronoun.’ In Figure 7.21, however, the utterance is not separated by a pause; instead it is marked by the high phrase tone at the end of the phrase /caan/ ‘rain.’

Figure 7.20 Series of high tones with H% and H-.

(20) ləm blaan caan taj lin hou naaw mpeN
in month rain elder.sib 1s have go Phnom Penh
‘My elder sibling went to Phnom Penh during rainy season.’ (s3 1-7)

Figure 7.21 Different realization of sequence of high tones.
(21)  tələm  blaan  caan  taj  lin  naaw  mpeŋ
    in  month  rain  elder.sib  ıs  go  Phnom Penh
    ‘My elder sibling went to Phnom Penh during rainy season.’ (s4 1-7)

Figure 7.22. A sequence of H% and H- tones over two IPs.

(22)  ləm  blaan  caan  taj  kamaj  lin  naaw  mpeŋ
    in  month  rain  elder.sib  female  ıs  go  Phnom Penh
    ‘My older sister went to Phnom Penh during rainy season.’ (s2 1-7)

Figure 7.22 shows the same sentence by a third speaker. Note that Figures 7.20, 7.21, and 7.22 are all realizations of the same sentence but the realization of the AP, IP, and the relevant edge tones are different for all three. The speaker in Figure 7.20 divided the sentence into three IPs, each IP ending in a H%: {ləm blaan caan}IP {taj lin hou naaw}IP {mpeŋ}IP. The second speaker in Figure 7.21 has two IPs with the first IP containing two APs: {[ləm blaan caan]AP [taj lin hou naaw]AP}IP {mpeŋ}IP. In Figure 7.22, the sentence has two IPs, with the second IP containing two APs: {ləm blaan caan}IP {[taj lin hou naaw]AP [mpeŋ]AP}IP. Unlike in the previous two examples where the phrase tone occurs after the second word, the phrase tone occurs after the third word /lin/, suggesting that phrase tone placement is not dependent on how far it is from the edge of the AP.
The H- accent as a marker of a constituent can be observed in previous examples Figures 7.8, 7.10, and 7.17 as well. In Figure 7.8, the subject /va solleh/ ‘uncle Solleh’ and the verb plus time expression are bounded by a high phrase tones. Figures 7.20 and 7.17 show the same utterance by different speakers. In both cases, the subject /va fah/ ‘Aunt Fah’ is marked by the high phrase tone. The version in Figure 7.10 has no other tone until the edge tone at the end of the utterance. The utterance in Figure 7.17 has an additional phrase tone at the end of /mata/ [ŋm̩ta] ‘eye’.

Defining a phrase tone leads to the conclusion that there is a prosodic unit smaller than an IP, which I will tentatively call an Accentual Phrase (AP). Based on examples of the phrase tone thus far, an AP does not necessarily coincide with a syntactic constituent nor does it have a prototypical number of syllables. It may consist of only one word, as in Figure 7.19. It may coincide with a syntactic constituent, as in Figure 7.21, where the phrase accent marks both the end of the prepositional phrase and the subject.

I assume that a larger prosodic unit is comprised of smaller units. An utterance with multiple APs thus has the form

\[
\{[\ H]_{\text{AP}} \ H]_{\text{AP}} \ (L)]_{\text{AP}} \} \text{IP}
\]

where a non-final AP has a H- phrase tone at its right edge. The AP may or may not have a pitch accent.

(7.19) mijɛj lakaj haraŋ nin cuuj
speak male one.CL DEM NEG.IMP
[\%L H-][ H\* ] L\%]

(7.22) taj kamaj lin naaw mpeŋ
elder.sib female 1s go Phnom Penh
[\%L H-][ ] L\%]

In both utterances, non-final phrases are marked by the high tone. One possible analysis of this situation is that the final APs of the utterance are not specified for tone, forming a
kind of residual material left over after the preceding material has been specified and subdivided. This interpretation may be represented as

$$\left[\%L/H[H-\text{AP} [H-\text{AP} [\emptyset]\text{AP} L/H/HL\%]\right]$$

An alternative analysis is that all APs end in a high tone but the H- on the final AP is overridden by whichever boundary tone that occurs on the IP boundary.

$$\left[\%L/H[H-\text{AP} [H-\text{AP} [H-]\text{AP} L/H\%]\right]$$

For the moment, I will adopt the second analysis. It is a simple analysis in that all APs display the same contour without exceptions. There is no need to specify a different type of AP that depends on its relative position in the IP. As I mentioned previously in the case of H*L versus HL%, an analysis with the least number of defined elements is preferable to one which has many elements, and particularly those which have many variations of the same type of element.

7.5 Global Trends

In this section, I discuss several intonation patterns whose span is beyond the confines of the IP unit.

7.5.1 The topic-comment construction

As mentioned in Chapter Three, WC utterances often take the form of a topic-comment construction. Prepositional phrases and time expressions occur at the beginning of the sentence before the subject. The tonal pattern of the topic comment construction often reflects syntactic boundaries and is realized in two different ways. One is as a series of short IPs ([L … H][L … H] [H … (L)], where the subject is the first IP with a [L … H] contour and the predicate is another with a [H … L] contour. If there are time expressions or prepositional phrases occurring before the subject, such clauses and the subject have a [L … H] contour while the final portion of the utterance has the contour [H … (boundary tone)] where the final boundary tone may vary between the simple tones L%, H% or the complex tone HL%. In Figure 7.1, /va fah/ ‘Aunt Fah’ is the subject, ending in a high H%. In 7.2, the prepositional phrase /ləm kruusaa lin/ ‘in my family’ is
the initial IP that ends in H%. Figure 7.7 illustrates the three-IP utterance, [blaan caan]_{IP} [taj lin]_{IP} [naaw mpen]_{IP} where the first two IPs end in H% and the final ends in a L%.

Another possible tonal realization of the construction is to mark the topic portion with a phrase tone H- such that the overall contour is [%L … H- … L%]. The subject-topic AP is [LH] and the second AP starts at a high pitch. The topic or subject is the first AP with [%L … H-]; the second AP starts at a high tone and drops, so that the pitch is a peak at the H-. The second IP of Figure 7.20 and the first of 7.21 show this pattern. The final AP in both examples ends in a High edge tone H%.


(22) {[taj lin ]H- AP [hou naaw]_{AP}} H%

The same pattern, containing a series of utterance-medial high tones, may be either a series of APs or IPs; non-final APs or IPs end in a high tone.
(a) {[L … H]_{AP} [L … H]_{AP} [ … L/H]_{AP}}_{IP}
(b) {L … H}_{IP} {L … H}_{IP} {T … T}_{IP}

There is a gradual rise to a peak which occurs at the end of non-final clauses. Aside from slight pauses between IPs, these two contours describe the same tonal pattern yet have different labels.

The above analysis then offers this question: is it possible that the AP and IP with the same Low-High pattern may be one kind of prosodic unit? The difference between an IP with a Low-High pattern and an AP with the same pattern is that the IP is bounded by a pause and the AP is not.

An alternative analysis that addresses this issue is to define both types of prosodic units as an IPs, but have a different disjuncture label on the break index tier. For example, re-examining 7.21:
The current analysis defines an IP based on a pause, so example 7.21 has two IPs, the first of which contains three APs. The break indices are 2 for AP boundaries and 4 for IP boundaries. In the alternative analysis, each Low-High grouping would be an IP. Crucially, the break indices would be the same as in the current analysis. In the above example, the break indices for both current and alternative analysis would be 2 for the first two groupings, \{talam blaan caan\} and \{taj lin\}, and 3 for \{naaw\} and \{mpeɲ\}. For the examples I have presented above, either analysis adequately describes the tonal contour of the utterances. As more data is accrued, we may find other evidence to support the definition of an Accentual Phrase with a tonal contour different from a Low-High. Until then, we may keep the current analysis while entertaining the alternate one as a possibility. If there is no other evidence for an AP, the alternate analysis may be preferable as the more parsimonious one, having just one prosodic unit above the word.

7.5.2 Declination

Many utterances display a gradual falling of pitch as in Figure 7.23. Here, the first H% shows the biggest pitch rise. The subsequent high edge tones become lower after the initial one. As with the L…H contour, declination is another global trend seen across small IPs in one utterance. Although declination is not an obligatory phenomenon (cf. Figure 7.20 where the second peak is just as high as the first), it was common across all speakers.
7.6 PROSODIC STRUCTURE

The largest prosodic unit in this language is the Intonation Phrase (IP). An IP is bounded by edge tones at both phrase edges. The size or number of words in the IP may vary from just one, as in the first IP of Figure 7.22 /lɨn/ ‘first person pronoun’, to an entire sentence. As discussed in 7.4.2 an utterance may consist of several IPs.

The WC Accentsual Phrase (AP) is defined by the phrase tone H- at its right edge. The number of words or syllables in the AP is variable. An AP may consist of a single word, or a phrase with several words. I assume that a larger prosodic unit may be wholly divisible into complete smaller ones. Therefore, it follows that if there are no phrase tones within the IP, the IP contains a single AP. When there are multiple phrase tones, the IP comprises several APs. In cases where there are a series of APs, e.g. [L … H]AP [L … H]AP [ … H]AP the high phrase tone on the last AP is overridden by the adjacent IP boundary tone; therefore, the final tone on the IP is one of three edge tones, L%, H%, and HL%.

How does WC compare to other languages in the intonation typology scheme of Jun 2005? Jun’s typology defines the prosodic structure of a language based on characterizations of prominence and rhythm. In this typology, elements of prosody are
divided into prominence units and rhythmic units. Each of the units are further subdivided into lexical, or word-level, and postlexical, or the level above the word. There are several possibilities for each subdivision. A language has three possible ways to mark lexical prominence: tone, stress, or lexical pitch accent. Postlexical prominence may be shown by head- or edge-marking. Head-marking marks the most prominent rhythmic unit of the phrase, while edge marking marks the boundaries of the phrase. A lexical rhythmic unit may be a syllable, mora, or foot. Postlexical units may be the Accentual Phrase (AP), Intermediate Phrase (iP), or Intonational Phrase (IP).

Postlexical prominence in WC is marked by both head marking and edge marking, because it uses both pitch accent (head marking) and IP and AP edge tones (edge marking). These tones, and particularly the boundary tones, may be correlated to the results of Chapter 6. In Chapter 6, we saw that word-final syllables – that is, stressed syllables – have greater pitch movement than word-initial syllables. At the phrase level, syllables in phrase-final position displayed a greater pitch movement than in other positions, which suggested that in WC, there is more tonal movement at ends of phrases than in medial positions. In examining the intonational contours, this was indeed the case; all WC utterances are marked by boundary tones at phrase edges. Pitch accents are not obligatory in an IP; when an utterance does not have pitch accent, pitch movement occurs only at the edges of the utterance.

In Jun 2005’s typology, most languages that use stress as opposed to tone or lexical pitch accent have only postlexical head marking. This is true of English, German, Arabic, and a number of other languages. Stress languages with both head and edge marking are Farsi and Bininj Gun-wok, an Australian language. On the basis of just these languages it seems that WC’s combination of lexical and postlexical prominence is not common. However, the typology of intonation is still in its early stages; an examination of a wider set of languages may show that a stress language with both head and edge marking is a common pattern.

WC does not have lexical stress; rather, WC word stress is predictable, always occurring on the final syllable. WC disyllabic words fit into the template of the foot with a weak-strong sequence of syllables. Monosyllables are feet by themselves. At the
postlexical level, there are two units, the IP and AP. Other languages with this combination are Farsi, French, Bengali, and Korean.

7.7 Labeling

Lastly, I will discuss labeling schemes. The number of tiers, disjunctures, and prosodic units are language specific in ToBI. Tiers commonly defined for a language are those containing words, those containing tones, those specifying each disjuncture, or break index, plus a miscellaneous tier used for comments. In labeling the above figures, I used three tiers: the gloss tier, tone tier, and break tier. The gloss tier contains glosses matching each word in the utterance. Here I used only phonetic transcription. However, it may be informative and helpful to have phonemic and phonetic transcription in different tiers. WC speakers tend to drop word-initial pre-syllables, so that a word such as /malam/ ‘night’ may be pronounced [ləm]. Just having the phonetic transcription may be confusing if the word-final syllable potentially belongs to several possible words. Another consideration is that different speakers may pronounce the same word differently, or that even the same speaker may on different occasions pronounce the same word differently. For example, /talam/ ‘in, inside’ was pronounced [təlam] and [ləm]. The phonemic tier /talam/ would capture the fact that these are instances of the same word.

The tone tier marks the boundary tones and pitch accents, if any. The break tier indicates break indices. The break indices start at 0 or 1 for the least or smallest disjuncture between words. 1 is commonly used for word boundaries, a convention I adopt. Here I gave the label “1” to word breaks, “2” to AP boundaries, and “3” to IP boundaries. In the above figures, I did not use 0; although it may be used for fused words. For example, the proper name “Phnom Penh” [pnom peŋ] was often realized as [mpeŋ] with the coda of the first word fused onto the second word. [mpeŋ] may be considered one word, or two words with a zero juncture at the m-p boundary. The phonetic tier would have [mpeN] entered; the phonological tier would have [pʰnom peN] (here, I use “N” for the palatal nasal, but a different symbol may be used instead.).
7.8 Summary

In this Chapter, I discussed the tonal grammar of WC. WC has three kinds of tone: boundary tones, a pitch accent, and a phrase accent. There are two prosodic groupings above the word: an Intonational Phrase (IP) and Accentual Phrase (AP). The boundary tones at the beginning of an IP are %L and %H. Those at the end of an IP are L%, H%, and HL%. The correspondence of boundary tones to utterance types is shown below in Table 7.1.

The AP has the tonal pattern [ … H] where the high phrase tone H- occurs at the AP’s right edge. When the right edge of the AP coincides with the end of an IP – that is, on the last AP – the boundary tone on the IP takes precedence over the phrase tone.

Table 7.1 Summary of tones and break indices.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone</td>
<td>%L</td>
<td>IP initial boundary tone</td>
</tr>
<tr>
<td></td>
<td>%H</td>
<td>IP initial boundary tone</td>
</tr>
<tr>
<td></td>
<td>L%</td>
<td>IP final boundary tone; declaratives, imperatives</td>
</tr>
<tr>
<td></td>
<td>H%</td>
<td>IP final boundary tone; yes/no questions, “uptalk”</td>
</tr>
<tr>
<td></td>
<td>HL%</td>
<td>IP final boundary tone; wh-questions, focus, some yes/no questions</td>
</tr>
<tr>
<td></td>
<td>H*</td>
<td>Pitch accent, occurs on prominent main syllables</td>
</tr>
<tr>
<td></td>
<td>H-</td>
<td>Phrase accent; AP final; may be preempted by IP boundary tone</td>
</tr>
<tr>
<td>Break indices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Word boundary</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>AP boundary</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>IP boundary</td>
</tr>
</tbody>
</table>
CHAPTER 8
CONCLUDING REMARKS

8.1 SUMMARY

This dissertation investigates the prosodic structure of Western Cham, an Austronesian language spoken primarily in Cambodia and also in Vietnam. I examine acoustic variables that indicate both word level and phrase-level prominences. In Chapter 1, I discuss the motivations of this work and the framework used. Chapter 2 provides an overview of previous work on both Western Cham and Eastern Cham. In addition, this chapter gives a historical overview of the Chamic people as a whole and sociolinguistic background of the Cham in Cambodia. I present a grammatical sketch of Western Cham in Chapter 3, including both phonology and syntactic characteristics. In Chapter 4, I describe my data collection scheme, equipment I used to collect data, materials, and analysis methods. Results of an examination of WC phonemic vowel length and effects of phrasal position on three acoustic variables, duration, pitch excursion, and mean intensity of a syllable, are presented in Chapter 5. Chapter 6 gives the results of examining the interaction of WC iambicity with several factors such as phrase position and phonemic vowel length. As in Chapter 5, I examine the effects of phrase position on the same three acoustic variables. Chapter 7 describes the basic tonal grammar and intonational phonology of WC using the Autosegmental-Metrical (AM) model.

8.2 OVERVIEW OF FINDINGS

In Chapters 5 and 6, I explored effects of phrase position, phonemic vowel length, and iambicity on three acoustic variables of a syllable, namely duration, pitch excursion, and mean intensity. Chapter 5 investigated two factors that may influence these acoustic variables: phonemic vowel length and position of the syllable in a phrase. Notably, the results show that phonemic vowel length was found not to have a significant effect on any of the three variables. The ratio of durations of syllables with short and long vowels was 1 to 1.2. This result suggested that for at least this particular speaker, phonemic length distinctions may be neutralizing phonetically. Effects of phrase position were seen
on syllable durations as well. Durations of phrase-final syllables were significantly longer than those in phrase-initial syllables.

Chapter 6 explored iambicity effects by comparing acoustic variables for first and second syllables of disyllabic words and phrases. The results show that second syllables had greater mean values for all three variables. In particular, second syllable durations were approximately twice as long as first syllables. The iambic nature of WC words correlates with the frequent reduction and dropping of initial syllables observed among speakers.

Phrase position significantly affected all three variables. Duration and pitch excursion outcomes confirmed my hypotheses about their behavior; phrase-final syllables had the longest durations and also exhibited the greatest pitch excursions. Mean intensities had were affected in the opposite direction from my predictions. Results showed greatest intensities in initial position and least intensities in final position.

Phonemic vowel length effects were varied. Length was found to be a significant factor affecting values of syllable durations in Chapter 6, but not in Chapter 5. This discrepancy in results may be due to a number of linguistic and non-linguistic factors or a combination of those factors. Because the results of Chapter 5 are based on the speech of one person, the results may be idiosyncratic to him. Moreover, there are differences in the data collected. The word list used in Chapter 5 contained more monosyllabic words while that in Chapter 6 was comprised of disyllabic words and phrases made up of two monosyllabic words. The speakers in Chapter 6 are from a different province than the speaker of Chapter 5; there may have been regional differences in speech patterns of the two groups of speakers.

In Chapter 7, I presented a tonal grammar of WC using the A-M framework. At the sentential level, I defined several boundary tones, one pitch accent, and one phrase tone. I also posited two prosodic units; the larger unit is the Intonational Phrase (IP) and the smaller unit the Accentual Phrase (AP). Two initial boundary tones, a High or a Low, may occur at the beginning of an IP. At the end of an IP, there are three possible boundary tones, a simple High, Low, or a contour High-Low tone. The pitch accent $H^*$ occurs on stressed syllables. The pitch peak is aligned with the midpoint of the syllable; the pitch falls immediately after the peak, so that both rise and fall are contained within
the syllable. There is one phrase accent, a high tone, which demarcates a long utterance into APs. The phrase accent is aligned to the phrase in such a way that the peak occurs at the end of the final word in the AP. The AP does not have other distinguishing features such as having a prototypical number of syllables.

A series of IPs may exhibit a certain intonation pattern in which non-final IPs have a final high and the final IP ends in a low tone. This pattern of rising tones was observed in one utterance comprised of multiple IPs or narratives, and may be similar in function to High Rising Terminals (HRT) that have been described for Japanese and several varieties of English.

I also presented cases in which an IP and an AP both have the same Low-High contour; that is, a phrase begins on a low and ends at a high point in pitch. I discuss the possibility of conflating the two prosodic units. With the present set of data, there are no examples that would give more support to one analysis over the other; both are possible descriptions. Therefore, for this present work, I keep the AP-IP analysis.

8.3 LIMITATIONS OF THIS WORK

The present study is based on data from a small number of speakers. Inclusion of other age groups; in particular, older speakers aged 30 and above may yield different results, such as more varied intonational contour. Examining the speech of people in other areas will show whether the segmental variation observed in this speaker set is idiosyncratic or more common among the greater Cambodian Cham population.

Due to time limitations, I only collected a few short narratives of limited type. A wider variety of narratives, such as hortatory texts, folktales, historical narratives, may provide a richer picture of WC intonation and phonology. In particular, the examination of different speech genres would further advance the analysis of WC intonation. The present work is based on elicited sentences and some personal narratives. Dialogues or multiparty conversations would provide new material to enrich the typology of intonational contours.
8.4 **Future directions**

There are a number of possible directions for future work on WC phonology and phonetics.

### 8.4.1 Perception test on vowel length

In Chapter 5, I found that phonemic vowel length did not have a significant effect on syllable durations, loudness, nor pitch excursion over the syllable. Yet in Chapter 6, phonemic vowel length was found to be a significant factor in the outcomes of all three variables. Perception test using tokens with varying vowel durations would probe whether speakers perceive phonemic length. It is possible that only a subset of speakers perceive length. Another possibility is that speakers produce a length distinction without perceiving it, or that they perceive a length distinction but do not produce one. In addition to linguistic factors, social factors such as speakers’ age and geographical location should be explored to determine what factors affect the perception and production of phonemic length.

### 8.4.2 Geographical variation

The current study focused on speech of a small group of people. WC spoken in other areas have yet to be studied in detail. A comparison of previous papers on WC phonology points to differences in phonemic and phonetic realizations. In my interactions with different WC speakers, I noticed some phonological variation in vowel phonemes between Kompong Chhnang speakers and Kompong Cham speakers, namely a long monophthong to diphthong contrast: /i/ vs. /eɟɪ̯/, /ɨ/ vs. /ʊɛɟɪ̯/, /u/ vs. /ou/ . The Kompong Chhnang speakers tended to have monophthongs, Kompong Cham the diphthongs. A more in-depth study would show whether this difference can be observed in all lexical items with these particular vowels and whether the difference is influenced by non-linguistic factors such as age and gender. The presence or absence of vowel length distinctions may also be a matter of geographical variation. In addition, there may be other systematic phonological differences in regional varieties besides vowel phonemes that have not been uncovered yet.
8.4.3 Language contact

The current work contributes to the study of language contact in several ways. One, it provides a basis for a comparison of prosodic qualities of WC, its contact language Khmer, and WC spoken on the Vietnamese side of the border, Chau Doc. Because Chau Doc WC’s contact language is Vietnamese, a prosodic comparison of these varieties may reveal whether WC and Khmer prosody is similar, and if so, whether the similarities can be attributed to contact. A similar comparison may be made between WC and its sister language, EC, which also has Vietnamese as its contact language.

Another dimension of language contact is its sociolinguistic aspect. From a language documentation standpoint, it is notable that WC has coexisted with Khmer for centuries. While there have been lexical borrowings and phonological, possibly syntactic influences, WC speakers do not seem to be shifting to Khmer, the dominant language.

There are several dimensions of language shift and language use that may be studied. The most relevant to the Cambodian Chams is religion. As I described in Chapter 2, a majority of Cambodian Chams practice the same type of Islam as in other predominantly Muslim countries. I observed a particularly close affinity towards Malaysia; the Chams are aware that the writing system they use is also used in Malaysia, for example. The Malay influence can be seen in the use of Malay words among some Cham speakers. Because they are already oriented towards another culture – the Malay and other Muslims – the majority of Cambodian Chams may be less inclined to incorporate or adapt elements of Khmer culture. This strong religious affinity may also lead to a stronger language ideology. The speakers’ attitudes toward their language seem to be very positive. It is likely a factor in the strength of WC after its long coexistence with Khmer.

Historical background is another factor to consider in the state of the language. The Cham in Cambodia are those who moved from Vietnam, mainly in the 15th century, while those in Vietnam have been living in the same area for centuries. Therefore, it is possible that Cham communities in Cambodia were separate from others and close-knit.

Although WC in Cambodia may be a special case, it will be of interest to study language ideologies and social factors involved in language use to see how it interacts with language use. A longitudinal study may prove informative because Cambodia is just
beginning to urbanize and the Cham and the Khmer are increasingly interacting with each other and with people from other countries. The new factor in the language situation is English, which is increasingly common in the university and in business settings. At the moment, it is difficult to imagine that WC will become endangered as many other minority languages around the world have. It is much more likely that WC will absorb these new influences, from English, Malay, and other languages, to adapt and change.
APPENDIX A
Word List 2008

“r” indicates [ɣ]

rap    level
ŋat    careful
pʰat   penalty
baaʔ   contagious
kaʔ    tie up
kaaʔ   waste
paaʔ   four
paʔ    to string
kan    poor
kaan   fish
khan   cloth
khaan  tell

calaan road
psaŋ   husband
blaan  month
tʰaan branch
saŋ   house
klam  carry on shoulder
malam  night
taŋ  thatch
ban  copper
cam  Cham
caan  dish
can  hit
caan  rain
nam  six
paam  turn over
caan  barrier
caan  wait

pah  clap, slap
phah  blow
prah  rice (grain)
srah  pond
poh  fruit

maj  grandmother
maaj  come
<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>taj</td>
<td>younger brother</td>
</tr>
<tr>
<td>taaj</td>
<td>liver</td>
</tr>
<tr>
<td>paw</td>
<td>ash</td>
</tr>
<tr>
<td>pʰaw</td>
<td>new</td>
</tr>
<tr>
<td>pʰaaw</td>
<td>gun</td>
</tr>
<tr>
<td>tapaj</td>
<td>shake rice</td>
</tr>
<tr>
<td>tapaaj</td>
<td>rabbit</td>
</tr>
<tr>
<td>klaw</td>
<td>three</td>
</tr>
<tr>
<td>klaaw</td>
<td>laugh</td>
</tr>
<tr>
<td>pataw</td>
<td>stone</td>
</tr>
<tr>
<td>pataaw</td>
<td>king</td>
</tr>
<tr>
<td>baw</td>
<td>sniff, smell</td>
</tr>
<tr>
<td>blaj</td>
<td>buy</td>
</tr>
<tr>
<td>plaj</td>
<td>village</td>
</tr>
<tr>
<td>plaaj</td>
<td>canal</td>
</tr>
<tr>
<td>katal</td>
<td>itchy</td>
</tr>
<tr>
<td>pal</td>
<td>trowel</td>
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<td>bal</td>
<td>mend</td>
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<tr>
<td>cim</td>
<td>bird</td>
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<td>Word</td>
<td>Translation</td>
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<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>ñba?</td>
<td>salt</td>
</tr>
<tr>
<td>saə</td>
<td>seed</td>
</tr>
<tr>
<td>vəo</td>
<td>forget</td>
</tr>
<tr>
<td>ləmio</td>
<td>five</td>
</tr>
<tr>
<td>deih</td>
<td>sleep</td>
</tr>
<tr>
<td>taseiʔ</td>
<td>sea</td>
</tr>
<tr>
<td>ptowʔ</td>
<td>star</td>
</tr>
<tr>
<td>ptawʔ</td>
<td>hide</td>
</tr>
<tr>
<td>pawʔ</td>
<td>full</td>
</tr>
</tbody>
</table>

Frames 1 to 3 only

<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>laa</td>
<td>snake</td>
</tr>
<tr>
<td>paaʔ</td>
<td>to walk (kapaaq)</td>
</tr>
<tr>
<td>talah</td>
<td>tongue</td>
</tr>
</tbody>
</table>
APPENDIX B
Word and phrase lists for Chapters 6

1. CVCV

gloss        word
1. eye        mata
2. enter      tamiə
3. wound      laka
4. flesh, wound ralo
5. comb       tasei, tasi
6. rich       kaja
7. medicine   caru
8. old        taha

2. CVCV(V)C

1. sky        lanjiʔ?
2. walk       kapaaʔ?
3. chicken    manuʔ?
4. mosquito   camuʔ?
5. rough      karaʔ?
6. ocean      taseiʔ, tasiʔ?
7. drunk      mapuʔ?
8. sugarcane  tanoot

3. CVCV(V)C (final nasal)

1. bone       talaj
2. night      malam
3. street     calaan
4. cold laqan
5. sweet jamiin
6. earthworm laniij
7. wall taniiij

4. CVCV(V)C (final glide)
1. buffalo kapaaw
2. tooth takaj
3. man lakaj
4. louse kataw
5. shy malaw
6. king pataaaw
7. die mataaj

5. CVCCVC, CVCVCC
1. cloud ahnij
2. nine somlan
3. sell paplaj
4. kill pamtaj, pamataj
5. morning masuup, kumsuup
6. heavy traw?
7. cut with scissors ckaw?

6. 2-word phrases
1. duck egg poh tee, poh taa
2. leaf laa kjaw
3. moon ea blaan
4. June blaan nam
5. rainy season blaan caan
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Tuesday</td>
<td>raj ɳaa, raj ɳao</td>
<td></td>
</tr>
<tr>
<td>7. Wednesday</td>
<td>raj put</td>
<td></td>
</tr>
<tr>
<td>8. small dog</td>
<td>saw sit, also saw dusit, saw ducit</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C
Sentence lists for Chapter 7

Target words in sentences: eye, chicken, nine, night, rainy season

1. Declaratives
   1. Aunt Fah hurt her eye.
   2. I walk to the market.
   3. I made/cooked chicken soup and rice.
   4. I’m returning home at night.
   5. Our class has only two male students.
   6. There are nine people in my family.
   7. My sister is moving to Phnom Penh during rainy season.

2. Yes/No questions
   1. Did Aunt Fah hurt her eye?
   2. Did you feed the chickens today?
   3. Did Uncle Salleh come back last night?
   4. Did you see the man who brought the nets?
   5. Are you leaving home at 9?
   6. Will you be in Kratie until end of rainy season?

3. Wh-questions
   1. When did Aunt Fah hurt her eye?
   2. Who was the man who brought the nets?
   3. On what month did rainy season end last year?
   4. When did you feed the chickens?
   5. What time did Uncle Salleh come back last night?
   6. Why did you buy 9 (chicken)eggs?

4. Imperatives
1. Don't touch your eye.
2. Go feed the chickens.
3. Don’t go outside at night.
4. Leave the house before 9.
5. Don’t talk to that man.
6. Don’t travel during rainy season.

5. Focus
1. I didn’t walk, I rode a moto.
2. Did Aunt Fah hurt her nose? No, she hurt her eye.
3. Did you buy two cows? No, I bought two chickens.
4. Did you buy ten eggs? No, I only bought nine.
5. Did the female student take the exam? No, the male student did.
6. Are you going to Siem Reap in June? No, I’m waiting until end of rainy season.
7. Uncle Salleh didn’t leave at night, he left in the morning.
APPENDIX D
Transcripts of three narratives

\[ng = [ŋ], \ r= [γ], \ q= [ʔ]\]

Future goals

| lin kan mijeej mong riing (...) riing tour guide  |
| 1s want talk from story (...) story tour guide |
| I want to talk about (being) a tour guide |

| naw raj kanaat (...) naw raj kanaat lin kan ɲaq rang bopraε hong parang go day ? go day ? 1s want do person translate and foreign in the future (...) in the future I want to be a translator |

| paq mqan ti talam plaj kou bst lin hou akah (39) lin kan bopraε walk outside PREP in country Khmer if 1s have chance (kh) 1s want translate and travel outside of Cambodia if I have the opportunity I want to translate |

| paq mqan (44) naw lakaọ lengiw hong kan thaw kun lepih kray lo lo walk outside go ? out and want know LOC? place ? many many (and) travel abroad and want to know about many ? places |

| hong kan thaw kun ka lengiw kong lin deel naw o and want know LOC? Prep out REL 1s ever go NEG and want to learn about places I’ve never been to |

| bloh lin kan (78) srawceaw ka lengiw pa? hong kan thaw ring paε already 1s want research Prep out ? and want know story study I want to (do) research abroad and want to learn about studying |

| kan thaw (la)kaw riing ɲaq pruq jaw pi want know (please?) story do work how and about how to work (abroad) |

| kan thaw mong? (la)kaw rang riccumran tu naj cong mung (la)kaw want know from ? person develop ? ? from |

| kou tu naj Khmer I want to know how things are different from Cambodia’ |
Making bamboo soup (curry)

<table>
<thead>
<tr>
<th>lin mijeej riing paay kɔɔ lepung cam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1s talk story soup carmelized (?) bamboo Cham</td>
</tr>
<tr>
<td>I (will) talk about Cham bamboo soup</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>kɔɔ lepung cam ru kɔ lepung kɔɔ</th>
</tr>
</thead>
<tbody>
<tr>
<td>carmelized bamboo Cham or bamboo carmelized</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>tamip naq tray kuah leqou kuah kuah o bloh ni</th>
</tr>
</thead>
<tbody>
<tr>
<td>first do lp scrape coconut scrape scrape NEG already DEM</td>
</tr>
<tr>
<td>First we scrape the coconut, then after scraping</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>tɔpaq miq hakeq miq ea tang miq ea tang miq bloh</th>
</tr>
</thead>
<tbody>
<tr>
<td>squeeze squeeze what take water solid take water solid take already</td>
</tr>
<tr>
<td>(we) squeeze (what we scrape) to take the coconut milk, then after (that)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>miq dop da keq keq miq pi yi lepung yi kɔ kaan yi kɔɔ riing</th>
</tr>
</thead>
<tbody>
<tr>
<td>take utensils what what take like bamboo like fish like spice.paste (kruung)</td>
</tr>
<tr>
<td>we prepare utensils and take things like bamboo, fish, spice paste (mix)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>keq keq naq mpiyq ploh tray miq (uh) ea ting ou li na crong ploh</th>
</tr>
</thead>
<tbody>
<tr>
<td>what what do keep already lp take (uh) water coconut ?? boil already</td>
</tr>
<tr>
<td>then keep (?) …. We take coconut milk (Kh) to boil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cang cru cru traj … traj teh phoq</th>
</tr>
</thead>
<tbody>
<tr>
<td>wait until boil lp lp sprinkle (put in) prahoc</td>
</tr>
<tr>
<td>wait until (it) boils (then) we put prahoc in coconut milk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>teh phoq bloh tray ceh ring ceh ceh ring bloh</th>
</tr>
</thead>
<tbody>
<tr>
<td>put.in prahoc already lp put.in spice.paste put.in spice puts already</td>
</tr>
<tr>
<td>after prahoc we put in spice paste and after</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>na phoq tray cang iu ha cru bieh hacet somcet lapung</th>
</tr>
</thead>
<tbody>
<tr>
<td>? prahoc lp wait see ? boil until little add bamboo</td>
</tr>
<tr>
<td>the prahoc and spices we wait a little until it boils then add bamboo</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ceh lepung bloh ceh kaan tik ceh kaan hatay</th>
</tr>
</thead>
<tbody>
<tr>
<td>put.in bamboo already put.in fish (mistake) put.in fish after</td>
</tr>
<tr>
<td>after adding bamboo, add fish, then after fish</td>
</tr>
<tr>
<td>bloh hou raq ton hou jœa luaj na phæj lepung puj kan already have boil until have flavor (soft enough to eat) bamboo? ? boil until the flavors have seeped through the bamboo</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>faw iw qbaq tepaa mi bœ pah ntaim sra naw taste look salty bland? if bland add salt go then taste it to see if it’s salty or bland. If it’s bland add (kh) salt</td>
</tr>
<tr>
<td>bœ baq thaw naq jaw pi o if salty know do how NEG If it’s too salty (I) don’t know what to do</td>
</tr>
<tr>
<td>bloh naw bloh trayj jo ceh tang keq keq ji kiing already go? already 1p put.in palm sugar what what ? spice.paste then after that we add palm sugar and (things like) spice.paste</td>
</tr>
<tr>
<td>faw naw tngi naw bot lœh naw taste go delicious go ? take.off.from heat go if it tastes good then take it off from the fire</td>
</tr>
</tbody>
</table>
**Studying English**

My name is Yusoh, I want to speak about learning English.

I’ve been studying English since 2005 to this year, 2009.

I first studied... I studied the children’s book “English for Children”

Before, I didn’t know how to speak English.

<table>
<thead>
<tr>
<th>lin ngin Yusoh lin kin mije:j mung rung paet angkleis 1s name Yusoh 1s want speak from story study English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mung tamip maj lin tcoh paet ankleis talaw from first come 1ps enter study English before</td>
</tr>
<tr>
<td>Munj thon toa lapaw lemi: bieh tal ni pa? thon ji from year two 1000 5 until DEM four year?</td>
</tr>
<tr>
<td>Thon toa lapaw somlan year two 1000 nine</td>
</tr>
<tr>
<td>I’ve been studying English since 2005 to this year, 2009.</td>
</tr>
<tr>
<td>Lin pae? domboong lin pae? (...) po (...) nu?ne? 1s study first (K) 1s study book child</td>
</tr>
<tr>
<td>Po English for Children book English for Children</td>
</tr>
<tr>
<td>I first studied... I studied the children’s book “English for Children”</td>
</tr>
<tr>
<td>Toa mej kae lin paet habang (ha)ket (ha)bang hacet tae After that 1s study on.tim little one.tim little also</td>
</tr>
<tr>
<td>After that I studied step by step</td>
</tr>
<tr>
<td>Munj (ta)law lin thaw (nin?) hou thaw mije:j ankleis o before 1s know have know speak English NEG</td>
</tr>
<tr>
<td>Before, I didn’t know how to speak English</td>
</tr>
<tr>
<td>Lin mong talaw ji boh haoj ji boh praŋ boh ke? 1s time first ? see already ? see foreigner see what</td>
</tr>
</tbody>
</table>
When I saw a foreigner, I was shy and didn’t speak.

After that I studied first with a teacher named Hossein.

After that I had another teacher named Leb Ka.

He doesn’t have class in a classroom. He teachers in the field, rice field, in a temple or mosque.

He would tell stories like (about?) trees,
a ... menu? cim pørum traj mi? traj boh traj miːj
chicken animal bird self? self see self speak
chickens, animals, birds, (anything) he?I? see, I speak

ruŋ nin te(traj) (m)paet te(traj) hou miːj cam o
about DEM self study self have speak Cham NEG
about it…

ləm mung lin paet hong kuat miːj (te?) ankleis ji
in from 1s study with 3s speak ? English

ankleis rilraj rilraj toa mej kaj hou kuat hou naw tøm
English everyday after that have 3s have go ?

prang toap mej kuat hou prang nin maj plaj lin
foreigner after 3s have foreigner DEM come village 1s

He had this foreigner come to my village

nin maj lin hou miːj hong prang habang hacet
DEM come 1s have speak with foreigner one.time small

habang hacet toap maj t?? lo lo naw bieh lin rilraj ni
one.time small after that ? many many go until 1s today

... and I spoke with the foreigner(s?) little by little and many more so today

lin ac miːj ankleis cæŋ ji rilraj lin tɔ? lin tɔ?
1s can speak English now today 1s still 1s still

now I can speak English today ... I still

paet ptɔ: ni ræ lin paet hoŋ (on)ku: Husein tkæ
study continue 1s study with teacher Hussein again

continue to study I study with teacher Hussein again

bieh tal thon toa paw thon toa paw ploh bæt nin ji haaj
until year two 1000 year 2 1000 ten maybe

maybe until the year 2010.
REFERENCES


