A Phonological Reconstruction of Proto-Hlai

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A Phonological Reconstruction of Proto-Hlai

By

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Preface

This book presents a reconstruction of the phoneme inventory of Proto-Hlai, based on data from twelve Hlai languages spoken on Hainan, China. A classification of the Hlai languages is given with the innovations upon which it based, flanked by discussions of reconstruction methodology and contact relationships. The inventory of Proto-Hlai initials is reconstructed, and original sesquisyllabic forms are shown to be necessary to account for the reflexes between the daughter languages; it is also noted that the inventory of initials is also marked by the presence of aspiration on most consonants in word-initial position. This is followed by the reconstruction of the rime inventory, an outstanding feature of which is two laryngeal components which are argued to have been the precursors to two of the synchronic tone categories in the daughter languages, and which conditioned segmental variation in most of the daughter languages. A comparison is made between Proto-Hlai and Proto-Tai, and a preliminary reconstruction of Proto-Western Kam-Tai (the immediate ancestor of Proto-Hlai) is performed. When this reconstruction is compared with that of Proto-Hlai, it is shown that several important sound changes occurred in Pre-Hlai, including intervocalic voiced obstruent lenition, vocalic transfer, aspiration of main syllable-initial consonants, and peripheral vowel raising. The language Jiamao is examined in detail, and it is argued that Jiamao is a non-Hlai language which has been in close contact with Hlai since the Pre-Hlai period. An examination of the correspondences between Jiamao and Hlai reveals at minimum two layers of Hlai loanwords in Jiamao, and evidence that Jiamao was originally very different from Hlai structurally. The book concludes with a summary of findings, empirical and theoretical contributions, and suggestions for future research. The appendix 'Hlai Language Data and Proto-Hlai Reconstructions' is available online via <http://dx.doi.org/10.6084/m9.figshare.1512402>.

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I am indebted to all of the Hlai language consultants on Hainan (listed in chapter one) who worked with me during my fieldwork in 2003–04, in particular Lin Baosong (林保松), a native speaker of Ha Em who generously arranged (in cooperation with Wang Xueping (王學萍)) for my work with many of the other consultants with no request for compensation. I would like to thank Wu Zhongyong (吳鐘勇), my primary Nadouhua consultant, for his patience during the long hours spent during our initial survey of his language. Thanks also to Liu Jiansan (劉劍三) for his constructive dialogue and the gift of his self-authored Lingao dictionary. I want to especially acknowledge Wang Yuqiu (王裕秋), our liaison at Hainan Normal University, who regularly advocated for my family and without whom my fieldwork would not have been possible.

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CHAPTER 1

Introduction

The purpose of this book is the reconstruction of the phonological system and lexical inventory of Proto-Hlai, one of the four main branches of the Kra-Dai phylum of Southeast Asia. This reconstruction is based primarily on the data found in Ouyang & Zheng (1983), and has been supplemented by Ouyang (1998) as well as the author's own fieldwork in Hainan during the academic year of 2003–04. Data from a total of twelve languages have been used in the reconstruction, all of which are spoken on the island of Hainan, China. The theoretical goal of this book is to develop a theory of sound change with general principles that are applicable over the range of Hlai diachronic evolution, and the empirical goal is to implement these principles in explaining individual paths of phonological change which can be applied to the reconstruction of the Proto-Hlai phoneme inventory and lexicon.

This book is a significant contribution to the field of Kra-Dai (and more generally Southeast Asian) historical linguistics, in that the ebook edition provides a reconstruction of over one thousand Hlai vocabulary items which are thus available for comparison with forms in other languages and families both within and outside of the Kra-Dai phylum. It also contributes to historical reconstruction methodology by analyzing the types of change which have occurred between Proto-Hlai and its daughter languages, thereby creating an inventory and typology of sound change which is possible and especially applicable within Southeast Asia.

The reconstruction presented here has been divided between the system of initials (chapter 2) and the system of rimes (chapter 3), which form separate and largely exclusive systems. In addition to these, a discussion of Pre-Hlai, the stage prior to Proto-Hlai, is also included (chapter 4), accompanied by a comparison with Proto-Tai. An analysis of the relationship between Jiamao, a non-Hlai language isolate, and the rest of Hlai with which it has been in long-standing contact is treated in chapter 5. Chapter 6 concludes with a summary of findings, contributions, and suggestions for future research.

1.1 Background

The Hlai family is a member of the Kra-Dai phylum (also commonly known as Tai-Kadai) of Southeast Asia. Although there is not uniform agreement yet

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among specialists regarding finer details of Kra-Dai subgrouping, there is unanimity that the following constituents exist:

(1)	Kra	Kam-Sui	Tai
	Lakkja	Hlai	Be
	Biao		

Of these seven groups, Lakkja, Biao and Be are relatively small, consisting of only a few dialects each. It is generally felt that Lakkja and Biao are closest to Kam-Sui, and that Be is closest to Tai, the only question being whether or not they are actually constituents of these respective larger families or coordinate with them.

Ostapirat (2005) treats Lakkja as part of Kam-Sui, whereas Solnit (1988) and Hansell (1988) consider it coordinate with Kam-Sui; L-Thongkum (1992), on the other hand, considers Lakkja closer to Tai based on a count of 243 reconstructed Lakkja lexical items. Although there is currently limited data on Biao, it appears to be closest to Lakkja, and they are placed in a subgroup here.

Be appears to be most similar to Tai, and shares a few lexical isoglosses with Northern Tai; however, besides the lexical items which it shares with Hlai which are likely borrowings, it also shares a small amount of vocabulary with Kam-Sui. Like Biao, there is some evidence that Be has a Mon-Khmer substratum (an interesting topic in its own right which is unfortunately outside the scope of this book). Pending further study, it will tentatively be considered to be coordinate with Tai.

Based on a count of the lexical items in Liang & Zhang (1996) in which Hlai is cognate with one or more other Kra-Dai branches, Hlai was found to share lexical items exclusively with Tai in 42 instances, and exclusively with Kam-Sui in only 13 instances. This supports the hypothesis that, its exotic features notwithstanding, Hlai subgroups most closely with Tai-Be.

The working hypothesis presented in this book is that a first-order split exists between Kra (Western Kra-Dai) and the rest of the phylum (Eastern Kra-Dai). Eastern Kra-Dai is divided in turn between Lakkja-Biao and Kam-Tai, the latter of which is divided between Kam-Sui and Western Kam-Tai. This final node is comprised of Tai-Be on the one hand, and Hlai on the other. This hypothesis serves to reconcile L-Thongkum's observation that Lakkja and Tai share a set of common vocabulary with Solnit and Hansell's association of Lakkja with Kam-Sui. Bearing in mind that this classification is still tentative and awaiting final proof, the figure below represents an articulated working model of the Kra-Dai phylum:

(2)

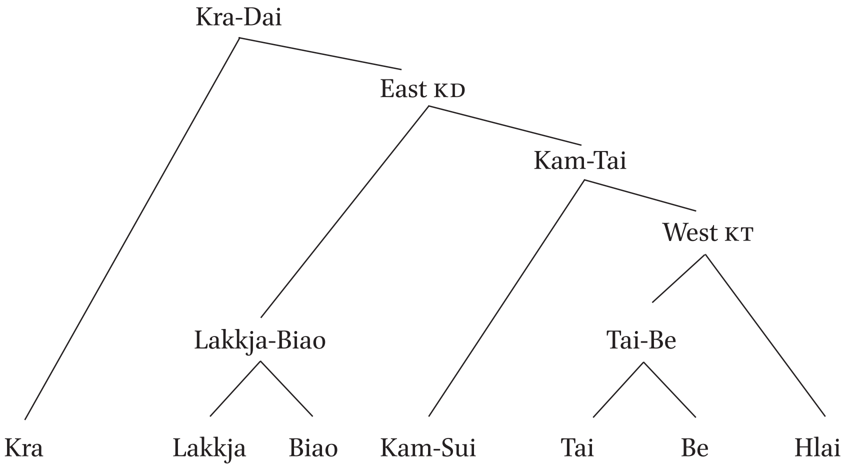


FIGURE 1 *Kra-Dai Phylogenetic Tree.*

Although reconstructions of various degrees of detail exist for all of the families above, Proto-Hlai will be compared specifically with Proto-Tai in chapter four, as Tai-Be is assumed for now to be its closest relative within Kra-Dai. Proto-Be data are omitted for ease of exposition, in order to allow the comparison of Proto-Tai forms with the Proto-Northern Tai and Proto-Southern Tai forms upon which they are based.

The Hlai languages are spoken exclusively on the island of Hainan, China. There is nothing to suggest that the speakers of the Hlai languages were not the first inhabitants of the island, the only other potential contenders being the speakers of the Jiamao language, which shows evidence of being in longstanding contact with Hlai, but is not actually a Hlai language itself. The Hlai are currently the largest 'minority group' on Hainan, which they share with various groups of Chinese (speaking varieties of Sinitic including Hakka, Yue (Danzhouhua), Southern Min (Hainanese), and Southwest Mandarin (Junhua)), as well as other ethnic groups including the Be (who also belong to the Kra-Dai phylum) in northern Hainan, the Utsat (whose language, Tsat, belongs to the Chamic subgroup of Austronesian) in southern Hainan, and pockets of Mien speakers (of the Hmong-Mien phylum), who were originally conscripted soldiers sent to Hainan by the Chinese to subdue the Hlai. In fact, the only major Southeast Asian language phylum which is not represented on Hainan is Austroasiatic. One other language, which must for now be considered an isolate, is Jiamao, mentioned above. Although it is shown in chapter five that there is very good reason to consider Jiamao to be ultimately of non-Hlai origin, speakers of Jiamao are considered to be part of the Hlai ethnic group by the Chinese government, and are counted as such in national censuses. Conversely, the speakers of Cunhua and Nadouhua, which I consider to be essentially Hlai languages based on their core vocabulary, are considered to be Chinese by the government and are counted as such.

According to the 1990 census (Ostapirat 1993a:1), the Hlai population was estimated to be 1,110,000. However, a more conservative (and probably more accurate) number of 747,000 *speakers* is given in Shearer & Hongkai (2002), which approaches 800,000 if the speakers of Cunhua and Nadouhua are included. The Hlai languages have traditionally been divided into five branches: Ha, Qi, Run, Meifu (which also includes the language referred to here as Changjiang), and Jiamao, with Cunhua and Nadouhua being outliers and falling outside of this classification. The primary groups are shown below, with population figures adapted from Shearer & Hongkai (2002: 88–90), and alternate names used in Ouyang & Zheng (1983) and other sources given in parentheses:

(3) TABLE 1 *Hlai Language Population Figures*

Family	*Group*	*Language*	*Population*
Hlai			798,800
	Bouhin (Heitu)		73,000
	Ha Em (Zhongsha)		193,000
	Lauhut (Baoding)		166,000
	Qi		178,000
		Tongzha (Tongshi)	125,000
		Zandui (Qiandui)	29,000
		Baoting (Baocheng)	24,000
	Run		44,000
		Baisha	36,000
		Yuanmen	8,000
	Meifu	(Xifang) & Changjiang	30,000

Family	*Group*	*Language*	*Population*
	NWCHl		62,500
		Cunhua (Ngan Fon)	60,000
		Nadouhua (Dongfang)	2,500
	Jiamao		52,300

As can be seen from the table above, the Ha Em, Lauhut, and Qi groups are comparatively robust, while the Bouhin, Run, Meifu, NWCHl and Jiamao groups have fewer speakers. The Run and Meifu groups, along with NWCHl, are in closer contact with Chinese and their speakers are under greater pressure to shift to Chinese as a first language. Yuanmen, and Nadouhua especially, are critically endangered, and there is little evidence that the children of Nadouhua speakers are learning the language from their parents, many of whom are only semi-fluent themselves.

1.2 Procedures and Materials

Data for this monograph is drawn largely from Ouyang & Zheng (1983). Complimentary to this is Ouyang (1998), and Fu (1997). Fu (1990) was also consulted and used to establish an initial database on Nadouhua. These materials formed the core of the original database which was organized first by lexical items (alphabetical by the Chinese gloss), then by initials, rimes, and finally tone categories. Sound correspondences were listed, irregularities noted, and attempts were made to find causes for the irregularities. Some irregularities were the result of original mistakes in transcription; others were the result of borrowing (either from Chinese or between Hlai languages themselves); still others may be attributed to either idiosyncratic internal transmission errors or are otherwise still unexplained.

In addition to this, the author also performed fieldwork in Hainan during the period September 2003–June 2004. During this time, fieldwork focused primarily on Nadouhua, although consultants were also located who spoke the ten varieties in Ouyang & Zheng (1983), as well as Cunhua; additionally, the Changjiang language was documented for the first time. The data for this language are the most incomplete, since the Changjiang consultant only had eight hours during which to work, and attention was paid in that case to core Hlai vocabulary items. In all cases, data was elicited and recorded in a Word document, and occasional corrections made to already published material. A wordlist of 200 core items was established, and recordings were made for each language with at least one consultant. Recordings were done using a Shure BETA58a cardioid microphone and Speech Analyzer 2.5 software (SIL Speech Tools), recorded into a Dell Inspiron 600m laptop computer.

The language consultants who offered their valuable time and energy to this work are the following:

(4) Hainan Hlai Language Consultants

Bouhin:	Luo Musheng (羅木生), Li Dejun (李德軍)
Ha Em:	Lin Baosong (林保松)
Lauhut:	Chen Wenhui (陳文輝), Liu Wencheng (劉文成)
Tongzha:	Zhang Ruqun (張儒群), Wang Jili (王積禮)
Zandui:	Wang Xunzhao (王軒趙)
Baoting:	Lin Jiao (林嬌), Feng Haiqing (馮海青)
Baisha:	Fu Ailing (符愛玲)
Yuanmen:	Wang Liwei (王麗偉), Wang Juqiong (王菊瓊)
Moyfaw:	Fu Yuli (符宇理)
Changjiang:	He Xianmei (何仙梅)
Nadouhua:	Wu Zhongyong (吳鐘勇), Gao Jingying (高井英), Fu Na (符娜), Gao Fangning (高芳寧)
Cunhua:	Wu Xun (吳勛), Wen Xinghai (文欣海)
Jiamao:	Huang Xiaoxiang (黃曉香)

1.3 Previous Work

This section provides an overview of previous work on the Hlai languages, divided into two categories. The first category summarizes data which has been collected, described, and published. The second category includes publications which have performed some kind of analysis upon this data.

1.3.1 *Data*

Publications on what is now known as the Hlai languages began in the late nineteenth century, an overview of which is included in Ostapirat (1993a: 11–18). The first modern large-scale collection of data was that of Savina (1931), in which he recorded two languages. The first, which he referred to as Southern Day, includes approximately 1,200 lexical items, and is essentially the same as

Bouhin. The second, which he referred to as Central Hlai, includes a smaller number of words (150); it is a Qi language, but it is difficult to associate it with one of the three specific languages used in the present study. These languages were recorded in Vietnamese orthography, and must be read accordingly.

The next major publication of data was that of Wang & Qian (1951), which records a dialect of Baisha. It is fairly similar to the dialect of Baisha recorded in Ouyang & Zheng (1983), with the general exception that it records alveolopalatal affricates which have since become plain alveolar affricates, and the final *-l* is transcribed in the place of *-ɰ* (this will be discussed more in chapter three).

Ouyang & Zheng (1980) presented a limited amount of data for Lauhut (Baoding) and Tongzha (Tongshi). This was followed up by the much more comprehensive and massive study which they published as Ouyang & Zheng (1983), a large and detailed reference on the Hlai languages that provides data on nine languages plus Jiamao. It not only gives detailed phonetic descriptions of each of the languages, but also includes a total of 1,730 lexical items for all ten languages. A detailed language map of the Hlai languages on Hainan is also provided, along with the traditional classification mentioned at the beginning of this chapter.

Fu (1983) presented a short wordlist of Cunhua lexical items, the number of which was doubled in the follow-up publication of Ouyang & Fu (1988). These short articles were finally followed by monographs on Cunhua, first Fu (1997) which is written by a native speaker of Cunhua, and then Ouyang (1998), a detailed treatment of Cunhua with comparative analysis and hypotheses about the history of Cunhua as a Chinese-Hlai mixed language. Finally, Fu (1990) presented a short wordlist for Nadouhua, also presumed to be a mixed language. It should be noted that the mixed status of both Cunhua and Nadouhua, while not pursued in detail here, has the potential for a sizable study in its own right.

1.3.2 *Analysis*

Benedict (1942) was the first publication to group Hlai (Li) with Tai, along with other lesser-known languages, in a new phylum which he called *Tai-Kadai*, where *Tai* was taken as one taxonomic unit, and the other languages (including Hlai, Gelao, Laqua [Qabiao], and Lachi) were placed under the umbrella term of *Kadai*. This term has been in common use since then, but is now in competition with another suggested name for the phylum, *Kra-Dai* (Ostapirat 1999a), which is the term adopted here for the reasons argued therein.

According to Ostapirat (1993a:17), Shafer (1957) was the first to present comparative work on Hlai. Solnit (1982), using data from Ouyang & Zheng (1980), treated registrogenesis and its connection with Hlai nasals and fricatives.

Haudricourt (1984), reprinted as Haudricourt (1989), presented an article on Hlai tones, providing a further outline of registrogenesis for the Hlai languages in which he focuses primarily on initials, using data from Ouyang & Zheng (1980).

Matisoff (1988) is the first large-scale reconstruction of the system of Proto-Hlai initials, based on Ouyang & Zheng (1983). Matisoff excluded Jiamao data based on 'its extreme (and apparently unsystematic) aberrancy with respect to others' (1988:289). He also did not have any access to data on Cunhua or Nadouhua.

Thurgood (1991) was the next large comparative study using the data in Ouyang & Zheng (1983). Using Matisoff (1988) as a place of departure, he proposed his own reconstruction of Hlai initials, and provided the first comprehensive reconstruction of the Hlai rimes. In this paper, Thurgood used additional data from both Cunhua and Nadouhua which had been unavailable to Matisoff. Thurgood (1992) was the first paper to treat Jiamao and attempt to resolve its apparent inconsistencies with the other Hlai languages. He is also the first to suggest that Jiamao may have not originally been a Hlai language.

Peiros (1998) was the third scholar to present a reconstruction of the system of Hlai initials. His reconstruction diverges more from Matisoff (1988) than does Thurgood (1991). He also suggests a vague outline of the Hlai rime system, but does not go into sufficient detail to be taken into account in this study. This represents the first serious effort to integrate the Hlai data into the greater Kra-Dai picture, with a reconstruction of Proto-Kra-Dai initials included.

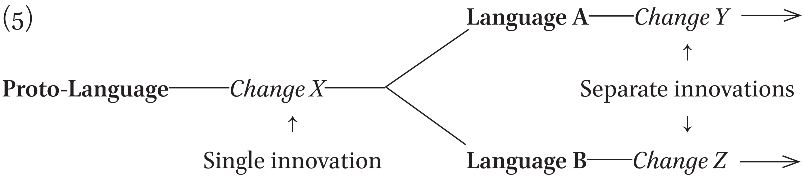
Ostapirat (1993a) is a reconstruction of the Proto-Hlai rime system, along with the first classification of the Hlai languages which does not directly mirror that in Ouyang & Zheng (1983). It is the best work to date on the background of Hlai studies. Ostapirat (1993b) provides an argument for dental and velar clusters in the Proto-Hlai initials, a hypothesis which he seems to have later abandoned. Ostapirat (1996) addresses the complicated issue of Kra-Dai *-ɰ*, and examines the possibility (based largely on Wang & Qian 1951, which describe a variety of Baisha) that final *-l* is at least one source for this final glide. Ostapirat (2004) provides a revised reconstruction of both Proto-Hlai initials and rimes (the latter of which differing significantly in some respects with his proposed system in Ostapirat 1993a), and attempts to integrate the Jiamao data into the reconstruction. Finally, Ostapirat (2005) addresses the putative relationship between Kra-Dai and Austronesian, first advocated in Benedict (1942), arguing that the hypothesis should still be taken seriously, and representing the second major attempt at integrating the Hlai material into an overall Kra-Dai picture (although a comprehensive reconstruction is not included in this particular paper, the goal rather being to show that there are regular correspondences in specific areas between Kra-Dai phonemes on the one hand and Austronesian phonemes on the other).

1.4 The Hlai Linguistic Area

Hainan is an island with few natural barriers to prevent travel and/or interaction among its inhabitants, and as a result natives of Hainan are often at least bilingual, and often have a functional knowledge of three or even more languages. Although it is ultimately possible to subgroup the Hlai languages as shown in the preceding section, there is also evidence for contact relationships which have been intense and longstanding. These relationships often betray themselves in identifiable loanwords, and are also attested to by consultants with which I have done fieldwork. The most important of these contact relationships are described in section 1.7. The sociolinguistic situation on Hainan has grown out of a complicated series of immigration and subsequent interaction (a process which intensified with Chinese immigration beginning in the Song dynasty (Kwok 2006: 202)), and Hainan is a terminal point for migration as a result of being an island off the Chinese mainland with no proximal geographic neighbors. The human mosaic resulting from this has created a more richly complicated system than many traditional continental situations in which population movement is comparatively unrestricted.

The unmarked situation in historical linguistics has been that changes in one language or language branch which do not occur in another define a point in time in which the two languages have broken away from each other and are no longer in contact:

(5)



However, all evidence indicates that although there were some important changes which happened in Proto-Hlai (PHl) itself, when the proto-language branched into its daughter languages, there were new sound changes that seem to have originated in some area, gained momentum, and diffused across the entire language area, affecting it as essentially a single speech community.

Further evidence for this comes from the fact that languages which arrived on Hainan in fairly recent times, such as the variety of Southern Min Chinese spoken on Hainan (Hainanese), have participated in more recent changes such as stop implosion and desibilantization. This situation is more accurately portrayed in (6):

(6)

	Language A—*Change X*	—Change Z ⟶	
	↑	↑	
Proto-Hlai—*Change W*—	Separate innovations	Shared innovation … etc. …	
↑	↓	↓	
Single innovation	**Language B**—*Change Y*	—*Change Z* ⟶	

This fact is crucial to an understanding of PHl reconstruction, because it means that sound changes shared by daughter languages may not be a reliable indicator of their unity or disunity at the time those changes were effected. This is very similar to the situation which Ross (1988: 9–11) models in Oceanic, in which he uses the term *linkage* to refer to '… a group of communalects which have arisen by dialect differentiation.' He divides linkages into two kinds, the first being a *chain* where '… communalects are typically spread along a coastline, each related most closely to its neighbor on either side …', and the second being a *network*, where '… communalects are scattered over a land area or an archipelago, typically having neighbors on more than two sides, and often sharing different innovations with several of these.' The Hlai languages under discussion here fall very squarely under the second (network) model, and it is shown below that various degrees of interaction have continued between subgroups after their initial branching, leading primarily to lexical borrowing and to the diffusion of sound changes across already differentiated groups which are not necessarily close to each other in the Hlai family tree.

The fact that sound change within Hlai, and on Hainan in general, can be understood to entail a large component of diffusion and/or parallel innovation allows an important degree of theoretical freedom. Without this understanding, a complex history of apparently monolithic changes would need to be chronologically linearized, and artificially projected back further in time than is historically accurate. Moreover, if the assumption were made that every shared innovation was an inheritance, the phylogenetic tree of the Hlai languages would be mired in not just one or two, but a number of paradoxical subgroupings which could not all be true simultaneously.

1.5 Theory of Language Change and Reconstruction

A central hypothesis about language change adopted here is that it is non-teleological, in line with Blevins (2004). It is often the case that languages are anthropomorphized, either purposefully or not, and it is said that some language 'does this' or 'does that', as if it were capable of conscious decision-making (for a critical view of this approach, see Enfield 2005). There is no 'hidden hand' assumed to be at work behind the direction of language change in the present work, and it is therefore possible for language change to potentially occur in favor of exotic changes as well as ordinary ones, towards asymmetry as well as symmetry. This does not negate the fact that there are typologically common changes and inventories which should be taken into consideration in reconstruction of both phoneme inventories as well as the various paths of change which phonemes can take individually or collectively. These typological commonalities are explained, however, through the inherent bias of the human articulatory and auditory systems, which are predisposed towards certain types of variation and error on both an individual level (where change is initiated) and at a community level (where change is conventionalized). It can therefore be anticipated that rare features of the inventory or particular asymmetries will be more unstable and prone to replacement due to these biases. It may also be supposed that change can be indirectly influenced in a psycholinguistic sense by the existence of categories with large numbers of exemplars, where change may be vectored toward such a category because of its high frequency (see the discussion in chapter two on *systemic realignment* in section 2.1.3).

I also generally subscribe to the Evolutionary Phonology model and the arguments for it in Blevins (2004). The Evolutionary Phonology model states that the primary motivation for phonological change is imperfect transmission between the speaker and the listener/learner. The three categories of mistransmission are summarized below:

(7) (a) Change: signal misheard by listener
(b) Chance: signal accurately heard, but intrinsically ambiguous
(c) Choice: multiple variants of signal available, and new exemplar is chosen

In theory, these scenarios are entirely reasonable, and have the power to explain the bulk of phonological change. In practice, however, it is not always easy to decide which of these three possibilities is behind a particular change, although educated guesses can be made. I will therefore make the general assumption that the changes discussed in this book are due to mistransmission, and will only categorize them more specifically when it is straightforward to do so.

1.5.1 *Principles of Language Change and Criteria for Reconstruction*

Four basic principles about language change and reconstruction are presented below: Directionality of Change, Commonality of Features, Economy, and Symmetry. Although not identical, these assumptions are informed by the reconstruction methodology outlined in Campbell (2004: section 5.2). Examples are given for each to illustrate the principles under discussion.

1.5.1.1 Directionality of Change

Phonemes, or constructs which are comprised of phonemes such as the initial and the rime, can change in ways which are on a continuum of statistical probability, i.e. there are changes which are considered more likely, less likely, and impossible. This can be evaluated according to both phonetic (can it be explained via an understanding of the biases of the articulatory and auditory systems?) as well as typological (is it commonly attested cross-linguistically?) criteria, although an evaluation may be subjective in cases where there has not been much research into the type of change in question. For example, of the two changes listed below, the first (8a) is more likely, and the second (8b) less likely:

(8) (a) m > b
(b) b > m

In evaluating sound change, those changes which are considered more likely are therefore explored first, and those which are considered less likely only entertained if and when there is strong evidence for them.

A corollary of this assumption is that changes will usually tend to occur one feature at a time. In other words, a change may involve place of articulation, or it may involve manner of articulation, but it is unlikely to involve both simultaneously. For example, the changes of a single feature in (9a) and (9b) below are more likely to occur than the simultaneous change of two features in (9c):

(9) (a) tç > tʃ
(b) tç > $tç^h$
(c) tç > $tʃ^h$

This is not an absolute rule, however, as it is possible (especially in the case of perception-based change) for more than one feature to be affected at a time.

1.5.1.2 Commonality of Features

As stated above, it is expected that sound change will often involve a single feature at a time, although it may occasionally involve more; in no case is there any reason to believe that all features will change simultaneously. For this reason, the assumption is made that the reflexes of proto-phonemes in the daughter languages will preserve one or more features of the original phoneme in the proto-language from which they have evolved. In some cases, multiple identical features will have been retained, as in the following correspondence set of initials from the twelve Hlai languages (the use of bold font indicates low register—see chapter two):

(10)	ɾ	ɾ	r	**r**	**l**	**l**
	l	**l**	**l**	r	r	**r**

In this example, all of the reflexes are [coronal] and retain the feature [liquid], varying between being a lateral or a non-lateral (generally a tap or a trill). A reconstruction of a liquid phoneme is very secure in this instance, and the question is merely what kind of liquid it was, a decision which can be informed by inspecting its place in the overall inventory of reconstructed phonemes.

In other cases, common features are not preserved across the reflexes of the daughter languages, as in the following correspondence set:

(11)	ɾ	ɾ	v	**f**	**f**	**f**
	v	**v**	kw	ɣ	f	**f**

In this example, there are no features which can be considered common to all of the reflexes. There are two taps, several labiodental fricatives, a velar fricative and a labialized velar stop. Since the place feature [labial] occurs in the majority of reflexes, it is likely that the proto-phoneme had some sort of a labial component. However, the two taps indicate that there was an alveolar component as well (and this still leaves the velar fricative and labialized velar stop in need of explanation). The reconstruction ultimately adopted here is *Cuɾ, a sesquisyllable with a high back rounded vowel preceding an alveolar tap which is the onset of the main syllable (see chapter two for the details of this reconstruction). This reconstruction is informed by both of the place features [labial] and [coronal], and the manner has been decided based on the principle of Directionality described above.

This example also highlights another corollary principle of language change and reconstruction, which is *the more heterogeneous the reflexes of the daughter languages, the more complex the original proto-phoneme*, where complexity is defined by the total number of features represented in the original initial (i.e. plain *p* is considered less complex than palatalized *pj*). One more example of this is the following:

(12)	tsʰ	tsʰ	f	tsʰ	tsʰ	tsʰ
	f	f	f	f	f	pfʰ

In this example, the one feature held in common across the reflexes of the daughter languages is that of frication. However, the place feature is split between [coronal] and [labial], with alveolar reflexes in five languages and labiodental reflexes in the others. Since there is no common place feature, and there is no typologically common change of either *tsʰ > *f* or *f > *tsʰ*, then the reconstruction of a complex proto-phoneme should be considered.

1.5.1.3 Economy of Change

In general, when more than one alternative is being considered, the one which involves the fewest steps of change should be favored. For example, it is known from comparative Tai work (see Li (1977)) that the original liquid of a stop-liquid cluster can become a glide, for example *kl > *kj*. Knowing this, and using again example (12) above, it would be logical to consider the following two potential reconstructions for this series of initials:

(13) (a) *ʈʂʰw
(b) *tʃʰr

The reason that one might consider the reconstruction in (13b) is that, since there is evidence for a labial component of the initial from amongst the daughter languages, this labial component could suggest that the proto-phoneme was a *C-r cluster, where the *r changed to *w*, influencing the outcome of change in the modern reflexes accordingly. Although this is not an unreasonable hypothesis from a typological standpoint, it suffers from the flaw that there is no direct evidence for a liquid, making the reconstruction of a *C-r cluster the product of internal reconstruction, which is based on assumptions about the nature of the *pre*-proto-language. In fact, the *C-r hypothesis is only one possible way in which this labial component may have arisen, and there are other possibilities such as the influence of a presyllable (as reconstructed for (11) above) or influence from a following vowel. Unless direct evidence comes to light for the reconstruction in (13b), the better reconstruction is therefore that in (13a), since that in (13b) requires an extra step to have taken place which is not necessary to account for the reflexes in the daughter languages.

1.5.1.4 System Symmetry

As stated above, although there is not some conscious way in which a language organizes itself, the biases inherent in production and perception tend to lead to phonological inventories which are more balanced than not. For this reason, it is important to check the phoneme inventory for symmetry and make sure that all reconstructed phonemes have been aligned in both place and manner in as many instances as possible.

If this is done carefully, then there may be a residue of reconstructed phonemes which do not fit perfectly into the inventory. This is acceptable, since there are many instances of phonological inventories which aren't absolutely symmetrical, although typological data should be consulted since some asymmetries are more typologically common than others (for example, it is common to have an implosive series which includes only the bilabial and alveolar places of articulation (Maddieson 1984: 112).

1.5.2 *Summary*

The four principles of language change and criteria for reconstruction given above provide a consistent framework within which to objectively evaluate and determine the most appropriate reconstruction for a given set of data. The three kinds of possible mistransmission between speaker and listener/learner given in (7) above may be employed in the endeavor of reconstruction when constrained by these principles. More specifically, the principle of Directionality, which relies on a typological knowledge of common sound changes (mistransmissions), can narrow the set of candidate proto-phonemes from which the daughters have descended. The principle of Commonality serves to ensure that the total set of features of all daughter language reflexes is accounted for in the reconstructed phoneme. The principle of Economy serves as a counterbalance to Commonality, in that is requires that no more features are present in the reconstructed phoneme than are necessary to account for those features which are represented collectively in the daughter language reflexes. Finally, the principle of Symmetry serves as a systemic constraint on the entire reconstructed inventory, requiring the alignment of phonemes within the inventory (along such lines as the place and manner of articulation of consonants and the height and backness of vowels) and excluding gaps wherever possible, acknowledging asymmetry only when there is a compelling case to do so.

1.6 Subgrouping

This section is divided into three parts. The first part (1.6.1) outlines and explains the theory of subgrouping which will be used to subgroup the Hlai languages, the second part (1.6.2) gives the Hlai family tree itself, and the third (1.6.3) implements this theory, offering the evidence for that tree at all nodes. When examples from the twelve Hlai language are given, they are given in this order:

(14) Order of the Hlai languages in examples

Bouhin	Ha Em	Lauhut	Tongzha	Zandui	Baoting
Cunhua	Nadouhua	Changjiang	Moyfaw	Baisha	Yuanmen

1.6.1 *Theory of Subgrouping*

The goal of this section is to explain the theory of subgrouping adopted in this study. Criteria are discussed which allow the discernment between (or the establishment of likelihood of) changes which have been inherited versus those which have been diffused through contact.

There are two objects which are available for analysis in phonological reconstruction: the sound changes which affect lexical items, and the lexical items themselves. In cases where there are either few lexical items recorded or where there is a range of items between languages, these cannot generally be used as a reliable criteria for subgrouping (Thurgood 1982: 251). In these cases, sound changes are the only viable object which can be used for subgrouping. It is fortunate that there is a large amount of lexical data available on the Hlai languages (the only exception presently being Changjiang, for which there is nevertheless enough data to be of use) to achieve results using the lexicon for subgrouping. This being the case, the lexicon will be examined first in view of its role in subgrouping, with sound change being treated thereafter.

Before proceeding, there is one general principle which can be outlined that applies to both the lexicon and to sound change. It may be asked whether retentions and innovations carry equal weight in subgrouping, and it has been convincingly argued (Thurgood 1982, Blust 1999, Campbell 2004) that innovations are a much better criteria than retentions, as all retentions may be potentially inherited by all languages which have descended from some proto-language, but innovations are only inherited by those daughter languages which have descended from the parent at the particular place in the tree at which the innovation originated.

For example, assume that a proto-form for some lexical item is known. Compare the two trees below, where the bottom nodes are individual languages and where X is a retention and Y an innovation. The fact that the first and second languages retain an inherited form in (15a) does not provide evidence that they should be subgrouped together; all that can be inferred is that the third language has innovated. However, in the case of (15b), the fact that both the second and third languages share an innovation (if it can be shown not to be a loan from one to the other) is evidence that they form a subgroup, and that the innovation can be reconstructed in an immediate ancestor:

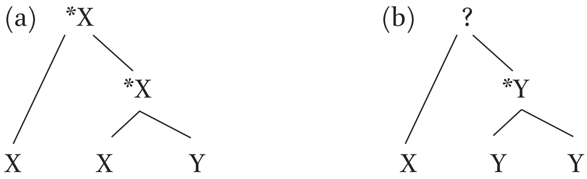
(15)


An example of this is given below, where the Proto-Hlai form for *pound rice* has been inherited in most languages, but where an innovation in the Run group was inherited by the daughter languages, Baisha and Yuanmen:

(16)

Gloss	*Proto-Hlai*	*Hlai language data*					
pound rice	*tçʰa:k	tsʰa:ʔ^{7}	tsʰe:ʔ^{7}	tsʰe:k^{7}	tsʰe:ʔ^{7}	tsʰe:ʔ^{7}	tsʰe:ʔ^{7}
		tsʰɛk^{2}	sɛʔ^{4}	tsʰe:ʔ^{7}	tsʰɯ:^{2}	pʰaw^{3}	pʰaw^{3}

It must occasionally be asked if a reconstructed form is truly descended from Proto-Hlai or is a more recent innovation. Internally, the best criteria to use in identifying the most likely Proto-Hlai form is that which is reconstructible using the most diverse branches of the tree. Take the examples below, where the subgrouping has been established, but the proto-form is unknown and must be reconstructed based on the evidence of the three languages represented by the terminal nodes of the tree:

(17)


In (17a), the second and third languages disagree, and the proto-form for this group would not be reconstructible based merely on the evidence found between these two languages. However, thanks to the fact that the first language agrees with the second, the third language can be shown to have innovated, and the proto-form is reconstructible at all levels. In (17b), on the other hand, the immediate ancestor of the second and third languages can be reconstructed, but since the first language disagrees with them, it is unclear which daughter, if either, has inherited the original form from the proto-language, which is not reconstructible based on this evidence (this is most often a problem at the highest level of the tree).

The only way that innovations can be identified in a situation like that shown in (17b) above is if there is external evidence available. This is fortunately the case for several Hlai lexical items, where cognates can be found in other branches of Kra-Dai (see chapter four). An example of this is given below:

(18)	*Gloss*	*Hlai language data*					
	house	rɯ:n^{1}	luŋ^{3}	ploŋ^{3}	ploŋ^{3}	poŋ^{3}	plɔŋ^{3}
		kɯn^{1}	pjaŋ^{3}	pɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}

In this case, the evidence at face value seems to strongly indicate that the Proto-Hlai form should be reconstructed as *m-loŋʔ, with innovations in Bouhin and Cunhua. However, there is evidence from both Proto-Tai *rwa:n and Proto-Be *ra:n *house* that the Bouhin form is the descendent of the original Hlai form. Since it is argued below that the initial split in Hlai is between Bouhin and the rest of the family (subsumed under a node called Greater Hlai), the Greater Hlai form can be shown to be an early innovation, which was then inherited regularly by all of the Greater Hlai daughter languages with a later additional innovation in Cunhua (although they have similar rimes, the initials of the Bouhin and Cunhua forms cannot be derived from a common ancestor).

There is one other confounding factor in this otherwise straightforward approach to subgrouping described above, and that is borrowing, which can occur in two different scenarios: (1) borrowing between two related languages, and (2) mutual borrowing from a third language. Borrowing can introduce a non-inherited lexical item into one or more languages, giving the false appearance of shared inheritance if there are no criteria by which to identify the borrowed words. The second scenario described above is generally not problematic in the case of the Hlai languages, as the third language which two (or more) Hlai languages may borrow from is nearly always Chinese (of one variety or another, all spoken on Hainan). Recent Chinese loanwords in the Hlai languages are normally readily identifiable due to the fact that they are easily traced to the source of origin, and the reflexes in the Hlai languages are generally irregular and occasionally contain phonotactic patterns not normally allowed in Hlai. An example is given below:

(19)	*Gloss*	*Hlai language data*					
	kick	tʰi:ʔ^{8}	(tʰam^{2})	tʰe:k^{8}	tʰe:ʔ^{7}	tʰi:ʔ^{9}	tʰek^{9}
		—	—	—	tʰe:k^{8}	tʰet^{7}	tiaʔ^{7}

Although all of the items above except for the Ha Em form appear to be related at first glance, there are a number of irregularities which allow the identification of these words as loans. The first is that tone 8 does not occur in Bouhin, Lauhut, or Moyfaw forms of native origin, nor does tone 9 normally occur in Zandui or Baoting forms. The Yuanmen initial fails to correspond to the initials of the other forms (it would also be aspirated), and while all of the rimes are permissible in the individual languages except for Baoting, they reflect a variety of earlier rimes including *i:k, *a:k and *it. Finally, these can be compared with Chinese 踢 (Mandarin *tʰi:*^{1}), to which the general shape of the Hlai items conform.

A more problematic situation arises in the case of borrowing between one Hlai language and another. Ideally, the two languages in question will have undergone different paths of change, so that a loan into the borrowing language will be conspicuous due to one or more irregular reflexes which can be shown to be regular in the donor language. Several examples of this are discussed below in section 1.5.3. It is more difficult when words occur in languages with regular correspondences, which gives the impression of common inheritance, as in the following example (prefixes are omitted here for the sake of exposition):

(20)	*Gloss*	*Proto-Hlai*	*Hlai language data*					
	a fly	*hwa:ŋʔ	va:ŋ^{3}	ve:ŋ^{3}	hwe:ŋ^{3}	ve:ŋ^{3}	nuaŋ^{4}tʰa:^{5}	ɲuaŋ^{1}
			zuj^{1}	veŋ^{3}	ve:ŋ^{3}	ve:ŋ^{3}	ɲuŋ^{1}tʰa:^{2}	ɲuŋ^{4}tʰa:^{5}

In this case, the Proto-Hlai form *hwa:ŋʔ has been inherited in the majority of Hlai languages. However, a form reconstructible as *C-ɲu:ŋ tʰa:ɦ (literally 'rice mosquito') occurs in Zandui, Baisha, and Yuanmen, and is an innovation (the bare form *mosquito* has been adopted in Baoting). Although it will be argued below that Baisha and Yuanmen indeed form a subgroup (Run), Zandui is actually part of the Qi subgroup with Tongzha and Baoting. A case such as the one above can serve to confuse an attempt at subgrouping, and must be explained as either a very early loan from Run into Zandui or an independent calque which may have come about through participation in a language area.

This kind of example is generally rare, and will not lead to a misanalysis as long as the criteria outlined below are adhered to.

1.6.1.1 Subgrouping: The Lexicon

When using the lexicon for subgrouping, the following two rules are stipulated:

(21) Criteria for lexical subgrouping
  (a) related languages share innovations not found in other languages
  (b) the sound correspondences between these innovated cognates are regular

The rationale for (21a) is that an innovation which occurs at some intermediate level should be inherited by all daughter languages and only those languages. The rationale for (21b) is that irregular sound correspondences are more likely to indicate a lateral contact relationship (where one language has borrowed from another) than one of vertical inheritance.

If both of these criteria are met, then the only remaining consideration is to what extent (21a) holds true. It is not enough to subgroup two languages together on the basis of a single lexical item which fulfills the requirements of (21) above; rather, confidence in the subgrouping increases in direct proportion to the amount of shared innovations which exist. One or two shared forms may be considered indicative of a subgroup, but twenty shared forms are more convincing. What is generally the case in the Hlai languages is that the greatest numbers of shared lexical innovations tend to be found at the lowest levels of the tree. Lexical innovations can still be identified at higher levels of the tree, but their frequency decreases and a greater reliance on sound change criteria is required.

1.6.1.2 Subgrouping: Sound Change

The general decision-making algorithm which has been used to decide between inherited sound changes and diffused sound changes has relied on a subjective assessment (backed up by typological data whenever possible) of which changes are likely to be rare, idiosyncratic, and less likely to diffuse, versus those which are more common and, once underway, will tend to apply wherever the relevant environment for such a change exists (in line with the argument in Blevins (2004) that the typological commonality of sound change correlates with its likelihood of independent occurrence). Data from the non-Hlai languages of Hainan have been informative in this regard, in that these languages have been receptive to certain sound changes (such as the shift from plain *p* and *t* to implosive *ɓ* and *ɗ* in Hainanese, Be, and Mien, followed by the shift from *s* to *t* documented in Shintani (1991)), but resistant to others, and therefore offer evidence as to the likelihood that some change can occur through diffusion versus being restricted to inheritance only.

Examples of sound changes which are considered less likely to diffuse across language boundaries include *vocalic transfer* (Benedict 1975) and *rhinoglottophilia* (Matisoff 1975). Vocalic transfer is a form of metathesis where the features of a high vowel preceding a stressed syllable are transferred to the initial of that stressed syllable, in the form of a coarticulation. Rhinoglottophilia is the reinterpretation of the percepts of a glottal consonant as nasalization, being realized as a nasal segment where there was none in the direct ancestor of the language in question. Both of these changes, while not lacking precedent (especially within Southeast Asia), occur rarely enough that multiple parallel innovations are improbable, and the languages which exhibit the change are therefore likely to have inherited it from a common ancestor.

Examples of changes which appear to diffuse readily include the shift from palato-alveolar affricates and fricatives to alveolar affricates and fricatives, and *registrogenesis*. The first change involves the shift of the palato-alveolar phonemes *tʃ^{h} and *tʃ (from earlier *ʈʂ^{h}, *tç^{h} and *tç) to the alveolar phonemes *ts^{h}* and *ts*. This change occurred in all of the Hlai languages irregardless of their relationship, and must therefore have been easily diffused. Registrogenesis is the development of high and low registers in correlation with the original voicing status (voiced or voiceless) of initial consonants. It only occurred in a subset of Hlai languages, but probably originated with Hainanese, and spread across contiguous languages, sometimes occurring in one language but failing to occur in another closely-related language. It would therefore be imprudent to suggest these changes as criteria for subgrouping, and they fail to obscure the picture if they are identified as areal changes which are easily diffused.

It has sometimes been the case that a rarer kind of change has preceded a more general type of change, thereby removing the environment for the latter change. An example of this can be seen in the reflexes of the Proto-Hlai initial *ʈʂ^{h}:

(22)	*Proto-Hlai*	*Hlai language data*					
	*ʈʂ^{h}	ts^{h}	ts^{h}	ts^{h}	ts^{h}	ts^{h}	ts^{h}
		h	h	ts^{h}	ts^{h}	ts^{h}	ts^{h}

While the common change from *ʈʂ^{h} to *ts^{h}* has occurred in most languages, a different and less-expected kind of change occurred in Cunhua and Nadouhua. The best explanation which can be offered for this is that a single change from *ʈʂ^{h} to *h* occurred in the direct ancestor of Cunhua and Nadouhua (Northwest Central Hlai), after which the change from *ʈʂ^{h} to *ts^{h}* diffused throughout the remaining subgroups and daughter languages at some later point.

Another example can be seen in the following reflexes of PHl *hlj:

(23)	*Proto-Hlai*	*Hlai language data*					
	*hlj	z	z	z	ɬ	ɬ	ɬ
		l	**z**	**z**	z	z	**ts**

Although there are two exceptions (Cunhua ***l*** and Yuanmen ***ts***), the majority of Hlai languages have undergone an identical change of *hlj to *z*. The Qi languages, on the other hand, all show the reflex *ɬ*. It is therefore assumed that *hlj changed to ɬ (via an intermediate stage of *ɮ) in Proto-Qi, while the change *hlj > *hj (and ultimately to *z*) subsequently diffused throughout the remaining languages with the exception of Cunhua and Yuanmen.

As with lexical innovations, one unique phonological innovation between two languages is indicative of common descent from a mutual ancestor, but a collection of shared innovations is quite convincing. The set of innovations which characterize each subgroup are given in the next section in support of the Hlai family tree proposed below.

1.6.2 *Subgrouping the Hlai Languages*

The subgrouping of Hlai languages adopted in this book largely overlaps but is non-identical with the traditional Chinese classification. One important change is the addition of a new language referred to here as *Changjiang*, following the tradition of associating a language with the area in which it is spoken. This language is closest to the one traditionally called *Meifu* (*Xifang* in Ouyang & Zheng 1983), a term which I have retained for the subgroup, referring to the individual language itself as *Moyfaw*[1] (the Hlai name from which Mandarin *Meifu* is derived). My Moyfaw-speaking consultants informed me that the Meifu group is generally more complex than has hitherto been implied in previous work, and that there may well be additional divisions within this group yet to be documented.

Another important difference is that I have included the northwestern languages Cunhua and Nadouhua in the Hlai family tree. The affiliation of these two languages has complex underpinnings, due to the fact that both languages are spoken by populations which are suspected to be of mixed Hlai-Chinese ancestry, and who currently consider themselves to be more ethnically aligned with the Chinese than the Hlai. Both Cunhua and Nadouhua have significant Chinese components of their vocabulary which are not found in the other Hlai languages, which supports the hypothesis of mixed ancestry and the intimate

1 The name *Moyfaw* is derived from PHl *C-mə:j Cuʈʂʰəw > PWCHl *ʔmɔ:j ɦʰəw 'below Chinese', or '(those) under the Chinese'.

language contact which would have accompanied it.[2] However, in both cases, the core of the vocabulary is undeniably Hlai, a fact which indicates to me that if they are to be classified, it should be with the other Hlai languages.

Finally, I have broken up the traditional Ha subgroup into individual constituents, as there is sufficient phonological evidence to indicate that Bouhin, Ha Em, and Lauhut should be considered independent groups which do not share common innovations with each other. In fact, there is good reason to believe that the first primary split in the Hlai family is between Bouhin and all other languages. Ostapirat (1993a) arrived at a similar conclusion, and separated Bouhin from the rest of the Ha group; he did not redo the classification as drastically as what is proposed here, and left it as a primary branch within what he called Southern Hlai, as opposed to a primary branch of Hlai proper. What actually seems to be the case is that the Hlai groups which were not in contact with other more recent (primarily Chinese) immigrants in the north-northeast contact zone on Hainan were grouped together under the cover-term *Ha*; the other traditional groups (Qi, Run, and Meifu) were in contact with non-Hlai immigrants, and thereby recognized individually.

The Hlai phylogenetic tree argued for in this book is given in (24), with alternative language names found in the literature (usually location names) given below the names used here (subgroup labels are explained below):

(24)

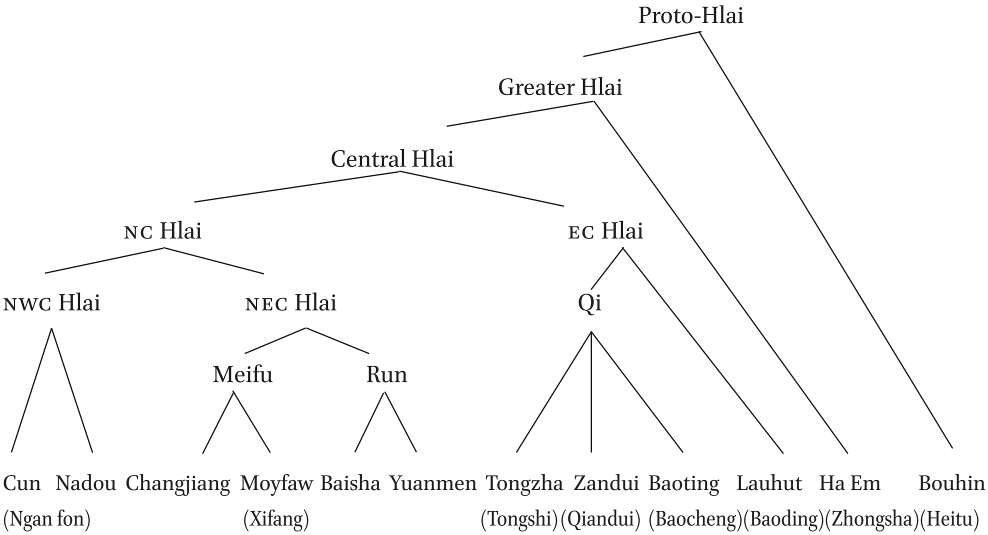


FIGURE 2 *Hlai Phylogenetic Tree*.

2 Ouyang (1998) includes an excellent discussion of this issue for Cunhua (in Mandarin).

The specific language locations are given in the map below, adapted from Edmondson & Solnit (1988). The only language not shown explicitly is Nadouhua, which is spoken close to the northwestern coast in Dongfang. The languages Bouhin and Ha Em are spoken in great swaths throughout the western and southern parts of the island, penetrating north as far as many of the North Central Hlai languages, which form enclaves within them. Lauhut and Tongzha also cover fairly large areas, and Jiamao, while generally spoken in the southeastern end of the island, has pockets of speakers further north.

(25)

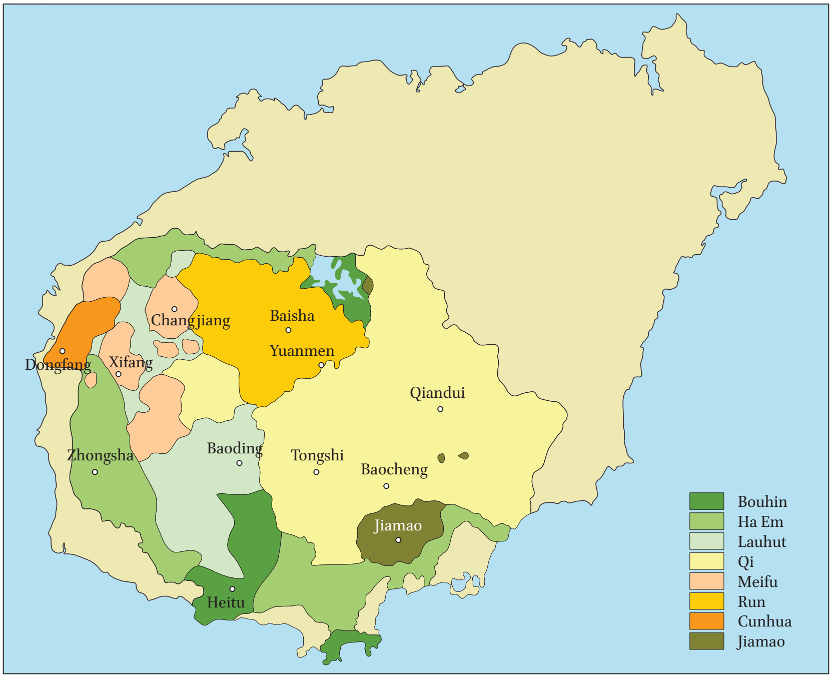


FIGURE 3 *Locations of the Hlai languages of Hainan.*

The hypothesis adopted here of the general pattern of population dispersal is the following. As the Proto-Hlai unity began to break up, the first division occurred between Bouhin and Greater Hlai. The Bouhin group was probably comparatively small and restricted to the center of the island, from where it eventually expanded to the north and south (there are no Bouhin-speaking communities on either the western or eastern peripheries of the island).

The next schism occurred between Ha Em and Central Hlai, the latter apparently also originating in the center of the Hlai speaking area, to the east of Bouhin. Evidence for this is primarily derived from the fact that Ha Em is spoken in a large swath around the periphery of the Hlai language area, primarily along the west coast and through the southeast. Interaction between Ha Em and Jiamao must have begun at this time, as Ha Em is the most likely donor of more recent Hlai lexical items into Jiamao and probably bordered it almost exclusively before the intrusion of the Qi group into that part of the island.

The Central Hlai group then broke into (roughly) northern and eastern groups, with the North Central Hlai group overtaking an area originally inhabited by Bouhin and Ha Em, and probably coming into contact relatively rapidly with non-Hlai Chinese immigrants to the north, leading to the genesis of Northwest Central Hlai (Cunhua and Nadouhua). Northeast Central Hlai eventually divided into the Meifu and Run groups.

The East Central Hlai group then bifurcated into Lauhut and Qi. Lauhut seems to have first expanded westward, and then to the north where it covered areas formerly occupied by North Central Hlai. The Qi languages eventually occupied a portion of the area which was once continuously occupied by Jiamao. It is difficult to subgroup the Qi group, as some evidence shows that Zandui groups with Tongzha, and other evidence shows that it groups with Baoting; for now, the Qi branch will be shown with a tripartite structure.

Finally, Meifu split into Changjiang (which became part of a linguistic area with Northwest Central Hlai), and Moyfaw (which aligned more closely with Run). The Run group itself divided into Baisha and Yuanmen, due at least partly to contact with Tongzha, with which Yuanmen shares several areal innovations (to be described below).

1.6.3 *Criteria for Subgrouping*

The key phonological distinctions used for subgrouping are given in this section, based on the criteria given above. Innovations used to distinguish between subgroups are shown here; differences in development between individual languages within the same subgroup will be dealt with later, as will sound changes that are the result of areal diffusion.

1.6.3.1 Bouhin vs Greater Hlai

There are a number of important differences between Bouhin (BH) and the rest of the Hlai languages, in the categories of both initials and rimes. The most important distinction between Bouhin and Greater Hlai (GHl) is found in the plain sonorants—more specifically, the nasals and liquids. It will be argued in the following chapter that all plain sonorants, with the exception of the approximants, were automatically preaspirated by the time of Proto-Hlai.

In Bouhin, the preaspirated sonorants either became deaspirated (in the case of the nasals) or hardened to an obstruent (in the case of the lateral). In Greater Hlai, on the other hand, the nasals all shifted to prenasalized stops (later becoming oral stops which finally devoiced) and the preaspirated lateral remained unchanged. In addition, PHl *hr merged in Bouhin with PHl *ɾ, while it shifted to a voiced velar fricative in Greater Hlai:

(26)	*PHl*	BH	*GHl*
	*hm	m	*mb
	*hn	n	*nd
	*hɲ	ɲ	*ɲɟ
	*hŋ	ŋ	*ŋg
	*hl	ɗ	*hl
	*hr	ɾ	*ɣ

In addition to this, there was a constraint which developed in Bouhin against fricatives; the hardening of the labial fricatives are a specifically Bouhin innovation:

(27)	*PHl*	BH	*GHl*
	*f^{h}	p^{h}	*f^{h}
	*C-w	p (< b < β)	*C-w

Bouhin also shows marked differences in the rimes. In the cases of high vowels followed by a glottal element, those in Greater Hlai underwent diphthongization; the same vowels remained pure in Bouhin, only undergoing a later and more recent diphthongization:

(28)	*PHl*	BH	*GHl*
	*iːɦ/ʔ	ej$^{B/C}$ (< iː$^{B/C}$)	*əj$^{B/C}$
	*ɯːɦ/ʔ	əɰ$^{B/C}$ (< ɯː$^{B/C}$)	*əɰ$^{B/C}$
	*uːɦ/ʔ	ow$^{B/C}$ (< uː$^{B/C}$)	*əw$^{B/C}$

In rimes with a schwa nucleus closed by stops, Bouhin underwent two innovative developments. In the short series of rimes, the nucleus was colored by the following stop (29a). This allowed the long series to shorten, and then undergo the vowel lowering which was the normal development for the short series in the other Hlai languages (29b):

(29)

	PHl	BH	GHl		PHl	BH	GHl
(a)	*əm	om	*əm	(b)	*ə:m	am	*ə:m
	*əp	op	*əp		*ə:p	ap	*ə:p
	*ən	en	*ən		*ə:n	an	*ə:n
	*ət	et	*ət		*ə:t	at	*ə:t
	*əŋ	oŋ	*əŋ		*ə:ŋ	aŋ	*ə:ŋ
	*ək	ok	*ək		*ə:k	ak	*ə:k

The final crucial distinction between Bouhin and Greater Hlai, where Bouhin has remained conservative, is in velar-closed rimes with long low nuclei. These remained unchanged in Bouhin, whereas they fronted in Greater Hlai:

(30)

PHl	BH	GHl
*a:ŋ	a:ŋ	*ɛ:ŋ
*a:k	a:ʔ	*ɛ:k

1.6.3.2 Bouhin and Ha Em vs Central Hlai

There are certain initials in PHl which actually represent the initial of a main syllable preceded by an original sesquisyllable. In general, the relationship between sesquisyllables and main syllables tended to be 'looser' in Bouhin and Ha Em, but became 'tighter' in Proto-Central Hlai. For example, there is a strong prohibition against liquid clusters in the Hlai languages. However, there is one exception, that being PHl *m-l. In Bouhin and Ha Em, the initial consonant denasalized, and then debuccalized after devoicing, merging with the reflexes of PHl *C-l. In Central Hlai, on the other hand, the two consonants merged into a cluster (31a).

Another example is a class of main syllable initials which were preceded by high vowels at the stage of Proto-Hlai. These high vowels were merely dropped in Bouhin and Ha Em along with the presyllable initial; however, in Central Hlai, a form of metathesis called *vocalic transfer* occurred in which the preceding high vowel became realized as a secondary articulation on the main consonant, prior to the deletion of the presyllable itself (31b). This metathesis, as an innovation, is the most important diagnostic feature of the Central Hlai group:

(31)

	PHl	BH	HE	CHl
(a)	*m-l	l	l	*mbl
(b)	*Cuʈʂʰ	tsʰ	tsʰ	*Cuʈʂʰw
	*Cuŋ	ŋ	ŋ	*Cuŋw

*Cuɾ	ɾ	ɾ	*Cuɾw
*Cuhr	ɾ	g	*Cuɣw
*Ciɦ	h	h	*Ciɦj
*Cuɦ	h	h	*Cuɦw
*Ciʔ	ʔ	ʔ	*Ciʔj
*Cuʔ	ʔ	ʔ	*Cuʔw

1.6.3.3 East Central Hlai vs North Central Hlai

There are three main criteria which distinguish East Central Hlai (ECHl) from North Central Hlai (NCHl). One of the most important of these is the distinct developments of PHl *Ciɦ and *Cuɦ, which were preserved in ECHl but were reinterpreted as preglottalized nasals in NCHl (via *rhinoglottophilia*):

(32)	*PHl*	*CHl*	*ECHl*	*NCHl*
	*Ciɦ	*Ciɦj	*Ciɦj	*ʔɲ
	*Cuɦ	*Cuɦw	*Cuɦw	*ʔŋw

Next, a chain shift occurred in NCHl involving rimes with high vowels, where rimes with short high vowels were lowered to mid vowels (33a), and those with long high vowels were shortened (33b); both categories were preserved in ECHl:

(33)	*PHl*	*CHl*	*ECHl*	*NCHl*
(a)	*iC	*iC	*iC	*eC
	*ɯC	*ɯC	*ɯC	*ɤC
	*uC	*uC	*uC	*oC
(b)	*i:C	*i:C	*i:C	*iC
	*ɯ:C	*ɯ:C	*ɯ:C	*ɯC
	*u:C	*u:C	*u:C	*uC

Finally, in *oC rimes with velar codas, the nucleus was lowered in NCHl but preserved in ECHl:

(34)	*PHl*	*CHl*	*ECHl*	*NCHl*
	*oŋ	*oŋ	*oŋ	*ɔŋ
	*ok	*ok	*ok	*ɔk

1.6.3.4 Lauhut vs Qi

One key difference between the Lauhut and Qi subgroups is that the Qi languages all underwent registrogenesis (discussed more thoroughly in chapter two), which never occurred in Lauhut. Since registrogenesis most likely occurred fairly late in the history of the Hlai languages, however, it should not be relied on as a subgrouping criterion.

In the initials, there are four main differences between Lauhut and Qi, all involving coarticulations. First, the affricate *ʈʂʰw became *f* in Lauhut but was reduced merely to *ʈʂʰ in the Qi languages. In the case of *hlj, Lauhut simplified this to the glide *hj (then becoming *z*), while in Qi it became a voiced lateral fricative *ɮ. PHl *[ɾ/hr]j and *Cuɾ became *ɾ and *Cuɾw respectively in ECHl, and underwent subsequent fortition in Qi to *d and *v, whereas the former remained *r* and the latter simplified to *w* in Lauhut.

(35)

PHl	*ECHl*	*LH*	*Qi*
*Cuʈʂʰ	*ʈʂʰw	f	*ʈʂʰ
*hlj	*hlj	z (< *hj)	*ɮ
*[ɾ/hr]j	*ɾ	r	*d
*Cuɾ	*Cuɾw	v (< *w)	*v

The nucleus of the PHl rime *ə:j backed and rounded in Lauhut, but lowered in Qi.

(36)

PHl	*ECHl*	*LH*	*Qi*
*ə:j	*ə:j	o:j	*a:j

Final palatal stops in Qi depalatalized (as they did in Bouhin and Ha Em), but were preserved in Lauhut.

(37)

PHl	*ECHl*	*LH*	*Qi*
*u:ɲ	*u:ɲ	u:ɲ	*u:n
*u:c	*u:c	u:c	*u:t
*uɲ	*uɲ	uɲ	*un
*uc	*uc	uc	*ut
*əɲ	*əɲ	aɲ	*an
*əc	*əc	ac	*at
*a:ɲ	*a:ɲ	a:ɲ	*a:n
*a:c	*a:c	a:c	*a:t

Finally, rimes with long front high nuclei closed by velars diphthongized in Qi, but remained pure in Lauhut:

(38)

PHl	*ECHl*	*LH*	*Qi*
*i:ŋ	*i:ŋ	i:ŋ	*iəŋ
*i:k	*i:k	i:k	*iək

1.6.3.5 Northwest Central Hlai versus Northeast Cenral Hlai

There are three criteria which allow the subgrouping of North Central Hlai into Northwest Central Hlai (NWCHl) and Northeast Central Hlai (NECHl). The first is the divergent development of PHl *ʈʂʰ, which remained an affricate in NECHl, but deaffricated to *hr (> *h) in NWCHl (a reinterpretation which occurred also in Proto-Be as well as several Tai subgroups) (39a). While PHl *sʰ remained alveolar in NECHl, it interdentalized to *θ in NWCHl (39b). Finally, NWCHl is the only subgroup to preserve evidence of PHl *hŋw, where it became *ɣw, as opposed to other languages in which it merged with PHl *hw (39c):

(39)		*PHl*	*NCHl*	*NECHl*	*NWCHl*
	(a)	*ʈʂʰ	*ʈʂʰ	*ʈʂʰ	*hr
	(b)	*sʰ	*sʰ	*sʰ	*θ
	(c)	*hŋw	*hŋw	*hw	*ɣw

The one distinction in rimes between the two branches is in PHl *iŋ, the coda of which alveolarized in NECHl, but remained velar in NWCHl:

(40)	*PHl*	*NCHl*	*NWCHl*	*NECHl*
	*iŋ	*eŋ	*eŋ	*en

1.6.3.6 Meifu vs Run

There are five different developments supporting the distinction between Meifu and Run in the initials. The first is PH *sʰ, which deaspirated to *s in Meifu but affricated to *tsʰ Run. The PHl palatalized coronals *hlj and *hrj also developed differently. The first simplified to *hj in Meifu but remained unchanged in Run. The latter hardened to *dʝ in NECHl; it depalatalized in Meifu but remained palatalized in Run. Finally, NECHl *C-w and *Cuɾw both simplified to *ʔw in Meifu, but became labiodental and bilabial fricatives in Run:

(41)	*PHl*	*NECHl*	*Meifu*	*Run*
	*sʰ	*sʰ	*s	*tsʰ
	*hlj	*hlj	*hj	*hlj
	*hrj	*dʝ	*d	*dʝ
	*Cuɾ	*Cuɾw	*ʔw	*v
	*C-w	*C-w	*ʔw	*β

There are several rimes which underwent diphthongization in Run but which retained long pure nuclei in Meifu (42a). In addition, PHl *ə:k underwent the same changes as other *ə:C rimes in Meifu, but shortened idiosyncratically in Run (42b):

		PHl	*NECHl*	*Meifu*	*Run*
(42)					
	(a)	*ə:m	*ɔ:m	*o:m	*uam
		*ə:p	*ɔ:p	*o:p	*uap
		*ə:ŋ	*ɔ:ŋ	*o:ŋ	*uaŋ
		*a:ŋ	*ɛ:ŋ	*e:ŋ	*iaŋ
	(b)	*ə:k	*ɔ:k	*o:k	*ɔʔ (< *uak)

1.6.4 *Summary*

In summary, there are a large number of sound changes (both initials and rimes) which separate Bouhin from the rest of the Hlai languages (Greater Hlai), and provide evidence that this is the first-order split in the Hlai family tree. The next split is between Ha Em and the rest of Hlai (Central Hlai), the principal criteria for which is the vocalic transfer which occurred in the latter. Central Hlai can be divided between North Central Hlai, in which rhinoglottophilia led to the merger of *Ciɦj and *Cuɦw with *C-ɲ and *C-ŋw, and where the length difference in the high vowel rimes was replaced by a height difference, and East Central Hlai, in which neither of these changes occurred.

Within East Central Hlai, a number of sound changes distinguish Lauhut and Qi in both initials and rimes. The three Qi languages are not subgrouped here, due to the difficulty in separating inherited from diffused sound changes. There is a salient split in North Central Hlai between Northwest Central Hlai and Northeast Central Hlai, the former being distinguished primarily by the unique developments of PHl $*ʈʂ^h$, $*s^h$, and *hŋw, but also by a handful of other changes. Finally, Meifu and Run are distinguished by developments primarily in the coronal liquids and the non-high rimes with grave codas.

No tonal information has been used in subgrouping. This is because, despite the existence of three distinct tonogenetic groups of languages (see chapter three), it appears to be the case that the tone system of a language developed largely in accordance with the linguistic area in which it participated, possibly long after the original breakup of Proto-Hlai. This assertion is in fact very plausible, in view of the degree to which it appears tonogenesis diffused throughout a large part of Southeast Asia, often cross-cutting language (and family) boundaries (see Enfield (2005) for an overview on diffusion in Southeast Asia).

1.7 Linguistic Area and Contact Relationships

This section is devoted to providing evidence for contact between various Hlai subgroups. This contact is most often betrayed through irregular reflexes which exist in lexical items in one language, which can be plausibly attributed to borrowing from a neighboring language in which the development was regular.

1.7.1 *Bouhin and Ha Em*

There is evidence for a period of contact, probably longstanding, between Bouhin and Ha Em beginning sometime after the subsequent changes which occurred in both after the initial breakup of PHl into Bouhin and Greater Hlai.[3] The direction of influence has largely been from Ha Em to Bouhin, which is evident through a number of items in Bouhin which show irregular correspondences in initials and/or rimes and/or tones, but which have exact matches in Ha Em.

1.7.1.1 Ha Em to Bouhin

At some point in the individual development of Bouhin, there was a change from PHl *f^{h} to aspirated *p^{h}*, and with one exception, all Bouhin words with this reflex appear to be otherwise regular. After this change, there were apparently a number of words borrowed from Ha Em beginning with *f*, which still obey the constraint against fricatives, but lack aspiration:

	Gloss	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
(43)	hold in mouth	*f^{h}ə:m	fo:m^{1}	po:m^{1}	p^{h}am^{1}
	side	*f^{h}a:ŋ	fe:ŋ^{1}	pe:ŋ^{1}	p^{h}a:ŋ^{1}
	shoulder pole	*f^{h}i:k	fi:ʔ^{7}	pi:ʔ^{9}	p^{h}i:ʔ^{7}

In (44), there is an unexpected reflex *f*, which otherwise only appears in Bouhin in Chinese loanwords. The fact that these initials did not undergo the shift to *p* in Bouhin could indicate that they have come into the language quite recently:

3 This was underscored by one of my two Bouhin consultants, whose father spoke Bouhin but whose mother spoke Ha Em, indicating that these two groups of speakers remain in close contact which includes intermarriage, at least in some areas.

(44)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	k.o. reed	*fʰa:w	fa:w^{1}	fa:w^{1}	pʰa:w^{1}
	vicious	*fʰən	fan^{1}	fan^{1}	pʰen^{1}

The examples in (45) are of a variety of PHl preaspirated nasal initials, all of which are normally reflected in Bouhin by plain nasals, but which instead begin with plain stops, the normal reflex in Ha Em (and all other Hlai languages):

(45)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	stupid	*hmə:j	po:j^{1}	po:j^{1}	ma:j^{1}
	widow(er)	*hmə:jʔ	po:j^{3}	po:j^{3}	ma:j^{3}
	tadpole	*hnu:ɦ	tow^{2}	tow^{2}	now^{2}
	pocket	*hni:ɦ	taj^{2}	taj^{2}	nej^{2}
	chop	*hnək	tak^{7}	tak^{7}	nok^{7}
	carp	*hɲa:t	tsa:t^{7}	tsa:t^{7}	ɲa:t^{7}

The following examples show cases where PHl *hl is reflected by *t* instead of the expected *ɗ*; in these cases, I suggest that Bouhin, lacking the phoneme *ɬ*, substituted an *s* for Ha Em *ɬ*, which then underwent the regular Bouhin shift to *t*:

(46)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	hear it said	*hli:ŋ	ɬi:ŋ^{1}	ti:ŋ^{1} (< si:ŋ^{1})	ɗi:ŋ^{1}
	epidemic	*hlu:nʔ	ɬu:n^{3}	tu:n^{3} (< su:n^{3})	ɗu:n^{3}
	armspan	*hla:nɦ	ɬa:n^{2}	ta:n^{2} (< sa:n^{2})	ɗa:n^{2}

Finally, the examples below are Bouhin forms which have *g* as the reflex of PHl rhotics, instead of the expected *r*; there are several words in this category, and the examples below have been chosen because they have irregular rimes in Bouhin as well, reinforcing their identification as loans:

(47)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	pile up	*hrə:p	go:p^{7}	go:p^{7}	rap^{7}
	cool (water)	*hrən	gan^{1}	gan^{1}	ren^{1}
	not	*Cuhri:ɦ	gaj^{2}	gaj^{2}	rej^{2}

There is one example where the Bouhin form indicates borrowing from Ha Em in the PHl rime category *ok:

	Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
(48)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	drip (cntr)	*kʰok	kʰuk^7	kʰuk^7	kʰok^7

There are a number of examples where PHl *ə:C has a reflex in Bouhin regular for Ha Em, but not for Bouhin itself:

	Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
(49)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	bee	*kə:j	ko:j^1	ko:j^1	ka:j^1
	hold in mouth	*fʰə:m	fo:m^1	po:m^1	pʰam^1
	love	*ʔə:p	ʔo:p^7	ʔo:p^7	ʔap^7
	sleep	*tçə:n	tso:n^1	tso:n^1	tsan^1
	(tie) tight	*fʰə:t	fo:t^7	pʰo:t^7	pʰat^7
	pickle	*C-mə:ŋ	mo:ŋ^1	mo:ŋ^1	maŋ^1
	heart	*Cuɦə:k	ho:ʔ^7	ho:ʔ^7	hak^7

There are also several examples of PHl *a:K, in which Bouhin would be expected to preserve the low vowel but shows a mid front vowel, of which two are given below:

	Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
(50)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	shrimp	*Cuɾa:ŋ	re:ŋ^1	re:ŋ^1	ra:ŋ^1
	phlegm	*ɦa:k	he:ʔ^7	he:ʔ^9	ha:ʔ^7

Finally, there are a number of examples of PHl *əC appearing with unexpected reflexes in Bouhin; the vowels of these rimes were normally colored by the place of the Bouhin coda, but regularly lowered to *aC in Ha Em:

	Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
(51)	*Gloss*	*PHl*	*Ha Em*	*Bouhin*	*Expected Bouhin*
	empty	*Cuɾi:ɦ	raj^2	raj^2	rej^2
	crocodile	*ki:ʔ	kaj^3	kaj^3	kej^3
	village	*ɓu:ʔ	ɓaw^3	ɓaw^3	ɓow^3
	plant seedlings	*ɗəp	ɗap^7	ɗap^7	ɗop^7
	curse	*tʰən	tʰan^1	tʰan^1	tʰen^1
	midge	*C-mət	mat^7	mat^7	met^7
	moan	*kəŋ	kaŋ^1	kaŋ^1	koŋ^1
	stick to	*pʰək	pʰak^7	pʰak^7	pʰok^7

1.7.1.2 Bouhin to Ha Em

There is a limited set of examples which show Bouhin influence on Ha Em, all being irregular intitials. It is probably significant that three of these six examples are female kinship terms, indicating a longstanding practice of intermarriage:

(52)	*Gloss*	*PHl*	*Bouhin*	*Ha Em*	*Expected Ha Em*
	mother	*hmi:ʔ	mej^{3}	mej^{3}	paj^{3}
	mat. grdmother	*hna:ʔ	na:^{3}	na:^{3}	ta:^{3}
	aunt	*hɲi:n	ɲi:n^{1}	ɲi:n^{1}	ki:n^{1}
	to fall	*hla:ɦ	ɗa:^{2}	ɗa:^{2}	ɬa:^{2}
	bat (animal)	*Cuhrɯ:k	rɯ:k^{7}	rɯ:k^{7}	gɯ:k^{7}
	to plant	*Cuhra:	ra:^{1}	ra:^{1}	ga:^{1}

1.7.2 *Bouhin/Ha Em/Jiamao*

There are three examples shared only between Bouhin, Ha Em, and Jiamao; the Bouhin rimes in all three examples are irregular, which indicates that Jiamao was the likely donor first into Ha Em and then indirectly from Ha Em into Bouhin:

(53)	*Gloss*	*PHl*	*Jiamao*	*Ha Em*	*Bouhin*
	exchange	*m-ləj	ɓɔ:k^{7}	ɓo:ʔ^{7}	ɓo:ʔ^{7}
	well (n.)	*tç^{h}u:ŋʔ	t^{h}ɔŋ^{5}	t^{h}uŋ^{2}	t^{h}uŋ^{2}
	to be	*C-mən	tsaŋ^{1}	tsaŋ^{3}	tsaŋ^{3}

1.7.3 *Jiamao and Baoting*

There is more recent evidence of intimate contact between Jiamao and Baoting, which is evident through occasional forms in Baoting with irregular correspondences, but which have a parallel in Jiamao.[4]

(54)	*Gloss*	*PHl*	*Jiamao*	*Baoting*	*Expected Baoting*
	roll around	*m-li:n	lin^{1}	li:n^{1}	pli:n^{1}
	non-gtns. rice	*tçi:mʔ	tsiam^{1}	tsiam^{1}	tsi:m^{3}
	dirty	*s^{h}i:k	ts^{h}iak^{7}	tiak^{9}	tiak^{7}
	silence	*ʔik	ʔi:k^{9}	ʔi:k^{7}	ʔik^{7}
	pimple	*Cuɾɯp	lup^{8}	lup^{8}	lɯp^{8}
	grandfather	*p^{h}u:ʔ	pə:w^{4}	p^{h}ə:w^{6}	p^{h}aw^{3}
	extinguish	*tçəp	tsep^{7}	tsep^{7}	tsap^{7}
	cloth	*ɗəp	təp^{7}	ɗəp^{7}	ɗap^{7}
	alcohol	*C-ɲa:wʔ	ɲə:w^{2}	ɲə:w^{5}	ɲa:w^{3}
	goose	*C-ɲa:nɦ	ɲə:n^{5}	ɲə:n^{5}	ɲa:n^{5}

4 This connection was again underscored by work with one of my two Baoting consultants, whose father spoke Baoting but whose mother spoke Jiamao.

1.7.4 *The Qi Branch*

There has been a certain amount of contact between the languages of the Qi branch. There seems to have been bidirectional influence between Tongzha and Zandui, and more unidirectional influence of Tongzha on Baoting. There do not seem to have been any obvious loans between Zandui and Baoting. The first set of examples in (55) are probable loanwords from Zandui into Tongzha:

(55)	*Gloss*	*PHl*	*Zandui*	*Tongzha*	*Expected Tongzha*
	flood	*ʋəc	vat^{8}	vat^{8}	fat^{8}
	knock	*ɓu:ŋʔ	ɓuaŋ^{3}	ɓuaŋ^{3}	ɓu:ŋ^{3}
	distribute	*ku:ɦ	ko:^{5}	kow^{5}	kaw^{5}
	collapse	*tʰu:ɦ	tʰo:^{5}	tʰow^{5}	tʰaw^{5}

The examples below, on the other hand, show loans from Tongzha into Zandui. The difference between the *k* of Zandui *scratch* (in high register) is unexpected, as it does not show a specific correspondence to the Tongzha initial:

(56)	*Gloss*	*PHl*	*Tongzha*	*Zandui*	*Expected Zandui*
	kiss	*ɾju:c	tu:t^{8}	tu:t^{8}	tʰu:t^{8}
	scratch	*hrɯnɦ	gɯn^{2}	kɯn^{5}	hɯn^{2}
	aim at	*hrəɲ	gan^{4}	gan^{4}	han^{4}
	cricket	*Cuɾu:ŋʔ	fu:ŋ^{6}	fu:ŋ^{6}	fuaŋ^{6}
	spider	*kʰu:ŋ	kʰu:ŋ^{1}	kʰu:ŋ^{1}	kʰuaŋ^{1}
	mix	*ɾəp	rop^{8}	lop^{9}	lap^{8}
	plant (seedlings)	*ɗəp	ɗop^{7}	ɗop^{7}	ɗap^{7}

The following are examples of loans from Tongzha into Baoting:

(57)	*Gloss*	*PHl*	*Tongzha*	*Baoting*	*Expected Baoting*
	slap	*pʰi:k	pʰiaʔ^{7}	pʰiaʔ^{7}	pʰiak^{7}
	toe	*sʰit	tet^{7}	tet^{7}	tit^{7}
	duck	*ɓit	ɓet^{7}	ɓet^{7}	ɓit^{7}
	mushroom	*ɗit	ɗet^{7}	ɗet^{7}	ɗit^{7}
	peel	*kʰuɲ	kʰun^{1}	kʰun^{1}	kʰɯn^{1}
	woman	*kʰəwʔ	kʰo:^{5}	kʰo:^{5}	kʰɔ:^{5}

Finally, there is one example of a Jiamao loan into Zandui:

(58)	*Gloss*	*PHl*	*Jiamao*	*Zandui*	*Expected Zandui*
	steel	Cuɦa:c	huaʔ^{7}	huaʔ^{7}	va:t^{7}

1.7.5 *Lauhut and Moyfaw*

There are several lines of evidence which support a contact zone shared by Lauhut and the Meifu group. The first of these is the pattern of tone contour development, which in this case also included Ha Em:

(59)	*Tone Category*	*Ha Em*	*Lauhut*	*Moyfaw*	*Changjiang*
	A	53	53	53	53
	B	55	55	55	44
	C	11	11	24	22
	D	55	55	55	15ʔ

The Ha Em and Lauhut tonal developments are identical, indicating a high degree of synchronization in the mechanisms which led to their genesis. It can be seen that Moyfaw is nearly identical, the only exception being in category C. Changjiang is less similar, with identical developments in category A and perhaps B, but differences in C and D. One explanation for this pattern is that the categories which show different contour tone patterns had already developed these before contact intensified; those which are the same, or nearly so, may have developed later and in tandem. This will be discussed more in chapter 3.

There are also several examples of unexpected reflexes in Moyfaw which can be explained as borrowings from Lauhut. The following are examples of initials which are unexpected in the former, but which have parallels in the latter:

(60)	*Gloss*	*PHl*	*Lauhut*	*Moyfaw*	*Expected Moyfaw*
	arrow	*s^{h}i:p	ti:p^7	tip^7	sip^7
	leopard	*Cuɦu:jʔ	hu:j^3	huj^3	ŋuj^3
	clear	*hra:w	ga:w^1	ɣa:w^1	xa:w^1
	calf	*hrjinʔ	reɲ^3	ren^3	ten^3
	cast (sand)	*Cuhruj	vuj^1	vuj^1	ɣuj^1

In addition to the above, the following examples can be added which show unexpected reflexes of rimes:

(61)	*Gloss*	*PHl*	*Lauhut*	*Moyfaw*	*Expected Moyfaw*
	unhusked rice	*C-mi:nʔ	mi:n^3	min^3	miŋ^3
	connect	*tç^{h}u:nʔ	ts^{h}u:n^3	ts^{h}un^3	ts^{h}uŋ^3
	tumor	*f^{h}ə:n	fo:n^1	fon^1	fo:ŋ^1
	just now	*ʔənʔ	ʔan^3	ʔan^3	ʔaŋ^3
	coffin	*koŋɦ	koŋ^2	koŋ^2	kɔŋ^2
	flea	*hmə:t	po:t^7	po:t^9	po:k^7

eat greedily	*ɓət	ɓat⁷	ɓat⁷	ɓak⁷
to ladle	*ɗok	ɗok⁷	ɗok⁷	ɗɔk⁷
spade	*tçʰa:c	tsʰa:c⁷	tsʰa:t⁷	tsʰo:t⁷
vomit	*fʱa:k	fe:k⁷	fek⁷	fɯ:²

1.7.6 *Moyfaw and Baisha*

Baisha has been described with a tone system with two correspondences in the A, B, and D categories, although it has never been clear what the basis of this distinction was (Matisoff 1988: 290), since it didn't seem to indicate a register split as is the case in most other languages with two tones per category. This 'tone split' in Baisha can, actually, be shown to be a result as evidence for loans from Moyfaw. Since Moyfaw and Baisha developed in very similar ways, evidence in itself for close contact between the two, it is difficult in most cases to detect loans based on unexpected segmental reflexes. However, the tone systems of each developed in a rather different manner, and it is this part of the phonology which betrays the loans. Compare the tone systems of the two languages:[5]

(62)	*Tone Category*	*Baisha 1*	*Baisha 2*	*Moyfaw*
	A	11 (1)	51 (4)	53 (1)
	B	31 (2)	55 (5)	55 (2)
	C	33 (3)	—	24 (3)
	D	11 (8)	55 (7)	55 (7)

It can be seen that of the two Baisha tones per category, there is one in every instance except category C which corresponds in shape to its Moyfaw equivalent and one which does not. If the present hypothesis of borrowing is correct, then a number of words were loaned from Moyfaw into Baisha (note the high incidence of kinship terms below) in all categories, with the only caveat that in category C, a tone (i.e. a pitch contour) had either not developed yet, or otherwise there was sufficient perceptual similarity for the Moyfaw tone to be assimilated as the native Baisha tone:

5 The parenthesized numbers in the table below indicate the numbers given to each tone in Ouyang & Zheng (1983), and which have been adopted in most subsequent citation of Hlai data. For example, the Baisha word for *stone* is listed as *tsʰiŋ⁴*, which means that its actual tone value is a falling tone: *tsʰiŋ⁵¹*.

(63)

	Gloss	*PHl*	*Moyfaw*	*Baisha*	*Expected Baisha*
(a)	stone	*tçʰi:n	tsʰiŋ^{1}	tsʰiŋ^{4}	tsʰiŋ^{1}
	o. bros wife	*tçu:	tsow^{1}	tsow^{4}	tsow^{1}
	aunt	*hmi:	pej^{1}	pej^{4}	pej^{1}
	aunt	*hɲi:n	kiŋ^{1}	kiŋ^{4}	kiŋ^{1}
(b)	woman	*kʰəwɦ	kʰo:^{2}	kʰo:^{5}	kʰo:^{2}
	finger	*hlji:ŋɦ	ziŋ^{2}	ziŋ^{5}	ziŋ^{2}
	shoulder	*ʋa:ɦ	va:^{2}	va:^{5}	va:^{2}
	branch (tree)	*C-ŋa:mɦ	ŋa:m^{2}	ŋa:m^{5}	ŋa:m^{2}
(c)	pat. grt grndpa	*pʰut	pʰok^{7}	pʰok^{7}	pʰok^{8}
	late	*tçʰəp	tsʰap^{7}	tsʰap^{7}	tsʰap^{8}
	nose	*kʰət	kʰak^{7}	kʰak^{7}	kʰak^{8}
	ten	*ɦʰu:t	fut^{7}	fut^{7}	fut^{8}

One probable loan from Baisha to Moyfaw is the word *snore*:

(64)

Gloss	*PHl*	*Baisha*	*Moyfaw*	*Expected Moyfaw*
snore	Cuɾa:n	fa:ŋ^{1}	fa:ŋ^{1}	ɣa:ŋ^{1}

1.7.7 *Baisha and Yuanmen*

There is also tonal evidence for loans from Baisha into Yuanmen. First, compare the tone values of the two languages:

(65)

Tone Category	*Baisha*	*Yuanmen (High)*	*Yuanmen (Low)*
A	11 (1)	42 (1)	11 (4)
B	31 (2)	51 (5)	131 (2)
C	33 (3)	44 (3)	13 (6)
D	11 (8)	55 (7)	13 (8)

It can be observed that Baisha tones A and B are closest in value to the Yuanmen tones of the same category in low register. Conversely, Baisha tone C is closest to Yuanmen tone C in high register, and Baisha tone D may, based on its low pitch level, be borrowed as the same tone in Yuanmen in low register. In fact, in the majority of cases in which the unexpected register occurs in Yuanmen, it has a parallel in Baisha with an identical or similar tone:

(66)

	Gloss	*PHl*	*Baisha*	*Yuanmen*	*Expected Yuanmen*
(a)	gecko	*Cuʔa:w	va:w^{1}	va:w^{4}	va:w^{1}

(b)	pull tight	*kuŋɦ	kəŋ^{2}	kəŋ^{2}	kəŋ^{5}
	turtle	*tʰu:ɦ	tʰaw^{2}	tʰow^{2}	tʰaw^{5}
	energy	*kʰu:ɦ	kʰaw^{2}	kʰaw^{2}	kʰaw^{5}
	rice	*tʰa:ɦ	tʰa:^{2}	tʰa:^{2}	tʰa:^{5}

(c)	complete	*C-mu:ŋʔ	muŋ^{3}	muŋ^{3}	muŋ^{6}
	armpit	*C-ŋi:ʔ	ŋaj^{3}	ŋaj^{3}	ŋaj^{6}
	to brave (water)	*hnuɲʔ	ton^{3}	tən^{3}	tən^{6}
	stretch	*hja:ʔ	za:^{3}	za:^{3}	za:^{6}

	Gloss	*PHl*	*Baisha*	*Yuanmen*	*Expected Yuanmen*
(d)	have	*ɗə:k	ɗɔʔ^{8}	ɗɔʔ^{8}	ɗɔʔ^{7}
	lash (a child)	*fʰi:t	fit^{8}	fit^{8}	fit^{7}
	throw	*sʰə:p	tsʰuap^{8}	tsʰuap^{8}	tsʰuap^{7}
	bird	*sʰəc	tsʰat^{8}	tsʰat^{8}	tsʰat^{7}

1.7.8 *Run and Qi*

There seems to have been, at some point after the split in NWCHl between Meifu and Run, a certain degree of contact between the Run and Qi branches. This can be seen most clearly in the development of original complex initials (although there is some similarity with Meifu in the development of PHl *ɾj). Meifu has been included below for comparison to highlight the similarities between Run and Qi:

(67)	*PHl*	*Meifu*	*Run*	*Qi*
	*fʰj	*ç	*f	*f
	*ɾj	*d	*d	*d
	*Cuɾ	*ʔw	*v	*v

There seems to be an especially intimate connection between Yuanmen and Tongzha, and it may be that interaction between Run and Qi (or even Tongzha specifically) is what led to the split between Baisha and Yuanmen within Run. Compare first the development of PHl *hlj:

(68)	*PHl*	*Baisha*	*Yuanmen*	*Qi*
	*hlj	*j	*dʝ	*ɮ

Moreover, the development of tones as well as the occurrence of registrogenesis in Yuanmen seems to have been directly related to Tongzha:

(69)	*Tone category*		*Baisha*	*Yuanmen*	*Tongzha*
	A	Hi	11	42	33
		Lo		11	11
	B	Hi	31	51	51
		Lo		131	121
	C	Hi	33	44	55
		Lo		13	14
	D	Hi	11	55	55
		Lo		13	13

1.7.9 *Nadouhua*

In the case of Nadouhua, there have been loanwords borrowed from at least two sources. One has been Meifu—whether Changjiang or Moyfaw is more difficult to determine precisely, although other evidence indicates that Changjiang forms part of a speech area with Nadouhua, making it the more likely candidate. The following are examples, where Nadouhua exhibits unexpected initials that are similar to those in Meifu (reconstructed via the comparison of Changjiang and Moyfaw):

(70)	*Gloss*	*PHl*	*Meifu*	*Nadouhua*	*Expected Nadouhua*
	flower	*ʈʂʰ[ɛ]:ŋ	*tsʰe:ŋ^{1}	feŋ^{1} (< seŋ^{1})	heŋ^{1}
	pus	*Cuhriw	*ʔwiw^{3}	ʔiw^{3}	ŋiw^{3}
	know	*Cuhrɯ:	*ʔwəɰ^{1}	ʔwɛʔ^{4}	ŋɛʔ^{4}

Nadouhua has apparently also borrowed from Cunhua. The following examples show words with original PHl *hr, which have apparently been borrowed from Cunhua when *ɣ (< *hr) had already become *ɦ, and Nadouhua (which did not have *ɦ* in its inventory) inserted an epenthetic glide which was linked to the features of the following vowel:

(71)	*Gloss*	*PHl*	*Cunhua*	*Nadouhua*	*Expected Nadouhua*
	sell	*hri:wʔ	hiw^{4}	zi:^{3}	ŋi:^{3}
	spicy	*hrit	het^{4}	zeʔ^{5}	ŋeʔ^{4}
	fat	*hru:jʔ	huj^{4}	vuj^{3}	ŋuj^{3}

To illustrate, the following scenario is hypothesized to have occurred:

(72)	*Gloss*	*Pre-Cunhua*		*Pre-Nadouhua*		*Nadouhua*
	sell	*ɦi:wʔ	>	*ji:wʔ	>	zi:³
	fat	*ɦu:jʔ	>	*wu:jʔ	>	vuj³

The following examples are of loans from Cunhua into Nadouhua where the latter shows unexpected rimes:

(73)	*Gloss*	*PHl*	*Cunhua*	*Nadouhua*	*Expected Nadouhua*
	flea	*hmə:t	ɓat⁴	paʔ⁴	pɔʔ⁴
	son-in-law	*hlɯ:	tθow¹	low²	lɛ(w)²
	do	*ʋu:k	vok⁴	voʔ⁴	vuʔ⁴
	vine basket	*ɓoŋ	ɓoŋ¹	ɓoŋ¹	ɓɔŋ¹

1.7.10 *Lauhut and Cunhua*

Finally, it seems that Cunhua, like Moyfaw, borrowed from Lauhut in its recent history. The following are examples of unexpected correspondences in Cunhua initials, rimes, and/or tones which can plausibly be explained as borrowings from Lauhut:

(74)	*Gloss*	*PHl*	*Lauhut*	*Cunhua*	*Expected Cunhua*
	weave(fabric)	*hwi:	hwej¹	huj⁵	vɛj¹
	you (pl)	*C-mɯ:	məɰ¹	ma:¹ (< mə:¹)	mow¹
	look	*kiw	kiw¹	ʔiw¹	kɔj¹
	cotton	*ɓu:jʔ	ɓu:j³	ɓu:(j)³	ɓuj³
	wear (lower)	*pʰi:n	pʰi:n¹	pʰi:n¹	pʰin¹
	stick into	*C-ŋi:p	ɲi:p⁷	ni:p²	ŋip²
	adze	*pʰu:n	pʰu:n¹	pʰu:n³	pʰun¹
	kiss	*ɾju:c	ru:c⁷	lu:t²	lut⁴

1.7.11 *Summary*

Following the breakup of Proto-Hlai into various subgroups, and these subgroups into individual languages, it is apparent that there has been intimate contact between several non-sibling subgroups and languages around Hainan. This is evident not only through shared sound changes which have diffused from one language to another, but also through irregular reflexes in one language which can be explained through borrowing from another language in which those reflexes would be regular. The recognition of this contact is of the utmost importance in subgrouping, as it helps to differentiate sound changes which are more useful for subgrouping, and those which are more easily diffused.

Considerable contact has occurred between Bouhin and Ha Em, with most loanwords being borrowed into the former from the latter. A fair amount of more recent contact has occurred between Baoting and Jiamao, and there has been some contact as well within Qi between Tongzha and Zandui on the one hand and between Tongzha and Baoting on the other; there is also evidence of substantial contact between Run and Qi, particularly between Yuanmen and Tongzha. In the western half of the island, there has been an interesting unidirectionality of influence, first from Lauhut on Moyfaw, from Moyfaw on Baisha, and finally from Baisha on Yuanmen. Lauhut has also contributed some loanwords to Cunhua, which in turn has loaned words to Nadouhua, which has also borrowed at least a few items from Meifu (or probably more specifically, Changjiang). These contact relationships can be illustrated in the following simplified way (Changjiang and Moyfaw are collapsed below into Meifu (MF), due to the fact that there is not enough data available on Changjiang to make reliable inferences about contact):

(75) Directionality of Contact Among the Hlai Languages

		Baisha	→	Yuanmen		
		36,000		8,000		
		↑		↑		
Nadouhua	←	Meifu		Tongzha	→	Zandui
2,500		30,000		125,000		29,000
↑		↑		↓		
Cunhua	←	Lauhut		Baoting	←	Jiamao
60,000		166,000		24,000		52,300
		Bouhin	←	Ha Em		
		73,000		193,000		

It is interesting to note that when the chart above is compared with the population statistics in (3), there is an obvious and non-random correlation between population and what end of the arrow a language is on in a contact relationship. More specifically, the donor languages tend to have the highest populations, while the borrowing languages tend to have the smallest (note that the two most endangered languages, Yuanmen and Nadouhua, are exactly the two which are at the borrowing end of two contact relationships).

1.8 Conclusion

To summarize, the Hlai family is one of four major members of the Kra-Dai phylum of Southeast Asia. It is located on Hainan island, China, where speakers of Proto-Hlai probably comprised the founding population of the island. A total of twelve Hlai languages are presently in use, including the two mixed languages Cunhua and Nadouhua. In addition, the Jiamao language, an isolate, has been in contact with Hlai for what appears to have been quite a long time.

A general theory of sound change was discussed, which states that sound change is non-teleological and is normally the result of mistransmission. The following criteria were identified for use in reconstruction: Directionality of Change, Commonality of Features, Economy, and Symmetry.

Due to the sociolinguistic situation on Hainan, the evolution of the Hlai languages must be understood to have involved both language branching and language contact. The issue of subgrouping was raised, and the subgrouping methodology discussed which will be used to separate inherited from diffused innovations when possible. More precisely, a phylogenetic tree of the Hlai languages is reconstructible when more improbable sound changes are used as criteria for assuming shared inheritance, while more common changes are considered to be likely to have diffused or independently innovated.

Languages in the southern end of the island which were isolated from contact with other non-Hlai languages have tended to remain homogeneous, while languages in the northern and eastern contact zones have tended to undergo fission. Using evidence from irregular correspondences, it is possible to demonstrate contact relationships between the Hlai languages, and also to identify which language has exerted asymmetrical influence on another.

The next two chapters will outline correspondence sets across the Hlai languages and show the reconstruction of the PHl phonological inventory. The system of initials is treated in chapter two, and the system of rimes in chapter three.

CHAPTER 2

Reconstruction of Proto-Hlai Initials

The primary goal of this chapter is to present the sets of initial correspondences which have been used to reconstruct the Proto-Hlai (PHl) inventory of initials, and explain reflexes of Proto-Hlai initials in the daughter languages if they have followed divergent paths. The reconstruction here will also be compared with those of Matisoff (1988), Thurgood (1994), Peiros (1998), and Ostapirat (2004), and these alternative reconstructions will be considered and discussed. It is the purpose of this chapter to motivate the reconstruction of Proto-Hlai proposed herein so that it may in turn be used for comparative work with other branches of Kra-Dai and/or used for more detailed study of specific types of change exemplified below.

The reconstruction in the chapter will be of Proto-Hlai, as opposed to Pre-Hlai which will be reconstructed in chapter four. Proto-Hlai is meant to be the best possible reconstruction of the single proto-language which existed just prior to its first division into daughter languages. The reconstruction of the Proto-Hlai system of initials in this chapter results in an inventory with distinctive asymmetries and gaps. The discussion of Pre-Hlai in chapter four will demonstrate how this system originated in a much more balanced and typologically common system.

Before a discussion and reconstruction of specific natural classes of initials is initiated, there are two preliminary issues which are addressed briefly below. The first is a reiteration of the theory of sound change adopted here. The second is a discussion of how two specific sound changes which occurred after the break-up of Proto-Hlai, initial obstruent devoicing and registrogenesis, interact with each other in ways that are meaningful in the context of Proto-Hlai reconstruction. With this background, we will be in a position to properly examine the various classes of initials themselves and the evolution of their individual members into their present forms in the daughter languages.

2.1 Sound Change: Initials

In the reconstruction of Proto-Hlai initials undertaken in this chapter, the following criteria described in chapter one are adhered to:

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(i) Directionality of Change: typologically natural changes are referred to and used as a model whenever possible; changes are assumed to occur one feature at a time unless evidence forces a different analysis.
(ii) Commonality of Features: phonemes are reconstructed based on the features common between reflexes of daughter languages; greater heterogeneity of reflexes is taken to indicate greater complexity of the proto-phoneme.
(iii) Economy: a phoneme is reconstructed to the extent that it satisfactorily accounts for the posited change(s) between it and the reflexes of the daughter languages, and reconstructions assuming more changes than necessary are avoided.
(iv) Symmetry: the reconstructed inventory is checked to make sure that no symmetries have been overlooked in natural classes, either in place or in manner; it is accepted that parts of the inventory may be asymmetrical, and these are checked for typological naturalness.

Throughout the history of Hlai (including Pre-Hlai, Proto-Hlai, and the daughter languages), there are four main categories of sound change which are observable in the initials. These are (1) temporal compression, (2) gesture reduction, (3) onset fortition, and (4) systemic realignment. Of these four, *temporal compression* has been the most pervasive, and can be observed at all stages of the evolution of Hlai. *Gesture reduction* is most pronounced in Pre-Hlai, and will therefore be treated in chapter four. *Onset fortition* can be observed in the transition from Pre-Hlai to PHl through a sound change referred to here as *main-syllable aspiration* (see chapter four) and in the daughter languages. *Systemic realignment* is most prominent in the cases of the individual daughter languages, after the breakup of PHl. Temporal compression, onset fortition, and systemic realignment will each be exemplified below, using examples from this chapter. It is sometimes the case that a particular change can fall into more than one of these categories simultaneously.

2.1.1 *Temporal Compression*

Bybee (2001) proposes that speech, like other motor activities, is an automated phenomenon, and as such is subject to the same kinds of overlap of originally linearized gestures. Bybee posits two main articulatory impetuses of sound change, one of which is temporal compression (the other being gesture reduction). Temporal compression occurs when the gestures associated with two segments that are linearized, and therefore discrete, begin to overlap as the time between the implementation of the first and second segments is decreased, leading to the deterioriation of their linearization. This can lead both to articulatorily-motivated sound change, as the two sets of gestures interfere with each other as their segments are compressed, as well as auditorily-motivated change as the percepts from each segment become confused in different ways over shorter durations. This often leads to various forms of coalescence, where features of each segment are preserved in the resulting single segment, although occasionally one segment is merely lost. Some of the most striking examples of temporal compression will be discussed in chapter four; however, there are also sound changes treated in this chapter which can serve to illustrate this kind of sound change:

(1)	*Examples of temporal compression*			*Source*
(a)	fʱj	>	ç	NWCHl, Meifu
	ʈʂʰw	>	f	NCHl and Lauhut
(b)	ŋw	>	ɱ	Yuanmen
	hrj	>	dʝ	Run
(c)	hŋw	>	hw	Various
	Cuɣw	>	ʔw	NECHl
	Cuɦw	>	ʔw	Western
(d)	ʔl	>	l	All
	hlj	>	l	Cunhua
	ɾj	>	j	Bouhin, Ha Em

(1a) shows examples of coalescence between a fricate (fricative or affricate) with a coarticulated glide, which result in another fricative that retains the manner of the original fricate but which has a place of articulation influenced by the following glide, shown in (2):

(2) fʱj > ç

[fric] [glide] [fric] ~~[glide]~~
[lab] [pal] ~~[lab]~~ [pal]

The examples in (1b) are of sonorants which coalesce with following glides, shown in (3):

(3) ŋw > ɱ

[nas] [glide] [nas] ~~[glide]~~
[vel] [lab] ~~[vel]~~ [pal]

(1c) shows examples of complex segments in which the medial 'host' segment is lost at the expense of preserving the glottal element at the left edge, and the glide at the right, shown in (4):

(4) Cuɦw > ʔw

[const] [fric] [glide] [const + glide] ~~[fric]~~
[glt] [lab] ~~[glt]~~ [lab]

Finally, (1d) gives examples of complex segments in which one member is merely deleted, without involving modification of the other member, shown in (5):

(5) ʔl > l

[const] [lat] ~~[const]~~ [lat]
[cor] [cor]

2.1.2 *Onset Fortition*

I also accept Blevins' (2004) proposal that fortition in onset position is a natural change. Some examples of fortition are provided here:

(6)

	Examples of fortition in onset position			*Source*
(a)	hm	>	b	Greater Hlai
	hn	>	d	Greater Hlai
(b)	f^h	>	pf^h	Yuanmen
	s^h	>	ts^h	Run
(c)	hl	>	d	Bouhin
	hlj	>	dʝ	Run
	ɾ	>	d	Run, Meifu, Qi
(d)	hw	>	v	All
	hj	>	ʝ	All
	ʋ	>	v	Various

The first kind of fortition, illustrated in (6a), is an example in which preaspirated nasal stops change to prenasalized stops, with sonority decreasing in tandem with oral closure. Another kind, an increase in oral stricture in fricatives leading to their change to affricates, is shown in (6b). The development of oral closure in liquids is yet a third kind (6c). Finally, the narrowing of oral stricture in glides and approximants, giving rise to fricatives, is yet another example (6d). Several of the fortitions above are correlated with the change called *main-syllable aspiration*, discussed in chapter four.

2.1.3 *Systemic Realignment*

Finally, an important factor in sound change seems to be the psycholinguistic influence which preexisting categories (structural analogy: Blevins (2004: 153–55)) and/or categorical gaps exert over potential paths of change. The sound changes described below involve either whole merger of formerly distinct categories, or the influence of one category on the shift of another:

(7)	*Examples of systemic realignment*				*Source*
(a)	ʋ	>	v	(v already in system)	Tongzha
	hlj	>	dʝ	(dʝ already in system)	Yuanmen
(b)	v	>	f	(f already in system)	Tongzha, Run
	ɮ	>	ɬ	(ɬ already in system)	Qi
(c)	Ciɦj	>	ʔɲ	(ʔɲ already in system)	NCHl
	Cuɦw	>	ʔŋw	(ʔŋw already in system)	NCHl
(d)	Cuɣw	>	ʔw	(ʔw already in system)	NECHl
	Cuɾw	>	ʔw	(ʔw already in system)	Meifu
(e)	s^h	>	t	(original *t → t^h)	Bouhin, Ha Em, ECHl
	ɾ	>	l	(original *l → ɬ)	Various

In (7a), approximants are merged with pre-existing categories in the initial inventory. (7b) gives examples of the devoicing of voiced obstruents, allowing a merger with existing voiceless obstruents. (7c) is an example of sesquisyllabic forms with fricatives hosting coarticulated glides preceded by merging with simpler, pre-existing segments. Examples of deletion of medial approximants allowing merger with a preexisting category are shown in (7d). Finally, (7e) provides three examples of gap-filling shifts, after these slots were vacated by their original occupants.

The three kinds of sound change detailed above provide an overview of the general mechanisms of change which have been at work within the Hlai languages throughout various points in their history. These sound changes seem to be general aspects of the dynamic sound system, which are always present as potential changes depending on the combination of the variables surrounding language transmission.

2.2 Sound Changes after the Breakup of Proto-Hlai

Although there are a number of different kinds of sound change which have occurred in the history of the Hlai languages, not all of them have spread over equally large areas. This section describes two kinds of changes which have been widespread enough to affect a majority of the Hlai languages; more limited changes will be described individually in the discussion of initials itself. The two changes described below are also interactive, and understanding how this is so will clarify very much of the history of the Hlai initials.

2.2.1 *Devoicing*

There is evidence, both internal and external, that there has been a constraint against initial voiced obstruents in Hlai for a very long time. In every instance that a sound change leads to a new initial voiced obstruent (or obstruent series), it is apparent that devoicing occurs shortly thereafter. The instances in which this occurred in Pre-Hlai will be treated in chapter four.

Devoicing of obstruents after the break-up of Proto-Hlai has occurred in instances which have included all of the daughter languages, a subset, or individual cases. A good example is the class of medial glottal fricatives, which underwent devoicing after the words which contained them lost their presyllables. This happened across the board with glottal fricatives preceded by non-high vowels, but only occurred outside of NCHl with those preceded by high vowels due to the rhinoglottophilic change which occurred in this branch:

(8)	*Other Hlai*					*NCHl*				
	*ɦ	>	ɦ	>	h	*ɦ	>	ɦ	>	h
	*Ciɦ	>	ɦ(j)	>	h(j)	*Ciɦ	>	C-ɲ	>	ʔɲ
	*Cuɦ	>	ɦ(w)	>	h(w)	*Cuɦ	>	C-ŋw	>	ʔŋw

Another example of widespread devoicing occurred in the case of PHl *C-w, which generally underwent fortition to β after the loss of the presyllable, devoicing to ɸ and then shifting to *f*, except in the case of the Meifu branch where it remained a glide:

(9)

Other Hlai					*Meifu*		
*C-w	>	β	>	ɸ > f	*C-w	>	ʔw

An example in which devoicing occurred on a smaller scale is in the Run branch, where PHl *ɾj and *hr underwent fortitions to voiced obstruents which subsequently underwent devoicing:

(10)

Run				
*ɾj	>	d	>	t
*hr	>	ɣ	>	x

It is crucial to understand that registrogenesis (see below) occurred chronologically between earlier and later obstruent devoicings. Any obstruents which were devoiced prior to registrogenesis conditioned high register, irregardless of their earlier status as voiced obstruents. However, all obstruents which were voiced at the stage of registrogenesis conditioned low register, even if they subsequently devoiced. This can be illustrated in Run, using the reflex of PHl *ɾj above and that of PHl *hn (bold font indicates that a phoneme has conditioned low register):

(11)

PHl				*Devoicing*		*Registrogenesis*		*Devoicing*
*ɾj	>	d	>	t	>	t	>	t
*hn	>	hnᵈ	>	nd	>	d	>	**t**

2.2.2 *Registrogenesis*

The Hlai languages, as is typical of the typological area in which they participate, are tone languages, and each word has an obligatory lexical tone. There are two components of the tone system: tone category and register. The first of these is correlated with the rime, and in Kra-Dai studies there are four original tone categories traditionally labeled A, B, C, and D. These categories are very likely inherited from Proto-Kra-Dai itself. However, since they do not bear directly on the system of initials, they can be put aside until the discussion of PHl rimes in chapter three. Register (and the development thereof, *registrogenesis*), on the other hand, is correlated directly with the system of initials, and is therefore relevant to the present discussion (for a more detailed discussion, see chapter three section 3.2).

When there is a phonological register split in the Southeast Asian linguistic area, the two registers are usually referred to as 'high' register (with higher pitch across the rime) and 'low' register (with lower pitch across the rime). High register correlates with an original voiceless onset, and low register with an original voiced onset (Yip 2002: 33–38). In Southeast Asian historical linguistics, it is considered axiomatic that when there is a register split, high register indicates an originally voiceless initial, and low register indicates an originally voiced intitial. This is because in the process of registrogenesis, the natural lowering of F0 which accompanies voiced consonants becomes phonologized. For example:

(12) (a) High register results from:

p	t	c	k	ʔ
pʰ	tʰ	cʰ	kʰ	
f	s	ç	x	h

(b) Low register results from:

b	d	dʝ	g	
v	z	ʝ	ɣ	ɦ
m	n	ɲ	ŋ	
	l			
w	r	j		

Although the classes of obstruents and sonorants function in rather different ways phonetically, there has nevertheless been a sort of compensatory adjustment in the register system so that the high and low pairs of the obstruent and sonorant categories are made equivalent, and a two-level register system results:

(13) TABLE 2 *Obstruent and Sonorant Initial Correlates with Register*

Obstruents	**Register**	**Sonorants**	**Register**
p	High	ʔm	High
b	Low	m	Low

This phenomenon is so regular, that when discrepancies occur between the syllable initial and expected tone register, a logical explanation has been formulated to account for them. This has proved to be extremely fruitful for diachronic exploration of Southeast Asian languages in the following two ways:

A. When voiceless obstruents are associated with low register, it is normally assumed that the obstruent was originally voiced, and underwent devoicing after registrogenesis:

(14)	p^{low}	<	*b
	f^{low}	<	*v

B. When voiced intitials are associated with high register, it is assumed that either there was originally a preceding voiceless consonant which conditioned the register and was subsequently lost, or that the glottis was held in a marked configuration (either spread or constricted) which preempted voicing. Depending on the nature of the initial inventory in question, these segments are usually represented as follows:

(15)	b^{high}	<	*C-b, *ʔb
	m^{high}	<	*C-m, *ʔm, *hm
	w^{high}	<	*C-w, *ʔw, *hw

Diachronically, the least sonorous segment controls the register in a complex initial with both voiceless and voiced elements. For example, a cluster such as *pl* conditions high register, since the *p* is voiceless which trumps the more sonorous liquid. A fully voiced initial cluster, such as *bl*, would condition low register, since neither segment is voiceless.

In the Hlai languages, registrogenesis occurred only after the breakup of PHl, and even after the breakup of the Hlai subgroups into individual languages. It was very likely induced through contact with Hainanese, a variety of Southern Min (the first variety of Chinese to be spoken on Hainan, beginning in the Song dynasty). The strongest evidence for this is that those languages which underwent registrogenesis fall along the northern and north-eastern periphery of the Hlai-speaking area, where contact with Hainanese and other non-Hlai languages has been most intensive. It is also important to note that when languages underwent registrogenesis, they did not necessarily do it at the same time, so that some languages will show high register for the same lexical item, and some low, depending on which segmental and laryngeal changes had occurred by the time of the register split.

The Hlai languages can be divided between those which have undergone a register split, and those which have not. Moreover, not all languages that have undergone the split have done so in all four tone categories. Those which have undergone a split in all four categories are Yuanmen, Tongzha, Zandui, and Baoting (which, as shown in the previous chapter, are part of a linguistic area). Cunhua has a split in all categories except for B, and Nadouhua and Changjiang have a split in the A category, but not in B, C, or D:[1]

(16) Register split in the Hlai languages

(a) *No register split*

Bouhin	A^{high} A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}
Ha Em	A^{high} A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}
Lauhut	A^{high} A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}
Moyfaw	A^{high} A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}
Baisha	A^{high} A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}

(b) *Register split in category A only*

Nadouhua	A^{high}	A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}
Changjiang	A^{high}	A^{low}	B^{high} B^{low}	C^{high} C^{low}	D^{high} D^{low}

(c) *Register split in categories A, C, D*

Cunhua	A^{high}	A^{low}	B^{high} B^{low}	C^{high}	C^{low}	D^{high}	D^{low}

(d) *Register split in all categories*

Tongzha	A^{high}	A^{low}	B^{high}	B^{low}	C^{high}	C^{low}	D^{high}	D^{low}
Zandui	A^{high}	A^{low}	B^{high}	B^{low}	C^{high}	C^{low}	D^{high}	D^{low}
Baoting	A^{high}	A^{low}	B^{high}	B^{low}	C^{high}	C^{low}	D^{high}	D^{low}
Yuanmen	A^{high}	A^{low}	B^{high}	B^{low}	C^{high}	C^{low}	D^{high}	D^{low}

The table below shows all of the languages which have undergone registrogenesis and the tone numbers which have been assigned to each tone in each register in the descriptive literature:[2]

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1 This variation is explored more fully in the next chapter, where it is suggested that pre-existing phonation originating from final laryngeals may have blocked registrogenesis in categories B, C and D.

2 The traditional numbering system which has been assigned to tones in the Hlai literature is less than optimal. The system is based on languages without a register split, where tone

(17) Tone numbers in registrogenetic languages

Tone Category	*Register*	*Nadou*[3]	*Cjiang*	*Cunhua*	*Ymen*	*Tzha*	*Zdui*	*Bting*
A	High	1	1	1	1	1	1	1
	Low	4	4	4	4	4	4	4
B	High	2	2	5	5	5	5	5
	Low	2	2	5	2	2	2	2
C	High	3	3	3	3	3	3	3
	Low	3	3	4	6	6	6	6
D	High	4	4	2	7	7	7	7
	Low	4	4	4	8	8	8	8

Although there is variation in tone contour across languages, a very salient property which can be seen is that tones in the high register, as the label suggests, are almost always higher in pitch level than their counterparts in the low register. The exception to this rule is Nadouhua, where the overall contour of tone category A has settled at the bottom of the pitch range in the high register. This pattern fits with the model articulated in Thurgood (2002), which argues that low register has been conditioned by breathy voice (an assertion which is given additional strength by segmental reflexes of Zandui stops, to be described below). This is shown more clearly in the following table, which shows the actual pitch values of the tones in the registrogenetic languages:

categories A, B, C, and D are assigned numbers 1, 2, 3, and 4 respectively. In the registrogenetic languages in Ouyang & Zheng (1983), this correlation was maintained, but an effort was made to correlate odd numbers with high register, and even numbers with low register. Therefore, category B appears 'flipped' when compared with categories A and C. These categories were later applied to the less symmetrical tone/register categories in Cunhua and Nadouhua, making the system even more opaque. In assigning numbers to Changjiang, I have used the same system as Nadouhua, with which its history of registrogenesis is identical.

3 Nadouhua and Changjiang tone 4 is always accompanied by glottal constriction within the rhyme.

(18) Tone values in Registrogenetic Languages

Language	*Tone*	*High*	*Low*[4]	*Language*	*Tone*	*High*	*Low*
Nadouhua	A	11	21ʔ	Tongzha	A	33	11
Changjiang	A	53	15ʔ		B	51	121
Cunhua	A	35	13		C	55	14
	C	42	13		D	55	13
	D	33	13	Zandui	A	33	11
Yuanmen	A	42	11		B	42	21
	B	51	131		C	35	213
	C	44	13		D	42	21
	D	55	13	Baoting	A	44	22
					B	53	31
					C	35	213
					D	53/44[5]	31

The PHl initials themselves can be grouped into categories according to whether or not their reflexes triggered high or low register, and in which languages (low register is indicated with boxed phonemes).

The first category is comprised of those initials which unanimously indicate high register. The first subcategory within this group (19a) is comprised of original voiceless obstruents, including stops, affricates and fricatives. The second subcategory (19b) is comprised of glottal stop, both initial and medial. The third subcategory (19c) is comprised of the two implosive initials. The fourth subcategory (19d) has a single member, the preaspirated lateral. Finally, the fifth subcategory (19e) is comprised of originally voiced medials which devoiced in all languages when they became initial prior to registrogenesis:

(19)		*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	(a)	*p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h
		*t^h	t^h~ts^h	t^h	t^h	t^h	t^h	t^h	t^h
		*$tʂ^h$	h	h	ts^h	ts^h	ts^h	ts^h	ts^h

4 There is one exceptional property which is shared by Nadouhua and Changjiang, indicating close contact at the time of registrogenesis. This is the presence of glottal constriction in the low register of category A, where there was no historical laryngeal segment. What seems to have occurred here is that voiced initials became associated with laryngealization (Thurgood 1991: 4–8), and resulted in the reinterpretation of this creaky voice as the presence of glottal constriction.

5 The two values for this tone reflect long and short rimes, respectively.

	*Cuʈʂʰ	f	f	f	pfʰ	tsʰ	tsʰ	tsʰ
	*tçʰ	tsʰ	s	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ
	*kʰ	kʰ	kʰ	kʰ	kʰ	kʰ	kʰ	kʰ
	*tç	ts	ts	ts	t	ts	ts	ts
	*k	k	k	k	k	k	k	k
	*fʰ	f	f	f	pfʰ	f	f	f
	*fʰj	s	f	s	pfʰ	f	f	f
	*sʰ	tθ	f	s	tsʰ	t	t	t
(b)	*ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ
	*Ciʔ	z	ʔj	z	z	z	z	ʔj
	*Cuʔ	v	ʔw	kw	v	ʔw	v	ʔw
(c)	*ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ
	*ɗ	ɗ~ts	ɗ	ɗ	ɗ	ɗ	ɗ	ɗ
(d)	*hl	tθ	l	ɬ	ɬ	ɬ	ɬ	ɬ
(e)	*C-w	f	f	kw	f	f	f	f
	*C-ɦ	h	h	h	h	h	h	h

The second category is comprised of those initials which only exhibit low register in Yuanmen; these are both medial glottal fricatives, which underwent a shift to medial nasals in NCHl:

(20)	*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	*Ciɦ	ɲ	ŋj	ɲ	ɲ	z	z	hj
	*Cuɦ	ŋ	ŋ(w)	ŋ	ɱ	gw	v	hw

The third category is comprised of initials which exhibit low register in only Yuanmen and Zandui; these are all medial sonorants:

(21)	*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	*C-m	m	m	m	m	m	m	m
	*C-n	n	n	n	n	n	n	n
	*C-ɲ	ɲ	ŋj	ɲ	ɲ	ɲ	ɲ	ɲ
	*C-ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ
	*Cuŋ	ŋ	ŋw	ŋ	ɱ	ŋw	ŋ	ŋw
	*C-l	l	l	l	l	l	l	l

The fourth category is comprised of an initial which exhibits low register in Cunhua, Nadouhua, and Changjiang; this includes the one true cluster in PHl:

(22)	*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	*m-l	ɓ~l	pj	p	pl	pl	p	pl

The fifth category is comprised of an initial which exhibits low register in Nadouhua and the Qi languages; it also includes only one member, medial *hr:

(23)	*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	*Cuhr	v	ŋ	kw	v	gw	v	hw

The sixth category consists of initials which exhibit high register only in Cunhua and Baoting; this includes the two PHl preaspirated glides:

(24)	*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	*hj	z	z	z	z	z	z	z
	*hw	v	v	v	v	v	v	v

The penultimate category consists of initials which exhibit low register in all but one language. This is a heterogeneous category which includes (a) the preaspirated labio-velar nasal, and (b) various approximants:

(25)		*PHl*	*Cun*	*Nadou*	*CJ*	*YM*	*TZ*	*ZD*	*BT*
	(a)	*hŋw	h	ŋ	v	v	v	v	v
	(b)	*ʋ	v	v	v	v	f	v	v
		*ɾj	z	l	t	t	t	t^h	t
		*Cuɾ	v	v	kw	f	f	f	f
		*hr	h	ŋ	g	k^h	g	h	h

The final category consists of initials which conditioned low register in all languages; it includes (a) all of the initial preaspirated nasals, as well as (b) the preaspirated palatalized lateral and rhotic and (c) the plain tap:

(26)

	PHl	Cun	Nadou	CJ	YM	TZ	ZD	BT
(a)	*hm	ɓ	p	p	p	p	pʰ	p
	*hn	ɗ~ts	t	t	t	t	tʰ	t
	*hɲ	ts	ts	ts	ts	ts	tsʰ	ts
	*hŋ	k	k	k	k	k	kʰ	k
(b)	*hlj	l	z	z	ts	ɬ	ɬ	ɬ
	*hrj	z	l	t	ts	t	tʰ	t
(c)	*ɾ	l	l	l	r	r	l	l

In summary, the languages above which have undergone registrogenesis are crucial to the reconstruction of PHl, as they provide evidence for the voicing (or lack thereof) of initials at the point of registrogenesis. This evidence is still sometimes indirect however, given the fact that registrogenesis occurred after a second devoicing, which eliminated the context for low register in some originally voiced initials. This is the topic to which we now turn.

2.3 Reconstruction of Initials by Manner

The various categories of PHl initials will be reconstructed in this section. The data from the twelve Hlai languages in Ouyang & Zheng (1983) and from the author's own fieldwork are presented. In addition, the reflexes of the Bouhin ('Southern Hlai') and Qi ('Central Hlai') languages recorded in Savina (1931) and the Baisha dialect recorded in Wang & Qian (1951) are presented. The order of presentation will be that of obstruents (divided into stops, affricates, and fricatives), followed by sonorants (divided into nasals, liquids, approximants, and glides). The primary difference between obstruents and sonorants is in the development of the aspirated initials; aspirated obstruents remained so in both primary branches of Hlai, whereas aspirated sonorants developed differently in Bouhin and in Greater Hlai. These reconstructions are discussed below. Where changes from the proto-form have occurred, they are discussed in detail within the typology of changes outlined in section 2.2 above, and the assumed paths of change are outlined. Three examples of each initial will be provided. Finally, the reconstruction proposed here will be compared with the earlier reconstructions of Matisoff (1988), Thurgood (1991), Peiros (1998), and Ostapirat (2004). In order to facilitate exposition, the initials will be subdivided into obstruents, sonorants, and glottals (which are set apart because of the way in which they pattern with the sonorants, despite their technical classification as obstruents).

2.3.1 *Obstruent Initials*

There are four classes of PHl obstruent initials: aspirated stops, aspirated affricates, implosive/plain voiceless stops, and fricatives. These will be treated in turn below.

2.3.1.1 Aspirated Stops

The reflexes of the PHl aspirated stops are shown below in (27). With the single exception of the Cunhua reflexes for the alveolar stop, the modern reflexes of the stops are homogeneous and straightforward in their development from PHl. Note that all reflexes in the daughter languages show aspiration; note also that all reflexes are in the high register in languages which distinguish between high and low, indicating original voiceless onsets at the stage of registrogenesis:

(27) Reflexes of PHl voiceless stops

Bhin	*Ha Em*	*Lhut*	*Tzha*	*Zdui*	*Bting*
p^h	p^h	p^h	p^h	p^h	p^h
t^h	t^h	t^h	t^h	t^h	t^h
k^h	k^h	k^h	k^h	k^h	k^h

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
p^h	p^h	p^h	p^h	p^h	p^h
t^h~ts^h	t^h	t^h	t^h	t^h	t^h
k^h	k^h	k^h	k^h	k^h	k^h

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
f	p^h	p^h
t^h	t^h	t^h
x	x	k^h

Based on the nearly uniform reflexes in (27) above, a series of aspirated stops is reconstructed. The reconstructions which are adopted here are shown below in (28):

(28) $*p^h$
$*t^h$
$*k^h$

With one exception in Cunhua (see below), there has been no essential change between PHl and the reflexes in the daughter languages. Based on Savina's transcription, the velar aspirated stop lenited to a fricative in both his Southern and Central Hlai languages, and the bilabial aspirated stop in his Southern Hlai did so as well.

The only problematic development in the aspirated stops series is in Cunhua, where there are split reflexes between *tʰ* and *tsʰ* (29a). This phenomenon is also seen in other alveolar series, with split reflexes in Cunhua for PHl *ɗ (*ɗ* and *ts*) (29b) and PHl *sʰ (*tθ* and *tsʰ*) (29c); there are only examples of *ts* for *hn (where *ɗ* is expected) (29d):

(29) Palatal variation in Cunhua alveolar initials

	Gloss	*PHl*	*Cunhua*	*Gloss*	*PHl*	*Cunhua*
(a)	answer	*tʰin	tʰen^{1}	half	*tʰom	tsʰom^{1}
	dam	*tʰəːmʔ	tʰam^{3}	rice	*tʰaːɦ	tsʰɔː^{5}
	fall	*tʰok	tʰɔk^{2}	wrap	*tʰuːk	tsʰok^{2}
(b)	castrate	*ɗɯːn	ɗɯn^{1}	want	*ɗɯː	tsow^{1}
	forest	*ɗaːwʔ	ɗaw^{3}	boil	*ɗaːn	tsɔn^{1}
	have	*ɗuːk	ɗok^{2}	rear	*ɗuːɲ	tsuən^{3}
(c)	wild	*sʰuːn	tθuən^{1}	tread	*sʰɯːm	tsʰam^{1}
	water buffalo	*sʰujʔ	tθɔj^{3}	wart	*sʰuːc	tsʰuət^{2}
	ripe	*sʰɯːk	tθɯək^{2}	bird	*sʰəc	tsʰiat^{2}
(d)	—			top	*hnɯː	tsow^{4}
	—			six	*hnom	tsem^{4}
	—			long	*hnaːwʔ	tsaːw^{4}

There is, however, no split in the *C-n category, where Cunhua reflexes are always *n*, so it appears that this phenomenon is restricted to initial consonants and did not affect medials. Although there is no direct evidence for it, this variation seems to be between the original alveolar and palatal place of articulation, as Cunhua *tsʰ* and *ts* are reflexes of earlier *tçʰ and *tç respectively. There does not seem to be any discernible conditioning factor in the rimes following these initials which might have led to secondary palatalization, or any other kind of affrication.

In addition, there are two other non-alveolar initials in which Cunhua shows evidence of secondary palatalization. First, there are two instances where this variation occurs in items with original initial labiovelar glides, where the normal reflex is *v* (the vowel in *left* is irregular):

(30) Palatal Variation in Cunhua Initial Labiovelar Glides

Gloss	*PHl*	*Cunhua*
left	*hwi:ŋ	$zaŋ^1$
banana	*hwa:k	$zɛk^2$

Second, there are only two cases of which I am aware which involve palatalization of a medial, which in both instances was originally a velar nasal. The palatalization of the one in *straw* was probably due to the following original high front vowel:

(31) Palatalization of Cunhua medial velar nasals

Gloss	*PHl*	*Cunhua*
envy	*C-ŋa:jɦ	$ɲaj^5$
straw	*Cuŋiŋ	$ɲeŋ^3$

The reconstructions of Matisoff, Thurgood, Peiros, and Ostapirat are compared below with the one presented here:

(32)

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	$*p^h$	$*p^h$	$*p^h$	*(ʔ)p	$*p^h$
(b)	$*t^h$	$*t^h$	$*t^h$	*(ʔ)t	$*t^h$
(c)	$*k^h$	$*k^h$	$*k^h$	*k	$*k^h$

Matisoff's, Thurgood's, and Peiros's reconstructions are all in agreement with the present one. That of Ostapirat is similar to the reconstruction of Pre-Hlai provided in chapter four; it violates Commonality by omitting the ubiquitous presence of aspiration from the reconstruction, and cannot be arrived at merely through the comparative method. The optional glottal stops in his reconstruction are dependent on two different Jiamao reflexes, which I will provide an alternative explanation for in chapter five.

Examples of the PHl stops are given below, in the following order:[6]

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(33) Examples of aspirated stops

(a) ***pʰ**

翅膀	wing		*pʰi:k		
pʰi:k7	pʰi:ʔ7	pʰi:ʔ7	pʰiaʔ7	pʰiaʔ7	pʰiak7
pʰiək2	pʰiʔ4	pʰiʔ7	pʰik7	pʰit8	pʰiʔ7
沙	sand		*pʰu:ɦ		
(pʰaw2)	pʰaw2	pʰow2	pʰaw5	pʰo:5	pʰɔ:5
pʰa:5	pʰaw2	pʰaw2	pʰaw2	pʰaw2	pʰaw5
名字	name		*pʰa:ŋ		
pʰa:ŋ1	pʰe:ŋ1	pʰe:ŋ1	pʰe:ŋ1	pʰe:ŋ1	pʰe:ŋ1
pʰɛŋ1	pʰeŋ1	pʰe:ŋ1	pʰe:ŋ1	pʰiaŋ1	pʰiaŋ1

(b) ***tʰ**

屁	fart		*tʰu:[t/c]		
tʰu:t7	tʰu:t7	tʰu:t7	tʰu:t7	tʰu:t7	tʰu:t7
tʰuət2	tʰuʔ4	tʰut7	tʰut7	tʰut8	tʰut7
飯	rice		*tʰa:ɦ		
tʰa:2	tʰa:2	tʰa:2	tʰa:5	tʰa:5	tʰa:5
tsʰɔ:5	tʰa:2	tʰa:2	tʰa:2	tʰa:2	tʰa:2

6 Beginning here, forms which are suspected to be loans from another Hlai language due to the irregular correspondences discussed in chapter one are placed in parentheses.

鍋	pot		*tʰəw		
tʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1
tsʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1	tʰaw^1

(c) ***kʰ**

藍色	blue		*kʰi:w		
kʰi:w^1	kʰi:w^1	kʰi:w^1	kʰi:w^1	kʰiw^1	kʰi:w^1
kʰiw^1	kʰi:^{1}	kʰiw^1	kʰiw^1	kʰiw^1	kʰiw^1
腳	leg		*kʰok		
kʰok^7	kʰuk^7	kʰok^7	kʰok^7	kʰoʔ^7	kʰɔk^7
(kʰok^2)	(kʰoʔ^4)	kʰɔk^7	kʰɔk^7	kʰɔk^8	kʰɔk^7
輕	light (weight)		*kʰɯ:ʔ		
kʰəɰ^3	kʰaɰ^3	kʰaɰ^3	kʰaɰ^3	kʰaɰ^3	kʰaɰ^3
kʰɔ:^{3}	kʰaw^3	kʰaɰ^3	kʰəɰ^3	kʰaɰ^3	kʰaɰ^3

2.3.1.2 Aspirated Affricates

The reflexes of the PHl aspirated affricates are somewhat more complicated than those of the stops, and the most difficult task is in assigning values for place of articulation to each series. The reflexes of the three PHl affricates are given below:

(34) Reflexes of the PHl aspirated affricates

Bhin	*Ha Em*	*Lhut*	*Tzha*	*Zdui*	*Bting*
tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ
tsʰ	tsʰ	f	tsʰ	tsʰ	tsʰ
tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
h	h	tsʰ	tsʰ	tsʰ	tsʰ
f	f	f	f	f	pfʰ
tsʰ	s	tsʰ	tsʰ	tsʰ	tsʰ

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
ʃ	ʃ	tʃʰ
ʃ	ʃ	f
ʃ	ʃ	tʃʰ

I reconstruct these three series at two places of articulation: retroflex for the first two and palatal for the third. The second retroflex initial was preceded by a presyllable with *u, resulting in labialization of the initial in Central Hlai:

(35) *ʈʂʰ
*Cuʈʂʰ
*tɕʰ

Retroflex and palatal affricates are reconstructed based partly on the witness of Savina and Wang & Qian given above,[7] and it is apparent that the shift to the alveolar place of articulation is a recent change.

The inventory of possible coarticulations for *ʈʂh is defective, including *w* but excluding *j*. This is probably a phonetic constraint resulting from the difficulty of articulating a retroflex obstruent with palatal coarticulation:

(36) *ʈʂʰ *ʈʂʰw (no *ʈʂʰj)

The developments of *ʈʂʰ and *Cuʈʂʰ are divergent in the daughter languages, with essentially two alternate paths in each case. The most common development of *ʈʂʰ was to *tsʰ*, merging with the reflexes of *tɕʰ, presumably through an intermediate stage of *tʃʰ:

(37) tɕʰ
tʃʰ > tsʰ
ʈʂʰ

7 There is one complication of this scenario involving Savina's 1931 transcription of Bouhin and a Qi language, which predates the collection of data in Ouyang & Zheng (1983) by at least two decades. Savina records the reflexes of both Proto-Hlai *tɕʰ and *tʃʰ as *ʃ* (<s> in the Vietnamese orthography he was employing), in occasional variation with *s* <x>. One interpretation of this fact is that Savina was recording real fricatives, and that his data are in conflict with that of Ouyang & Zheng (1983). An alternative interpretation is that Savina used the Vietnamese characters which came closest to the Hlai affricates; since Vietnamese script only allows for one affricate (unaspirated tɕ, written <c>), which Savina used consistently to represent Bouhin and Qi *tɕ*, he may have selected the closest (but suboptimal) Vietnamese characters possible for *tʃʰ* and *ts*ʰ, namely <s> and <x>, respectively.

The other reflex of *ʈʂʰ, in NWCHl, is *h* (as noted above, this is also true of Proto-Be and several Tai subgroups). Since *h* is otherwise only a reflex of *ɦ in NWCHl, it provides a point of departure for how this change might have occurred. It will be shown in chapter four that PHl *ɦ is a regular reflex of earlier uvulars. If *ʈʂʰ first deaffricated to *ʂʰ, it may be postulated that it was subsequently reinterpreted as the uvular fricative *χ, which subsequently shifted to *h*:

(38) ʈʂʰ > ʂʰ > χ > h

The development of *Cuʈʂʰ also followed two distinct paths, these being more evenly distributed across languages. In Bouhin and Ha Em, vocalic transfer simply failed to occur, whereas it did happen in Central Hlai, giving rise to the coarticulated affricate *ʈʂʰw. In Qi, the labiovelar glide was simply lost, and *ʈʂʰw merged with *ʈʂʰ. However, in Lauhut and NCHl, this phoneme developed into a bilabial fricative, merging with *fʰ. The hypothesis I present here is that in these languages, there was a devoicing (natural in the environment following a fricative) and narrowing in aperture of the glide. As temporal compression occurred, there was a coalescence of the fricative element and the place features of *w̥, resulting in merger with the already existing category *fʰ. This is compared with the development of the other two Hlai affricates below:

(39)	*ʈʂʰ	>	tʃʰ	>	tsʰ
	*ʈʂʰw	>	tʃʰw̥	>	fʰ
	*tɕʰ	>	tʃʰ	>	tsʰ

A comparison with other reconstructions is given below:

(40)	*Matisoff*	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	—	—	—	*-t-	*ʈʂʰ
(b)	*sr	*sr	*sw	*-ut-	*Cuʈʂʰ
(c)	*tsʰ	*tsʰ	*cʰ	*c	*tɕʰ

None of Matisoff, Thurgood, or Peiros reconstruct an independent phoneme for the series of correspondences I reconstruct as *ʈʂʰ, owing to the fact that it can only be distinguished from PHl *tɕʰ by reflexes in NWCHl and Jiamao. Cunhua and Nadouhua were unavailable to Matisoff, and Jiamao was not used by either Matisoff or Thurgood (or presumably Peiros) due to its general complexity.

Matisoff and Thurgood agree in reconstructing *sr for the series which I reconstruct as *Cuʈʂʰ. *sr fits into a category in Matisoff's system which also includes *fr and *vr, where fricatives may form licit clusters with a following *r, making the cluster *sr a bit less striking if still typologically rare. Although Matisoff does not explicitly explain how *sr gave rise to the dual reflexes of *ts*^{h} and *f*, I infer that a shift of *r to *w* must be assumed. The alternative account proposed here is therefore more economical on internal grounds, since it already assumes a labial component *w which influenced the shift to *f*. Peiros reconstructs a labialized alveolar fricative, which is closer to my reconstruction in that it assumes original labialization, as opposed to a *C-r cluster.

Both Matisoff and Thurgood reconstruct alveolar *ts^h for the third set of correspondences, and I differ merely in reconstructing a palatal affricate, as this fits better into the overall system of PHl, as well as explaining such things as the NWCHl chain shift and the postalveolar values recorded for these consonants in Savina (1931) and Wang & Qian (1951). Peiros reconstructs an aspirated palatal stop, which I reconstruct at the Pre-Hlai stage, not Proto-Hlai (see chapter four); reconstruction of a stop in PHl violates Commonality since there are no stops represented amongst the reflexes of the daughter languages.

Ostapirat reconstructs medial *-t- for the first series, and medial *-t- preceded by *u for the second. These are an integral part of Ostapirat's system, in which stops become affricated intervocalically before the loss of a presyllable in an originally sesquisyllabic word. For the third series, he reconstructs a plain palatal stop. As with the PHl stops above, aspects of Ostapirat's reconstruction correspond better with the reconstruction for Pre-Hlai which I present in chapter four, and his reconstructed series of stops also violates Commonality.

Examples of the PHl affricates are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(41) Examples of aspirated affricates

(a) ***ȶɕ^h**

花	flower		*ȶɕ^{h}a:ŋ		
ts^{h}e:ŋ^1	ts^{h}e:ŋ^1	ts^{h}e:ŋ^1	ts^{h}e:ŋ^1	ts^{h}e:ŋ^1	ts^{h}e:ŋ^1
hɛŋ^1	(feŋ^1)	ts^{h}e:ŋ^1	ts^{h}e:ŋ^1	ts^{h}iaŋ^1	ts^{h}iaŋ^1
眼睛	eye		*ȶɕ^{h}a:		
ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}
hɔ:^{1}	ha:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}	ts^{h}a:^{1}

抬	lift		*ʈʂʰa:m		
tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1
hɔm^1	han^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰam^1

(b)			***Cuʈʂʰ**		
織	weave (fabric)		*Cuʈʂʰɯ:k		
tsʰɯ:ʔ^7	tsʰɯ:ʔ^7	fɯ:k^7	(fɯ:ʔ^7)	tsʰɯaʔ^7	tsʰɯ:ʔ^7
fɯək^2	fuʔ^4	fɯʔ^7	fɯk^7	fɯk^8	pfʰɯʔ^7
三	three		*Cuʈʂʰuʔ		
tsʰu:^{3}	tsʰu:^{3}	fu:^{3}	tsʰu:^{3}	tsʰu:^{3}	tsʰu:^{3}
fu:^{3}	fo:^{3}	fu:^{3}	fu:^{3}	fu:^{3}	pfʰu:^{3}
下面	bottom		*Cuʈʂʰəw		
tsʰaw^1	tsʰaw^1	fow^1	tsʰaw^1	tsʰaw^1	tsʰaw^1
faw^1	faw^1	faw^1	faw^1	faw^1	(pfaw^1)

(c)			***tçʰ**		
洞	hole		*tçʰu:ŋʔ		
tsʰu:ŋ^3	tsʰu:ŋ^3	tsʰu:ŋ^3	tsʰu:ŋ^3	tsʰuaŋ^3	tsʰu:ŋ^3
tsʰoŋ^3	suŋ^3	tsʰuŋ^3	tsʰuŋ^3	tsʰuŋ^3	tsʰuŋ^3
硬	hard		*tçʰə:nʔ		
tsʰan^3	tsʰo:n^3	tsʰo:n^3	tsʰo:n^3	tsʰɔ:n^3	tsʰɔ:n^3
tsʰan^3	sɔn^3	tsʰo:ŋ^3	tsʰo:ŋ^3	tsʰuaŋ^3	tsʰu:n^3
木杵	pestle		*tçʰa:k		
tsʰa:ʔ^7	tsʰe:ʔ^7	tsʰe:k^7	tsʰe:ʔ^7	tsʰe:ʔ^7	tsʰe:ʔ^7
tsʰɛk^2	sɛʔ^4	tsʰe:ʔ^7	tsʰɯ:^{2}	tsʰeʔ^8	tsʰiaʔ^7

2.3.1.3 Implosive and Plain Obstruents

The PHl plain and implosive stops and affricate are treated in this section. The modern reflexes of these initials are also very homogeneous. There is a noticeable difference in development between the anterior and posterior places of articulation, with the former being represented by implosive stops in the daughter languages, but the latter by plain obstruents.

(42) Reflexes of PHl implosive and plain obstruents

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*
ɓ	ɓ	ɓ	ɓ	ɓ	ɓ
ɗ	ɗ	ɗ	ɗ	ɗ	ɗ
ts	ts	ts	ts	ts	ts
k	k	k	k	k	k

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
ɓ	ɓ	ɓ	ɓ	ɓ	ɓ
ɗ~ts	ɗ	ɗ	ɗ	ɗ	ɗ
ts	ts	ts	ts	ts	t
k	k	k	k	k	k

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
b	b	p
d	d	t
tʃ	tʃ	tʃ
k	k	k

I reconstruct implosive stops at the bilabial and coronal places of articulation, but a plain affricate and stop at the palatal and velar places of articulation:

(43) *ɓ
*ɗ
*tç
*k

The areal dispersion of the implosive series across Hainan may have begun with the Hlai languages, and was the impetus for one of the greater areal changes which swept across unrelated languages of the entire island, bringing about the genesis of implosive initials in unrelated languages such as Hainanese, Hainan Mien (Yao), and Be (Shintani (1991)). Regarding the variation in Cunhua reflexes, see section 2.4.1 above.

For the third and fourth series of correspondences, I reconstruct *tç and *k. The development of *tç followed the uniform shift of all palatal affricates first to postalveolar affricates, then to alveolar affricates. The only variation in the reflexes of the daughter languages is that of Yuanmen in the palatal series, which is *t* instead of the expected *ts*. This is an example of systemic realignment, where a gap (the alveolar stop) in the plain stop series was filled by the change of *tç to *t*. The general path of change for the plain voiced series is shown below:

(44)	*PHl*	*Depalatalization*		*Alveolarization*		(*Desibilantization*: Yuanmen)
	*tç	>	tʃ	>	ts	(> t)

A typological parallel for this stop series can be found in Vietnamese (Ferlus 1992a), where in the time between Middle Vietnamese and modern Vietnamese, the plain bilabial and alveolar stops became imploded, while the postalveolar and velar stops did not (the postalveolar later deaffricated, filling the vacancy left by the original *t* after it became *ɗ*, similar to the case in Yuanmen). The series which resulted shows a cut-off at the same place of articulation, where all postalveolars fail to undergo implosion:

(45)	*Middle Vietnamese*	*Modern Vietnamese*
	p	ɓ <b>
	t	ɗ <đ>
	ts	t
	k	k

Likewise, at some point in the history of Khmer (Ferlus 1992b: 83), all prevocalic (that is, main-syllable initial) plain labial and alveolar stops became imploded while the palatal and velar stops remained unchanged:

(46)	*Pre-Khmer*	*Modern Khmer*
	p	ɓ
	t	ɗ
	c	c
	k	k

This asymmetry in the initial inventories of the above languages can be explained phonetically through the fact that palatal and velar implosives are more typologically marked, a result of the increase in difficulty articulating implosives as one moves further back in the vocal tract (Ladefoged & Maddieson (1996: 82)).

A comparison of reconstructions is given below:

(47)

		Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
	(a)	*ɓ	*ɓ	*ʔb	*(ʔ)b	*ɓ
	(b)	*ɗ	*ɗ	*ʔd	*(ʔ)d	*ɗ
	(c)	*ts	*ts	*c	*ɟ	*tç
	(d)	*k	*k	*k	*g	*k

Matisoff and Thurgood both reconstruct *ɓ and *ɗ for the first two series of correspondences, and *ts and *k for the second. All are in general agreement with the present reconstruction, although I also consider the reconstruction of a palatal affricate for the third series more appropriate than an alveolar one, for the same reasons given in section (2.4.2) above.

I consider Peiros's reconstruction of the first two series to be technically correct, but at a point in time previous to PHl; the reconstruction of *ʔb and *ʔd also violates Commonality, since the reflexes of the daughter languages uniformly indicate implosives. He reconstructs voiceless palatal and velar stops for the second series; I reject the reconstruction of a palatal stop for the reasons given in the previous section.

Ostapirat reconstructs the voiced stops *(ʔ)b, *(ʔ)d, *ɟ and *g. I consider this to be roughly approximate to a stage of Pre-Hlai, as there is no evidence for voiced initials amongst the reflexes of the daughter languages. This is another violation of Commonality since there is no synchronic evidence for plain voiced stops. The variation between preglottalized and plain *b and *d in Ostapirat's reconstruction is due to two distinct correspondences each in Jiamao.

Examples of the PHl voiced stops are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(48) Examples of PHl implosives, plain stop and affricate

(a) ***ɓ**

飛 fly *ɓin

ɓin¹	ɓin¹	ɓeɲ¹	ɓen¹	ɓen¹	ɓin¹
ɓen¹	ɓen¹	ɓen¹	ɓen¹	ɓen¹	ɓen¹

賊	thief		*ɓuj		
ɓuj^1	ɓuj^1	ɓuj^1	ɓuj^1	ɓuj^1	ɓuj^1
ɓɔj^1	ɓoj^1	ɓuj^1	ɓuj^1	ɓoj^1	ɓow^1
寬	wide		*ɓa:ŋ		
ɓe:ŋ^1	ɓe:ŋ^1	ɓe:ŋ^1	ɓe:ŋ^1	ɓe:ŋ^1	ɓe:ŋ^1
ɓɛŋ^1	ɓɛŋ^1	ɓe:ŋ^1	ɓe:ŋ^1	ɓiaŋ^1	ɓiaŋ^1
(b)			***ɗ**		
沸騰	boil		*ɗa:n		
ɗa:n^1	ɗa:n^1	ɗa:n^1	ɗa:n^1	ɗa:n^1	ɗa:n^1
tsɔn^1	ɗan^1	ɗa:ŋ^1	ɗa:ŋ^1	ɗa:ŋ^1	ɗuan^1
剝	to skin		*ɗa:ŋʔ		
ɗa:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3
ɗɛŋ^3	ɗeŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗiaŋ^3	ɗiaŋ^3
淡	insipid		*ɗəc		
ɗat^9	ɗat^7	ɗac^7	ɗat^7	ɗat^7	ɗat^7
tsiat^2	ɗaʔ^4	ɗat^7	ɗat^7	ɗat^8	ɗat^7
(c)			***tç**		
錢	money		*tçi:n		
tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1
(tθin^1)	tsin^1	tsiŋ^1	tsiŋ^1	tsiŋ^1	tin^1
潛水	dive		*tçom		
tsom^1	tsom^1	tsom^1	tsom^1	tsom^1	tsum^1
tsom^1	—	tsom^1	tsom^1	tsom^1	tom^1

睡	sleep		*tçə:n		
tso:n^{1}	tso:n^{1}	tso:n^{1}	tso:n^{1}	tsɔ:n^{1}	tsɔ:n^{1}
tsan^{1}	tsɔn^{1}	tso:ŋ^{1}	tso:ŋ^{1}	tsuaŋ^{1}	tu:n^{1}

(d)			***k**		
臭蟲	bedbug		*kɯp		
kɯp^{7}	kɯp^{7}	kɯp^{7}	kɯp^{7}	kup^{7}	kɯp^{7}
kup^{2}	kɛʔ^{4}	kɯp^{7}	kep^{7}	kop^{8}	kop^{7}
早	early		*ka:wʔ		
ka:w^{3}	ka:w^{3}	ka:w^{3}	ka:w^{3}	ka:w^{3}	ka:w^{3}
ka:w^{3}	kaw^{3}	ka:w^{3}	ka:w^{3}	ka:w^{3}	ka:w^{3}
白藤	white rattan		*kəc		
kat^{9}	kat^{7}	kac^{7}	kat^{7}	kat^{7}	kat^{7}
kiat^{2}	kaʔ^{4}	kat^{7}	kat^{7}	kat^{8}	kat^{7}

2.3.1.4 Fricatives

The reflexes of the PHl fricatives are the following:

(49) Reflexes of PHl fricatives

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*
p^{h}	f	f	f	f	f
p^{h}	f	f	f	f	f
t	t	t	t	t	t

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
f	f	f	f	f	pf^{h}
s	f	s	s	f	pf^{h}
tθ	f	s	s	ts^{h}	ts^{h}

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
pʰ	f	f
pʰ	—	f
t	—	tʃʰ

The Bouhin and Yuanmen reflexes above indicate that the Hlai voiceless fricatives had become strongly aspirated in Pre-Hlai; I therefore propose the following reconstructions:

(50) *fʰ
*fʰj
*sʰ

PHl *fʰ is reflected as *f* in all of the daughter languages except Yuanmen[8] and Bouhin. Regarding affrication at this place of articulation, a typological parallel exists in Hainanese (Norman 1969: 40), in which former Proto-Min aspirated stops have lenited to affricates:

(51)	*Proto-Min*	*Hainanese*
	*pʰ	f~pf~pfʰ~ɸ~pɸ
	*tʰ	h
	*tsʰ	s
	*kʰ	x

The evolution of this fricative has therefore probably taken a course such as the following:

(52)	Bouhin	*fʰ	>	pfʰ	>	pʰ
	Yuanmen	*fʰ	>	pfʰ		
	Other Hlai	*fʰ	>	f		

Palatalized *fʰj must be reconstructed in order to account for the alveolar fricatives in NCHl, and is reflected according to the correspondences given above in only one item, *tooth*. There is evidence for two more items with this initial based solely on Jiamao evidence (see chapter five). The development of *fʰj was the following:

8 The Yuanmen reflex, which is listed in Ouyang & Zheng (1983) as f⁽ʰ⁾, is actually described as an affricate pf⁽ʰ⁾

(53)	NWCHl, Meifu	*f^{h}j	>	ç	>	ʃ	>	s
	Other Hlai	*f^{h}j	>	f^h				

There was a shift of PHl *s^h to *t* throughout all of Hlai except NCHl, and it most likely occurred through an intermediate stage of *ts, as in the Vietnamese example above. *s^h underwent affrication to *ts^h* in the Run branch before merging with the reflex of *tç^h. It remains *s* in the Meifu branch, but shifted to *ϑ* in NWCHl with affrication to *tϑ* in Cunhua and a subsequent shift to *f* in Nadouhua. These developments are illustrated below:

(54)	NWCHl	*s^h	>	θ	>	tθ (Cun)/f (Nadou)
	Run	*s^h	>	ts^h		
	Meifu	*s^h	>	s		
	Other Hlai	*s^h	>	ts	>	t

A comparison of reconstructions is given below:

(55)		*Matisoff*	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
	(a)	*f	*p	*f	*-p-	*f^h
	(b)	—	—	—	*-ip-	*f^{h}j
	(c)	*s	*s	*s	*s	*s^h

Matisoff and Peiros reconstruct the first series as *f, and Thurgood as *p. I assume that the evidence Thurgood relies on to reconstruct a stop instead of a fricative is the Yuanmen reflex *pf^h* and the Bouhin reflex *p^h* under the assumption that they were retentions; as explained above, I understand these instead to be innovations (secondary fortitions), as the change of *p > *f* violates Directionality. Neither of them reconstruct anything for what is reconstructed here as *f^{h}j (which is very rare). Ostapirat reconstructs both as a medial *-p-, the latter with a preceding front high vowel, which fits into his system as a stop which undergoes frication intervocalically; without additional evidence for this reconstruction, this violates Commonality, since the majority of reflexes indicate *f.

Ostapirat's reconstruction of a medial consonant for the second series is legitimate given the Meifu data, but we differ in our reconstruction of the manner of the consonant itself. With the exception of aspiration, there is complete agreement about the reconstruction of the second series as *s[^{h}].

Examples of the PHl fricatives are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(56) Examples of PHl fricatives

(a)			***fʰ**		
雨	rain		*fʰun		
(pun^{1})	fun^{1}	fun^{1}	fun^{1}	fun^{1}	fun^{1}
fən^{1}	fɛn^{1}	foŋ^{1}	foŋ^{1}	foŋ^{1}	pfʰən^{1}
天	sky		*fʰa:ʔ		
(pa:^{3})	fa:^{3}	fa:^{3}	fa:^{3}	fa:^{3}	fa:^{3}
fɔ:^{3}	fa:^{3}	fa:^{3}	fa:^{3}	fa:^{3}	pfʰa:^{3}
皮	skin (of fruit)		*fʰa:k		
pʰa:ʔ^{7}	fe:ʔ^{7}	fe:k^{7}	fe:ʔ^{7}	fe:ʔ^{7}	fe:ʔ^{7}
fɛk^{2}	fɛʔ^{4}	fe:ʔ^{7}	fɯ:^{2}	feʔ^{8}	(pfiaʔ^{7})
(b)			***sʰ**		
成熟	ripe		*sʰɯ:k		
tɯ:ʔ^{7}	tɯ:ʔ^{7}	tɯ:k^{7}	tɯ:ʔ^{7}	tɯaʔ^{7}	tɯ:ʔ^{7}
tθɯək^{2}	feʔ^{4}	sɯʔ^{7}	sɯk^{7}	tsʰɯk^{8}	tsʰɯʔ7
水牛	water buffalo		*sʰujʔ		
tuj^{3}	tuj^{3}	tuj^{3}	tuj^{3}	tuj^{3}	tuj^{3}
tθɔj^{3}	foj^{3}	suj^{3}	suj^{3}	tsʰoj^{3}	tsʰow^{3}
洗	wash		*sʰə:k		
tak^{7}	to:ʔ^{7}	to:k^{7}	to:ʔ^{7}	tɔ:ʔ^{7}	tɔ:ʔ^{7}
tθak^{2}	fɔʔ^{4}	so:k^{7}	so:k^{7}	tsʰɔʔ^{8}	tsʰɔʔ^{7}
(c)			***fʰj**		
牙齒	tooth		*fʰjən		
pʰen^{1}	fan^{1}	fan^{1}	fan^{1}	fan^{1}	fan^{1}
sen^{1}	fen^{1}	sen^{1}	sen^{1}	faŋ^{1}	pfʰan^{1}

2.3.1.5 Interim Summary

A total of four classes of initials have been reconstructed in this subsection: aspirated stops, aspirated affricates, implosives and the plain stop and affricate, and fricatives. This half of the initial inventory is shown below:

(57)	*pʰ	*tʰ	*(Cu)ʈʂʰ	*tɕʰ	*kʰ
	*ɓ	*ɗ		*tɕ	*k
	*fʰ(j)	*sʰ			

There are several interesting asymmetries which are observable. The first is that implosive and plain initials are in complimentary distribution, according to anteriority of place of articulation. The distribution of the implosives is not typologically abnormal per se, as it is quite common for languages to have implosives at only the bilabial and alveolar places of articulation (Maddieson 1984: 112); it is less usual for these phonemes to lack plain counterparts with which they contrast (although less so in Southeast Asia, as shown above in examples (46–47). The contrast between a plain series and an aspirated series of stops, on the other hand, is very common (ibid.: 39).

The second is that the fricative series is defective according to the same criteria: fricatives exist at anterior places of articulation, but not posterior ones. This is also typologically regular, with the three most common fricatives being *s*, *ʃ*, and *f* (ibid.: 50).

Finally, coarticulations are very restricted, with palatal coarticulation being limited to *fʰ, and labiovelar coarticulation (in Central Hlai) limited to *ʈʂʰ. Palatalization of labials is not uncommon, but it is less common for postalveolars to have secondary articulations (ibid.: 38). These asymmetries are discussed and explained in chapter four, section 4.3.10.

2.3.2 *Sonorant Initials*

The sonorants are divided here into five categories: preaspirated nasals, medial nasals, laterals, approximants and preaspirated glides.

2.3.2.1 Preaspirated Nasals

The most common reflexes in this series are plain stops in low register. Only one language (Bouhin) has retained nasal reflexes. The reflexes in the other Hlai languages are relatively uniform, with only slight variations. The reflexes of the fifth series are quite different than those of the first four (bold font again indicates that the initial is correlated with low register):

(58) Reflexes of PHl preaspirated nasals

BHin	*Ha Em*	*LHut*	*Tzha*	*Zdui*	*Bting*
m	p	p	**p**	**p**$^{\mathbf{h}}$	**p**
n	t	t	**t**	**t**$^{\mathbf{h}}$	**t**
ɲ	ts	ts	**ts**	**ts**$^{\mathbf{h}}$	**ts**
ŋ	k	k	**k**	**k**$^{\mathbf{h}}$	**k**
v	v	hw	**v**	**v**	v

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
ɓ	**p**	**p**	p	p	**p**
ts	**t**	**t**	t	t	**t**
ts	**ts**	**ts**	ts	ts	**ts**
k	**k**	**k**	k	k	**k**
h	**ŋ/v**	**v**	v	v	**v**

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
m	**p**	p
n	**t**	t
ɲ	—	—
ŋ	**k**	k
v	**v**	v

I propose the reconstruction of a series of preaspirated nasals for these series:

(59) *hm
*hn
*hɲ
*hŋ
*hŋw

The Nadouhua reflexes of *hŋw may be conditioned by the following rime, as illustrated by the following examples:

(60) Split reflexes of PHl *hŋw in Nadouhua

Gloss	*PHl*	*Nadouhua*	*Gloss*	*PHl*	*Nadouhua*
yam	*hŋwəːj	ŋɔjʔ^4	day	*hŋwən	vanʔ^4
carry (water)	*hŋwəːjʔ	ŋɔj^3	sparse	*hŋwaːnʔ	van^3
ghost	*hŋwəːt	ŋɔʔ^4			

The hypothesis presented here is that preaspiration (which was lost in Bouhin) conditioned the reanalysis of original nasals as prenasalized stops in the Greater Hlai languages. I propose that this change occurred because Hlai nasals were truly preaspirated, and not merely voiceless. Bhaskararao & Ladefoged (1991) compare these two types of nasals, and find that preaspirated nasals in Angami (a Tibeto-Burman language of North Eastern India) are aspirated throughout the duration of the nasal, and that '… before the voicing for the vowel begins, the oral occlusion is released while air is still flowing out through the nose. The auditory impression is that there is an epenthetic voiceless plosive after the voiceless nasal and before the vowel.' This auditory impression could then lead to reanalysis and to the leftward migration of the velic opening, and the accompanying leftward migration of velic closure, resulting in the 'poststopping' of the nasals (Ladefoged & Maddieson 1996: 127–8):

(61) hm > hm^{b} > mb > **b**

During their duration as prenasalized voiced stops, these initials conditioned low register, only becoming voiceless stops when the nasal component of the initial was lost.

In general, the development of this class of initials was ultimately to plain voiceless stops, in low register if the language had undergone registrogenesis. Besides Bouhin, there are two other exceptions to this. The first is in Cunhua: instead of plain stops in low register, there are implosives in low register at the bilabial and alveolar places of articulation. This suggests that the Cunhua bilabial and alveolar reflexes participated in a late wave of implosion, perhaps at the time that implosives were entering the inventories of other non-Hlai languages around the island. The second exception is Zandui, the reflexes of which are aspirated instead of plain stops. I believe that the explanation for the aspirated Zandui initials is that they developed a particularly strong breathy-voiced release prior to devoicing. This breathy voice translated into aspiration after devoicing.

Below I show the various changes described above, using the labial nasals to stand for nasals at all places of articulation:

(62)	Cunhua	*hm	>	mb	>	**b**	>	**ɓ**
	Zandui	*hm	>	mb	>	**b**^{ɦ}	>	**p**^{h}
	Other Hlai	*hm	>	mb	>	**b**	>	**p**

The regular development of *hŋw was to merge with PHl *hw. In NWCHl, however, it seems to have been reanalyzed as ɦ in Cunhua; in Nadouhua, *ŋw* merely deaspirated:

(63)	NWCHl	*hŋw	>	ɦ (Cun)/ŋw (Nadou)	>	**h** (Cun)/**ŋ**/**v** (Nadou)
	Other Hlai	*hŋw	>	hw	>	hw/v

A comparison of reconstructions is given below:

(64) Comparison of reconstructions

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	*mb	*mʔ	*m	*-m-	*hm
(b)	*nd	*nʔ	*n	*-n-	*hn
(c)	*ndz	—	*ɲ	*-ɲ-	*hɲ
(d)	*ŋg	*ŋʔ	*ŋ	*-ŋ-	*hŋ
(e)	—	—	—	—	*hŋw

Matisoff (1988) reconstructs the prenasalized stops *mb, *nd, *ndz, *ŋg, for the first four series; this is the same as the present reconstruction of Greater Hlai, but cannot account for Bouhin (the change *mb > m violates Directionality), and therefore can't represent PHl. Thurgood (1991) reconstructs nasals with laryngeal constriction, *mʔ, *nʔ, and *ŋʔ, with nothing reconstructed at the palatal place of articulation (he reserves this slot in his system for another series of correspondences). Peiros reconstructs plain nasals, which I consider appropriate for Pre-Hlai, not Proto-Hlai (see chapter four); the reconstruction of plain nasals also lacks the explanatory power of inherent in the reconstruction of preaspirated nasals in providing a mechanism for change to oral stops. Ostapirat reconstructs medial *-m-, *-n-, *-ɲ-, *-ŋ-, and *-w-. He does this to distinguish this nasal series from what I reconstruct as the preglottalized nasal series (see below), arguing that initial nasals developed an allophonic glottal stop, another violation of Directionality. None of Matisoff, Thurgood, Peiros, or Ostapirat distinguish *hŋw from *hw, probably because the only reflexes which distinguish the two are found in NWCHl.

Examples of the PHl preaspirated nasals are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(65) Examples of PHl preaspirated nasals

(a)			***hm**		
蚂蚁	ant		*hmuc		
mut^7	put^7	puc^7	put^8	p^{h}ut^8	put^8
ɓət^4	puɛʔ^4	pət^7	pot^7	pot^8	pət^8
五	five		*hma:		
ma:^{1}	pa:^{1}	pa:^{1}	pa:^{4}	p^{h}a:^{4}	pa:^{4}
ɓɔ:^{4}	paʔ^4	pa:^{4}	pa:^{1}	pa:^{1}	pa:^{4}
湿	wet		*hmənʔ		
men^3	pan^3	pan^3	pan^6	p^{h}an^6	pan^6
ɓan^4	pan^3	pan^3	paŋ^3	paŋ^3	pan^6
(b)			***hn**		
老鼠	rat		*hniw		
niw^1	tiw^1	tiw^1	tiw^4	t^{h}iw^4	tiw^4
tsɔj^4	tiwʔ^4	tiw^4	tiw^1	tew^1	ti:w^4
六	six		*hnom		
nom^1	tom^1	tom^1	tom^4	t^{h}om^4	tum^4
tsem^4	tonʔ^4	tom^4	tom^1	tom^1	tom^4
長	long		*hna:wʔ		
na:w^3	ta:w^3	ta:w^3	ta:w^6	t^{h}a:w^6	ta:w^6
tsa:w^4	taw^3	ta:w^3	ta:w^3	ta:w^3	ta:w^6
(c)			***hɲ**		
粽子	dumpling		*hɲi:t		
—	—	tsi:t^7	tsi:t^8	ts^{h}i:t^8	tsi:t^8
tsit^4	tsiʔ^4	—	tsit^7	tsit^8	tsit^8

射	shoot		*hɲɯ:		
ɲəɰ^{1}	tsəɰ^{1}	tsəɰ^{1}	tsəɰ^{4}	ts^{h}əɰ^{4}	tsəɰ^{4}
—	—	tsəɰ^{4}	tsəɰ^{1}	tsəɰ^{1}	tsəɰ^{4}
自己	self		*hɲɯ:ʔ		
—	tsaɰ^{3}	tsaɰ^{3}	tsaɰ^{6}	ts^{h}aɰ^{6}	tsaɰ^{6}
tsɔ:^{4}	—	—	tsəɰ^{3}	tsaɰ^{3}	tsaɰ^{6}
(d)			***hŋ**		
針	needle		*hŋuc		
ŋut^{7}	kut^{7}	kuc^{7}	kut^{8}	k^{h}ut^{8}	kut^{8}
kət^{4}	kɛʔ^{4}	kət^{7}	kot^{7}	kot^{8}	kət^{8}
睡	sleep		*hŋu:ɦ		
ŋow^{2}	kaw^{2}	kaw^{2}	kaw^{2}	k^{h}o:^{2}	kɔ:^{2}
ka:^{5}	kaw^{2}	kaw^{2}	kaw^{2}	kaw^{2}	kaw^{2}
草	grass		*hŋənʔ		
ŋen^{3}	kan^{3}	kan^{3}	kan^{6}	k^{h}an^{6}	kan^{6}
kan^{4}	kan^{3}	kan^{3}	kaŋ^{3}	kaŋ^{3}	kan^{6}
(e)			***hŋw**		
疏	sparse		*hŋwa:nʔ		
va:n^{3}	va:n^{3}	hwa:n^{3}	va:n^{6}	va:n^{6}	va:n^{3}
hɔn^{4}	van^{3}	va:ŋ^{3}	va:ŋ^{3}	va:ŋ^{3}	vuan^{6}
日	day		*hŋwən		
ven^{1}	van^{1}	hwan^{1}	van^{4}	van^{4}	van^{1}
hon^{4}	vanʔ^{4}	van^{4}	vaŋ^{1}	vaŋ^{1}	van^{4}

搬運	transport[9]		*hŋwə:jʔ		
va:j^{3}	vo:j^{3}	hwo:j^{3}	va:j^{6}	va:j^{6}	va:j^{3}
—	ŋɔj^{3}	po:j^{3}	vo:j^{3}	vuaj^{3}	vu:j^{6}

2.3.2.2 Medial Nasals

This set of correspondences is very uniform across the daughter languages, which exclusively show nasal reflexes. Given that nasals are a class of sonorants, however, there is a surprisingly low number of languages in which they conditioned low register (indicated by bold font):

(66) Reflexes of PHl medial nasals

BHin	*Ha Em*	*LHut*	*Tzha*	*Zdui*	*Bting*
m	m	m	m	**m**	m
n	n	n	n	**n**	n
ɲ	ɲ	ɲ	ɲ	**n**	ɲ
ŋ	ŋ	ŋ	ŋ	**ŋ**	ŋ
ŋ	ŋ	ŋw	ŋw	**ŋ**	ŋ(w)

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
m	m	m	m	m	**m**
n	n	n	n	n	**n**
ɲ	ŋj	ɲ	ɲ	ɲ	**ɲ**
ŋ	ŋ	ŋ	ŋ	ŋ	**ŋ**
ŋ	ŋw	ŋ	ŋ	ŋ	**ɱ**

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
m	m	m
n	n	n
ɲ	—	ɲ
ŋ	ŋ	ŋ
ŋ	—	—

My solution to this problem is to reconstruct a set of medial nasals which eventually became preglottalized via temporal compression:

9 The initial in the Changjiang form for this word is irregular. It reflects an earlier *hm, which was the result of a mistransmission of *hŋw, providing unexpected confirmation of this reconstruction.

(67) *C-m
*C-n
*C-ɲ
*C-ŋ
*Cuŋ

In order to explain their tonal behavior (and adhere to Commonality by taking this into account), I suggest that these nasals had become preglottalized by the time of registrogenesis, in which case high register would be expected. Moreover, the two languages which do have reflexes in low register, Yuanmen and Zandui, could be explained as resulting from early deglottalization of these sonorants prior to registrogenesis. This explanation gains further weight when it is noted that these two languages are located at the geographic edges of Hainanese-speaking areas (in which a simple inventory of three plain nasals—*m, n, ŋ*—is the norm) where an 'exotic' feature such as preglottalization might be expected to be eroded due to language contact. This is illustrated below in (69):

(68)

	PHl			*Registrogenesis*			
Ymen, Zdui	*C-m	>	ʔm	>	**m**	>	**m**
Other Hlai	*C-m	>	ʔm	>	ʔm	>	m

The medial nasals have shown a remarkable degree of stability within the daughter languages. The only change which occurred (late, but across-the-board) is the loss of the initial glottal stop, which became possible without merger with the preaspirated nasals in all but Bouhin due to the shift of the latter to prenasalized stops in Greater Hlai. Preglottalization also acted as a buffer against change, preserving these sonorants intact segmentally when compared to their preaspirated counterparts:

(69)

*hm	>	mb	>	**b**	>	**p**
*C-m	>	ʔm	>	ʔm	>	m

In the development of *Cuŋ, vocalic transfer occurred in Central Hlai; the presyllable was lost in Bouhin and Ha Em before this could occur, possibly after neutralization of the vowel to schwa:

(70)

	*Cuŋ		
*Cəŋ	*Cuŋ		
*ʔŋ	*ʔŋ	*Cuŋw	
ŋ	ŋ	*ʔŋw	
BH	HE	Central Hl	

In terms of language-specific reflexes, *ʔm, *ʔn, and *ʔŋ, have all developed in a straightforward way. The palatal nasal *ʔɲ has 'broken' to *ŋj* in Nadou, becoming parallel with *ŋw*, and depalatalized to *n* in Zandui. The CHl labiovelar nasal *ʔŋw has merged (or is in the process of merging) with the reflexes of *ʔŋ in several languages; it became labiodentalized in Yuanmen.[10]

The various reconstructions of this class of nasals are given below:

(71) Comparison of reconstructions

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	*m	*m	*C-m	*m	*C-m
(b)	*n	*n	*C-n	*n	*C-n
(c)	*ɲ	*ɲ	*C-ɲ	*ɲ	*C-ɲ
(d)	*ŋ	*ŋ	*C-ŋ	*ŋ	*C-ŋ
(e)	*ŋw	*ŋw	*C-ŋw	*ŋw	*Cuŋ

Matisoff, Thurgood, and Ostapirat all reconstruct these as the plain sonorants *m, *n, *ɲ, *ŋ, and *ŋw, respectively. However, it is very problematic to reconstruct these as plain sonorants in view of their registral behavior, as only two out of seven of the registrogenetic languages show evidence of original voiced initials, which is what one would otherwise expect for plain sonorants. Ostapirat (2004:131) explains this as initial sonorants developing an allophonic glottal stop in initial position; however, this sort of change seems unnatural and is unprecedented in Southeast Asia, as far as I am aware.

Peiros's reconstruction of medial sonorants preceded by an initial stop is identical with the present reconstruction, save for the difference in *Cuŋ,

10 Yuanmen *ŋ* recorded by Ouyang and Zheng has merged completely with *m* in the speech of my Yuanmen consultants.

where it is assumed here that the labiovelar reflex only developed through vocalic transfer in the Central Hlai languages.

Examples of the PHl medial nasals are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(72) Examples of PHl medial nasals

(a) ***C-m**

掐	pinch		*C-mi:t		
mi:t^{7}	mi:t^{7}	mi:t^{7}	mi:t^{7}	mi:t^{8}	mit^{7}
mit^{2}	miʔ^{4}	mit^{7}	mit^{7}	(mit^{7})	mit^{8}
手	hand		*C-mɯ:		
məɰ^{1}	məɰ^{1}	məɰ^{1}	məɰ^{1}	məɰ^{4}	məɰ^{1}
mow^{1}	mɛw^{1}	—	məɰ^{1}	məɰ^{1}	məɰ^{4}
官	official		*C-mun		
mun^{1}	mun^{1}	mun^{1}	mun^{1}	mun^{4}	mun^{1}
mən^{1}	muɛn^{1}	mon^{1}	moŋ^{1}	moŋ^{1}	mən^{4}

(b) ***C-n**

竹筝	bamboo shoot		*C-nɯ:ŋ		
nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯaŋ^{4}	nɯ:ŋ^{1}
nɯəŋ^{1}	neŋ^{1}	nɯŋ^{1}	nɯŋ^{1}	nɯŋ^{1}	nɯŋ^{4}
皮膚	skin		*C-nə:ŋ		
naŋ^{1}	no:ŋ^{1}	no:ŋ^{1}	no:ŋ^{1}	nɔ:ŋ^{4}	nɔ:ŋ^{1}
naŋ^{1}	nɔŋ^{1}	no:ŋ^{1}	no:ŋ^{1}	nuaŋ^{1}	nuaŋ^{4}
水	water		*C-nəmʔ		
nom^{3}	nam^{3}	nom^{3}	nam^{3}	nam^{6}	nam^{3}
nam^{3}	nan^{3}	nam^{3}	nam^{3}	nam^{3}	nam^{6}

(c)			***C-ɲ**		
蚊子	mosquito		*C-ɲu:ŋ		
ɲu:ŋ^{1}	ɲu:ŋ^{1}	ɲu:ŋ^{1}	ɲu:ŋ^{1}	nuaŋ^{4}	ɲu:ŋ^{1}
ɲoŋ^{1}	ɲiw^{1}	ɲuŋ^{1}	ɲuŋ^{1}	ɲuŋ^{1}	ɲuŋ^{4}
鹽	salt		*C-ɲa:wʔ		
ɲa:w^{3}	ɲa:w^{3}	ɲa:w^{3}	ɲa:w^{3}	na:w^{6}	ɲa:w^{3}
ɲa:w^{3}	ŋja:^{3}	ɲa:w^{3}	ɲa:w^{3}	ɲa:w^{3}	ɲa:w^{6}
月(亮)	moon/month		*C-ɲa:n		
ɲa:n^{1}	ɲa:n^{1}	ɲa:n^{1}	ɲa:n^{1}	na:n^{4}	ɲa:n^{1}
ɲɔn^{1}	ŋjan^{1}	ɲe:n^{1}	ɲa:ŋ^{1}	ɲa:ŋ^{1}	ɲuan^{4}
(d)			***C-ŋ**		
哭	weep		*C-ŋi:ʔ		
ŋej^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{6}	ŋaj^{3}
ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{6}
肝	liver		*C-ŋa:n		
ŋa:n^{1}	ŋa:n^{1}	ŋa:n^{1}	ŋa:n^{1}	ŋa:n^{4}	ŋa:n^{1}
ŋɔn^{1}	ŋan^{1}	ŋa:ŋ^{1}	ŋa:ŋ^{1}	ŋa:ŋ^{1}	ŋuan^{4}
鰓	gill		*C-ŋa:k		
ŋa:ʔ^{7}	ŋe:ʔ^{7}	ŋe:k^{7}	ŋe:ʔ^{7}	ŋe:ʔ^{8}	ŋe:ʔ^{7}
ŋɛk^{2}	ŋeʔ^{4}	ŋe:ʔ^{7}	ŋɯ:^{2}	ŋeʔ^{8}	ŋiaʔ^{8}
(e)			***Cuŋ**		
稻草	rice straw		*Cuŋiŋʔ		
ŋiŋ^{3}	ŋiŋ^{3}	ŋwiŋ^{3}	—	—	—
ŋeŋ^{3}	ŋwɛn^{3}	ŋen^{3}	ŋen^{3}	ŋen^{3}	ɱen^{6}

戴	wear (hat)		*Cuɲəwʔ		
ɲaw³	ɲaw³	ɲwow³	—	ɲɔ:⁶	ɲɔ:³
ɲaw³	ɲɔ:³	ɲo:³	ɲwo:³	ɲo:³	mɲo:⁶
枕	rest head		*Cuɲa:n		
ɲa:n¹	ɲa:n¹	ɲa:n¹	ɲwa:n¹	ɲuan⁴	ɲa:n¹
—	—	ɲa:n¹	ɲa:n¹	ɲa:n¹	muan⁴

2.3.2.3 Laterals

There are four kinds of laterals which can be reconstructed for PHl:

(73) Reflexes of PHl laterals

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*
ɗ	ɬ	ɬ	ɬ	ɬ	ɬ
z	z	z	**ɬ**	**ɬ**	**ɬ**
l	l	l	l	l	l
l	l	pl	pl	p	pl

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
tθ	l	ɬ	ɬ	ɬ	ɬ
l	**z**	**z**	z	z	**ts**
l	l	l	l	l	l
ɓ~l	**pj**	**p**	pl	pl	pl

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
d	tl	ɬ
j	**tʰ**	ʒ
l	l	l
l	pl	pl

I treat the first and third series of laterals as analogous to the preaspirated and preglottalized nasals, respectively, reconstructing preaspirated and medial laterals. I reconstruct a palatalized lateral for the second series, and a medial lateral with preceding bilabial nasal stop for the final series:

(74) *hl
*hlj
*C-l
*m-l

The lateral liquid seems to have accommodated preaspiration more easily than the nasals, and shows uniform reflexes as a lateral fricative in all languages except NWCHl and Bouhin. In Cunhua, *ɬ* shifted to *tϑ*, merging with the reflex of original *sʰ. In Nadouhua, *ɬ* appears to have merely lost its aspiration, but must have done so fairly recently after it conditioned high register reflexes. There was a different kind of development in Bouhin:

(75)

	*hl		
*d		*hl	
ɗ	ɬ		*ɬ
BH	HE		Central Hl

That is, Bouhin *hl* hardened to *d*, after which it merged with *ɗ*.

The development of the medial laterals in the Greater Hlai languages is similar to the development of the nasals, and a contrast with the preaspirated laterals was maintained in the following way:

(76)	*hl	>	ɬ	>	ɬ
	*C-l	>	ʔl	>	l

In the case of *hlj, the majority of languages have lost all traces of the original lateral and simplified the cluster to a palatal glide *hj (which then evolved into the weak fricative *z*). The three exceptions to this are Cunhua, Yuanmen, and the Qi branch. Cunhua merely simplified in the opposite direction, maintaining the lateral but losing the palatal glide. In Yuanmen, the reflex of *hlj merged with the two reflex of *hrj. The fact that this did not occur in Baisha indicates that after the split of Run into Baisha and Yuanmen, *hlj developed into *hj in Baisha. In Yuanmen on the other hand, *hlj merged with *hrj into *ɾj before ultimately hardening to *dʝ*. This is shown below:

(77)	Baisha	*hlj	>	hj	>	ʝ	>	z
		*hrj	>	ɾj	>	dʝ	>	ts
	Yuanmen	*hlj	>	ɾj	>	**dʝ**	>	**ts**
		*hrj	>	ɾj	>	**dʝ**	>	**ts**

The reflexes in the languages of the Qi branch show a unique occurrence of the preaspirated lateral ɬ in low register. I hypothesize that *hlj developed narrower stricture in its palatal glide, and was reinterpreted as a voiced lateral fricative *ɮ, which conditioned low register before devoicing, merging with ɬ in high register:

(78) Qi *hlj > **ɮ** > **ɬ**

The cluster *m-l occupies a very unique position in the PHl phoneme inventory, as it continues to do today in the majority of the daughter languages where it is the single example of a stop-liquid cluster; these are common in various Tai languages (and in Proto-Tai), but non-existant in PHl except in this one case.

Although this cluster occurs in high register in most Central Hlai languages, it's occurrence in low register in Cunhua, Nadouhua, and Changjiang indicates an originally voiced initial. I propose that the originally sesquisyllabic sequence *m-l became a 'tight' cluster in Central Hlai due to temporal compression, and in so doing an excrescent stop was epenthesized between the nasal and lateral. The nasal element was eventually lost, but loss of this initial nasal and devoicing of the remaining voiced stop occurred at different times relative to registrogenesis. This stop epenthesis also appears to have been variable in Cunhua given the variation between its two reflexes of *m-l. This proposed evolution of *m-l is shown below:

(79)	Cunhua	*m-l	>	m-l~mbl	>	**l~bl**	>	**l~ɓ**
	Nadouhua	*m-l	>	mbl	>	**bl**	>	**pj**
	Changjiang	*m-l	>	mbl	>	**bl**	>	**p**
	Other CHl	*m-l	>	bl	>	pl	>	p(l)

As with other sesquisyllabic forms, it was normal for the sesquisyllable to merely be dropped in Bouhin and Ha Em:

(80) *m-l

*l   *m-l

l   l   *mbl

BH   HE   CHl

A comparison of reconstructions is given below:

(81) Comparison of reconstructions

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	*ɬ	*ɬʔ	*hl	*-l-	*hl
(b)	*z	*ljʔ	*z	*-il-	*hlj
(c)	*l	*l	*C-l	*l	*C-l
(d)	*pl	*pl	*pl	*p-l	*m-l

Matisoff reconstructs the first series as *ɬ, and Peiros *hl, in line with the present reconstruction. It is unclear to me why Thurgood reconstructs *ɬʔ, indicating glottal constriction, although he may be relying on the evidence of the Bouhin reflex *ɗ*. Ostapirat reconstructs medial *-l-, which underwent intervocalic fortition as a result of its medial position on analogy with his intervocalic nasal series.

Matisoff and Peiros reconstruct *z for the second series, which I consider untenable given the lateral reflexes which exist in Cunhua and the Qi branch (thereby violating Commonality, as well as Directionality in the case of the postulated change *z > *ɬ*). Thurgood reconstructs *ljʔ and Ostapirat medial *-il-, both of which are closer to the present reconstruction. I differ with Ostapirat on account of the Bouhin and Ha Em evidence which shows that the PHl initial must have already been palatalized before the breakup of the proto-language.

Matisoff, Thurgood, and Ostapirat reconstruct *l for the third series, whereas Peiros reconstructs *C-l, in line with the present reconstruction. The reason for not reconstructing this as an initial lateral is the same as the case of the plain nasals—the occurrence of all forms in high register except for Yuanmen and Zandui, indicating that the PHl form was originally sesquisyllabic and began with a voiceless obstruent. The occurrence of this initial in the low register or Yuanmen and Zandui finds its explanation in the same circumstances as the preglottalized nasals—early deglottalization occurred before registrogenesis, most likely as a result of contact with non-Hlai languages.

Matisoff, Thurgood, and Peiros all reconstruct *pl for the final series, and Ostapirat reconstructs *p-l, indicating an original sesquisyllable. The problem with the reconstruction of this cluster as *p-l is the fact that it is in low register in three of the four registrogenetic NCHl languages, where *p is expected to condition high register, although I agree with Ostapirat that the PHl form specifically represents a sesquisyllable, not a tight cluster.

Examples of the PHl laterals are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(82) Examples of PHl laterals

(a) ***hl**

深	deep		*hlə:k		
ɗak^7	ɬo:ʔ^7	ɬo:k^7	ɬo:ʔ^7	ɬɔ:ʔ^7	ɬɔ:ʔ^7
tθak^2	lɔʔ^4	ɬo:k^7	ɬo:k^7	ɬoʔ^8	ɬoʔ^7
二	two		*hlu:ʔ		
ɗow^3	ɬaw^3	ɬaw^3	ɬaw^3	ɬaw^3	ɬaw^3
tθa:(j)^3	law^3	ɬaw^3	ɬaw^3	ɬaw^3	ɬaw^3
血	blood		*hla:c		
ɗa:t7	ɬa:t^7	ɬa:c^7	ɬa:t^7	ɬa:t^7	ɬa:t^7
tθɔt^2	laʔ^4	ɬo:t^7	ɬo:t^7	ɬa:t^8	ɬuat^7

(b) ***hlj**

螞蟥	water leech		*hljiŋ		
ziŋ^1	ziŋ^1	ziŋ^1	ɬiŋ^4	ɬiŋ^4	ɬiŋ^4
liŋ^4	zeŋʔ^4	—	zen^1	zen^1	tsen^4
脖子	neck		*hljoŋʔ		
zoŋ^3	zuŋ^3	zoŋ^3	ɬoŋ^6	ɬoŋ^6	ɬɔŋ^6
lɔŋ^4	zaŋ^3	juaŋ^3	zɔŋ^3	zɔŋ^3	tsɔŋ^6

耳朵	ear[11]		*hl̩jəj		
zaj^{1}	zaj^{1}	zaj^{1}	ɬaj^{4}	ɬaj^{4}	ɬaj^{4}
laj^{4}	najʔ^{4}	zaj^{4}	zaj^{1}	zaj^{1}	tsaj^{4}
(c)			***C-l**		
(長)大	big		*C-luŋ		
luŋ^{1}	luŋ^{1}	loŋ^{1}	loŋ^{1}	luŋ^{4}	luŋ^{1}
loŋ^{1}	loŋ^{1}	luŋ^{1}	loŋ^{1}	luŋ^{1}	luŋ^{4}
鱗	fish scale		*C-lə:p		
lap^{7}	lo:p^{7}	lo:p^{7}	lo:p^{7}	lɔ:p^{8}	lɔ:p^{7}
lap^{2}	lɔʔ^{4}	lo:p^{7}	lo:p^{7}	luap^{8}	luap^{8}
遠	far		*C-ləj		
laj^{1}	laj^{1}	laj^{1}	laj^{1}	laj^{4}	laj^{1}
laj^{1}	laj^{1}	laj^{1}	laj^{1}	laj^{1}	laj^{4}
(d)			***m-l**		
嫩	tender		*m-lɯ:k		
lɯ:ʔ^{7}	lɯ:ʔ^{7}	plɯ:k^{7}	plɯ:ʔ^{7}	—	plɯ:ʔ^{7}
lɯək^{4}	pjuʔ^{4}	pɯʔ^{7}	plɯk^{7}	—	plɯʔ^{8}
房子	house		*m-loŋʔ		
—	luŋ^{3}	ploŋ^{3}	ploŋ^{3}	poŋ^{3}	plɔŋ^{3}
—	pjaŋ^{3}	pɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}

11 The Nadouhua initial is irregular, having assimilated under the influence of the initial syllable of this word, the full form being *nu^{2} najʔ^{4}*.

瞎	blind		*m-la:w		
la:w^{1}	la:w^{1}	pla:w^{1}	pla:w^{1}	pa:w^{1}	pla:w^{1}
ɓa:w^{4}	pjawʔ^{4}	pa:w^{4}	pla:w^{1}	pla:w^{1}	pla:w^{1}

2.3.2.4 Approximants

The set of combined approximants (including the rhotics) is large, owing to the fact that some may occur plain as well as accompanied by one or both of two coarticulated glides. The plain approximants developed in a rather straightforward manner; those with secondary articulations, on the other hand, seem to have been very unstable and often follow very divergent paths. Only the coronal approximants were able to support coarticulations, there being no evidence for coarticulated bilabial approximants.

There is a certain asymmetry in this class of initials, in that there is evidence in Meifu for an initial glottal stop at the onset of some, but not others. The hypothesis presented here is that all of these initials were once medial, an issue that is explored further in chapter four. For now, an initial consonant is automatically reconstructed in all cases.

The reflexes of the PHl approximants are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(83) Reflexes of the PHl approximants

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*
v	v	v	**f**	**v**	v
r	r	r	**r**	**l**	**l**
z	z	r	**t**	**t^{h}**	**t**
r	r	v	**f**	**f**	**f**
r	g	g	**g**	**h**	**h**
z	z	r	**t**	**t^{h}**	**t**
r	g	gw	**gw**	**v**	**hw**

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
v	**v**	**v**	v	v	**v**
l	**l**	**l**	r	r	**r**
l	**l**	**t**	t	t	t
v	**v**	kw	ɣ	f	**f**
h	**ŋ**	**g**	x	x	k^{h}

z	**l**	**t**	t	ts	**ts**
v	**ŋ/v**	kw	ɣ	v	v

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
v	v	v
d(r)	l	ɮ
j	t	t
d(r)	f	f
j	t	tʃ
d(r)	Ø	x
d(r)	v	v

I reconstruct the following approximants for the sets of correspondences above:

(84) *ʋ
*ɾ
*ɾj
*Cuɾ
*hr
*hrj
*Cuhr

The palatalized *ɾj and *hrj, and sesquisyllabic *Cuɾ and *Cuhr, must be reconstructed in order to account completely for the wide range of reflexes in the daughter languages, thus adhering to Commonality.

2.3.2.4.1 *Labiodental Approximants*
With the exception of Cunhua, Lauhut and Tongzha, the reflexes of *ʋ have merged almost completely with those of *hw. The Cunhua reflex is *v* in low register (compared to *v* in high register from *hw), the Lauhut reflex is *v* (as opposed to *hw* from *hw), and the Tongzha reflex is *f* in low register (instead of *v* in high register from *hw). The parallel changes in these three languages which show a distinction between *ʋ and *hw are shown below:

(85)	Cunhua	*ʋ	>	ʋ	>	**v**
		*hw	>	hw	>	v
	Lauhut	*ʋ	>	ʋ	>	v
		*hw	>	hw	>	hw
	Tongzha	*ʋ	>	v	>	**f**
		*hw	>	w	>	**v**

Hlai *v* is generally a very weak fricative in all languages, so that the change from *ʋ to *v* would have required only a slight increase in stricture.

2.3.2.4.2 *Alveolar Approximants*

In the case of PHl *ɾ, the flap is still retained in several languages. The most common changes are from *ɾ to *l* and from *ɾ to a trilled *r*. For the second and third series, I reconstruct *ɾj and *Cuɾ respectively. Based on the Bouhin and Ha Em reflexes (which preserve evidence of only a palatal glide), vocalic transfer had already occurred in Pre-Hlai *Ciɾ (> PHl *ɾj). The same was not true of *Cuɾ, which did not undergo vocalic transfer until the divergence of Central Hlai:

(86) *Cuɾ

*ɾ *Cuɾ

ɾ ɾ *Cuɾw

BH HE Central Hl

The development of *ɾj and *Cuɾ has been roughly parallel in Central Hlai. There seems to be a general division between languages in which these initials remained approximants or were reduced to glides, and those in which they underwent fortition to voiced obstruents. The first category includes Lauhut and NWCHl; fortition did not occur in these languages:

(87) _Evolution of *ɾj and *Cuɾ: no fortition of approximant_

Lauhut	*ɾj	>	ɾ	>	r
	*Cuɾw	>	w	>	v
NWCHl	*ɾj	>	ɾ	>	l
	*Cuɾw	>	w	>	v

In all instances, the presyllable was lost. *ɾj lost its palatal coarticulation as well, but in all cases the tap of Central Hlai *Cuɾw was lost, leaving only the labiovelar glide.

The second category includes the NECHl and Qi subgroups, where the approximant portion of *ɾj and (with the exception of Meifu) *Cuɾw did undergo fortition. A chain shift is observable, as it was in these three branches (as well as Lauhut) that original *ɾ became trilled *r, allowing original *ɾj to depalatalize to *ɾ and fill the vacancy left by this change. It was this tap (and its labialized counterpart) which underwent fortition, leading to final stops and fricatives in the daughter languages:

(88)							1st Devoicing		2nd Devoicing
Meifu	*ɾ	>	r	>	r	>	r	>	r
	*ɾj	>	ɾ	>	ɾ	>	d	>	**t**
	*Cuɾw	>	C-w	>	ʔw	>	ʔw	>	kw/ɣ
Run	*ɾ	>	r	>	r	>	r	>	r
	*ɾj	>	ɾ	>	d	>	t	>	t
	*Cuɾw	>	ɾw	>	ɾw	>	v	>	**f**
Qi	*ɾ	>	r	>	r	>	r	>	r
	*ɾj	>	ɾ	>	ɾ	>	d	>	**t**⁽ʰ⁾
	*Cuɾw	>	ɾw	>	ɾw	>	v	>	**f**

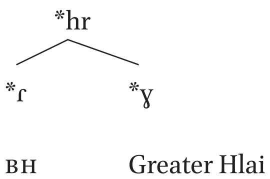
The general tendency was, more specifically, for *ɾ to harden to *d*. If *ɾ hardened prior to registrogenesis (as in Run), it underwent devoicing at this point and shows high register reflexes; if it hardened after registrogenesis (as in Meifu and Qi), then it conditioned low register reflexes before finally devoicing.

*Cuɾw developed through an intermediate stage of *v in both Run and Qi before finally devoicing to *f* in low register. In Meifu, there was a development directly to *ʔw, paralleling the case of *Cuhrw below, where the glottal stop was preserved at the expense of the approximant.

2.3.2.4.3 *Rhotic Approximants*

The first division within Hlai occurred early (see chapter 1), with the Bouhin reflex of *hr being an alveolar tap, but with *hr shifting to a velar fricative *ɣ in Greater Hlai:

(89)



Palatalized *hrj, on the other hand, merged largely with *ɾj in the Hlai daughter languages. It can only be distinguished based on reflexes in the NCHL languages Cunhua (**l** versus **z**) and Run (*d versus *dʝ).

Vocalic transfer in *Cuhr did not occur outside of Central Hlai, however, so that the timing of the changes in *hr itself and vocalic transfer occurred in the following way, with the presyllable leaving no trace in Bouhin and Ha Em, and original *hr and *Cuhr merging in these two languages:

(90) *Cuhr

*hr *Cuɣ

ɾ g *Cuɣw

BH HE Central Hl

The Nadouhua reflexes seem, as in the case of PHl *hŋw, to be conditioned by the following rime, with *v* occurring before *a*, and *ŋ* occurring elsewhere:

(91)

Gloss	*PHl*	*Nadouhua*	*Gloss*	*PHl*	*Nadouhua*
with	*Cuhru:	ŋɛwʔ⁴	to plant	*Cuhra:	vaʔ⁴
run	*Cuhru:ɦ	ŋɛw²			
head	*Cuhrəwʔ	ŋɔ:³			

The change from *Cuɣw to *ʔw occurred in all NCHl languages except for Nadouhua. The various paths of change in CHl are given below:

(92)

					Devoicing		*Registrogenesis*		
Run	*ɣ	>	ɣ	>	x	>	x	>	x/kʰ
	*Cuɣw	>	ʔw	>	ʔw	>	ʔw	>	v
Moyfaw	*ɣ	>	ɣ	>	x	>	x	>	x
	*Cuɣw	>	ʔw	>	ʔw	>	ʔw	>	ɣ
Changjiang	*ɣ	>	ɣ	>	ɣ	>	**ɣ**	>	**g**
	*Cuɣw	>	ʔw	>	kw	>	kw	>	kw
Other CHl	*ɣ	>	ɣ	>	ɣ	>	**ɣ**	>	**g/h/ŋ**
	*Cuɣw	>	ɣ(w)/w	>	ɣ(w)/w	>	**ɣ(w)/w**	>	**g(w)/ h(w)/ ŋ/v**

A comparison of reconstructions is given below:

(93) Comparison of reconstructions

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	*v	*wʔ	*v	*-ʋ-	*ʋ
(b)	*r	*rʔ	*r	*-r-	*ɾ
(c)	—	—	—	*-ir-	*ɾj
(d)	*vr	*prʔ	*zw	*-ur-	*Cuɾ
(e)	*ɮ/*ɣ	*ɮʔ/*ɣ	*rw/*ɣ	*-ʀ-/*–g-	*hr
(f)	—	—	—	*-ir-	*hrj
(g)	*ɣw	*ɣw	*ɣw	*-uʀ-/*-ug-	*Cuhr

Matisoff and Peiros reconstruct the first series as *v (which in the present system would have devoiced to *f* in the daughter languages), and Thurgood as *wʔ (which fails to explain the Tongzha reflex). Ostapirat's reconstruction of intervocalic *-ʋ- is in agreement with the one given here.

Matisoff and Peiros reconstruct *r, Thurgood *rʔ, and Ostapirat medial *-r- for the second series. The problem with the reconstruction of *r for this series in the present reconstruction is that there is a more suitable candidate for *(h)r based on the fifth series of correspondences in (83). A tap, however, is consistent with the evidence if it can be assumed that it can change to a trill; given the propensity within the Hlai languages toward airstream activity in the initials (i.e. the aspirated obstruents and preaspirated sonorants), this seems entirely reasonable.

None of Matisoff, Thurgood, or Peiros offer a reconstruction for the third or sixth series, although Matisoff notes a couple of examples and states that a cluster must be reconstructed; Ostapirat proposes medial *-ir- for these without distinguishing them. I prefer to reconstruct a palatalized tap for the third series, which allows a more direct explanation for how it can fill the gap left by former *ɾ in the languages where this occurs, and it is a better candidate for fortition to *d (satisfying Directionality); I reconstruct palatalized *hrj for the fifth series.

For the fourth series, Matisoff reconstructs *vr, Thurgood *prʔ (in parallel with their *fr and *pr, respectively), Peiros *zw (parallel to his *sw), and Ostapirat medial *-ur-. Matisoff and Thurgood probably also set up *r clusters here based on a combination of labiodental reflexes and Moyfaw *ɣ*; reconstruction of an *r cluster for this series is again a violation of Economy, since the reconstruction of a labial element is all which is necessary to explain the modern reflexes. I prefer to reconstruct *Cuɾ, which has the benefit of explaining the lack of labialization in Bouhin and Ha Em, its parallel development (in terms of fortition) with *ɾj, and the Meifu reflex *ʔw, which is understandable under the assumption of a presyllable initial pre-empting the medial tap.

Matisoff reconstructs the fifth series as either *ɮ or *ɣ, depending on the Bouhin reflex, and Thurgood does the same with near-identical *ɮʔ and *ɣ; Peiros also adopts an alternation between *rw and *ɣ, and Ostapirat reconstructs medial *-ʀ- or *–g-. These split reflexes are all based on the variation in Bouhin between *r* and *g*, the latter of which I have identified in chapter one as the result of loans from Ha Em, which means that the second variant in each reconstruction is based on data which should ultimately not be considered. The reconstruction of a lateral *ɮ cannot account as elegantly for the split in reflexes between Bouhin (the change *ɮ to *r* violates Directionality) and Greater Hlai (the reconstruction *ɣ fits into Matisoff's and Peiros's system of voiced fricatives (along with *v and *z)). Ostapirat's reconstruction of a uvular trill does not account for the Bouhin reflex adequately. Peiros's *rw is closer to my reconstruction, although the reconstruction of a labiovelar coarticulation for *this* series (as opposed to the seventh) seems unmotivated; Peiros's reconstruction of *rw contrasts with his *r, but is strange in that the reflexes between the two series have little in common except in Bouhin.

The reconstruction of *ɣw (and *-ug-) for the final series is unmotivated, as it is again based on what I consider to be loans from Ha Em. I agree with Ostapirat, however, in positing a preceding *u* for this initial.

Examples of the PHl approximants are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(94) Examples of PHl approximants

(a) ***ʋ**

上衣	clothes		*ʋa:ŋʔ		
ve:ŋ^3	ve:ŋ^3	ve:ŋ^3	fe:ŋ^6	ve:ŋ^6	ve:ŋ^3
vɛŋ^4	vɛŋ^3	ve:ŋ^3	ve:ŋ^3	viaŋ^3	viaŋ^6
肩膀	shoulder		*ʋa:ɦ		
va:^{2}	va:^{2}	va:^{2}	fa:^{2}	va:^{2}	va:^{5}
vɔ:^{5}	va:^{2}	va:^{2}	va:^{2}	va:^{5}	va:^{2}
弓	bow		*ʋəc		
vat^9	vat^7	vac^7	fat^8	vat^8	vat^7
viat^4	vaʔ^4	vat^7	vat^7	vat^8	vat^8

(b)			***ɾ**		
窩	nest		*ɾu:k		
ru:ʔ^7	ru:ʔ^7	ru:k^7	ru:ʔ^8	luaʔ^8	lu:ʔ^8
lok^4	luʔ^4	luʔ^7	ruk^7	ruk^8	ruʔ^8
腸	intestine		*ɾa:jʔ		
ra:j^3	ra:j^3	ra:j^3	ra:j^6	la:j^6	la:j^6
la:(j)^4	laj^3	la:j^3	ra:j^3	ra:j^3	ruaj^6
星星	star		*ɾa:w		
ra:w^1	ra:w^1	ra:w^1	ra:w^4	la:w^4	la:w^4
la:w^4	laʔ^4	la:w^4	ra:w^1	ra:w^1	ra:w^4
(c)			***ɾj**		
瞞	conceal		*ɾjom		
zom^1	zom^1	rom^1	tom^4	tʰom^4	tum^4
—	l[u]nʔ^4	tom^4	tom^1	tom^1	tom$^{[4]}$
舉	lift		*ɾjɯnɦ		
zɯn^2	zɯn^2	rɯn^2	tɯn^2	—	tɯn^2
—	—	—	təŋ^2	təŋ^2	tən^5
壞	bad		*ɾja:k		
za:ʔ^7	ze:ʔ^7	re:k^7	te:ʔ^8	tʰe:ʔ^8	te:ʔ^8
lɛk^4	leʔ^4	te:ʔ^7	tɯ:^{2}	teʔ^8	(tiaʔ^7)
(d)			***Cuɾ**		
生	raw		*Cuɾi:p		
ri:p^7	ri:p^7	vi:p^7	ɦi:p^8	ɦi:p^8	ɦi:p^8
vip^4	—	kip^7	ɣip^7	ɦip^8	ɦip^8

骨頭	bone		*Cuɾɯ:k		
rɯ:ʔ^{7}	rɯ:ʔ^{7}	vɯ:k^{7}	fɯ:ʔ^{8}	fɯaʔ^{8}	fɯ:ʔ^{8}
vɯək^{4}	vuʔ^{4}	kɯʔ^{7}	ɣɯk^{7}	fɯk^{8}	fɯʔ^{8}
地	earth		*Cuɾən		
ren^{1}	ran^{1}	van^{1}	fan^{4}	fan^{4}	fan^{4}
—	vanʔ^{4}	kwaŋ^{1}	ɣaŋ^{1}	faŋ^{1}	fan^{4}
(e)			***hr**		
辣	spicy		*hrit		
rit^{7}	git^{7}	gec^{7}	get^{8}	het^{8}	hit^{8}
het^{4}	(zeʔ^{5})	(git^{7})	xet^{7}	xet^{8}	k^{h}et^{7}
網	net		*hrə:jʔ		
ra:j^{3}	go:j^{3}	go:j^{3}	ga:j^{6}	ha:j^{6}	ha:j^{6}
hɔ:(j)^{4}	ŋɔj^{3}	go:j^{3}	xo:j^{3}	xuaj^{3}	k^{h}u:j^{3}
咱們	we (incl)		*hrəw		
ru:^{1}	gaw^{1}	ga:^{1}	gaw^{4}	haw^{4}	how^{4}
ha:^{5}	ŋawʔ^{4}	gaw^{4}	xaw^{1}	xə:^{1}	k^{h}oʔ^{7}
(f)			***hrj**		
笑	laugh		*hrja:w		
za:w^{1}	za:w^{1}	ra:w^{1}	ta:w^{4}	t^{h}a:w^{4}	ta:w^{4}
za:w^{4}	laʔ^{4}	ta:w^{1}	ta:w^{1}	tsa:w^{1}	tsa:w^{4}
玩	play		*hrjɯ:k		
zɯ:ʔ^{7}	zɯ:ʔ^{7}	rɯ:k^{7}	tɯ:ʔ^{8}	t^{h}ɯaʔ^{8}	tɯ:ʔ^{8}
zɯək^{4}	leʔ^{4}	tɯk^{7}	tɯk^{7}	(tɯk^{7})	—

小腿	calf (of leg)		*hrjinʔ		
zin^{3}	zin^{3}	reɲ^{3}	ten^{6}	t^{h}en^{6}	tin^{6}
—	—	—	(ren^{3})	tsen^{3}	tsen^{6}
(g)			***Cuhr**		
跑	run		*Cuhru:ɦ		
row^{2}	gow^{2}	gow^{2}	gow^{2}	—	how^{2}
vaw^{5}	ŋɛw^{2}	kow^{2}	ɣow^{2}	vow^{2}	vow^{5}
頭	head		*Cuhrəwʔ		
raw^{3}	gaw^{3}	gwow^{3}	go:^{6}	ho:^{6}	hɔ:^{6}
vaw^{3}	ŋɔ:^{3}	ko:^{3}	ɣo:^{3}	vo:^{3}	vo:^{3}
種	to plant		*Cuhra:		
ra:^{1}	(ra:^{1})	gwa:^{1}	go:^{6}	(va:^{4})	hwa:^{4}
vɔ:^{4}	vaʔ^{4}	kɔ:^{1}	ɣa:^{1}	va:^{1}	va:^{1}

2.3.2.5 Glides

Two of the PHl glides were originally preaspirated, and their reflexes are for the most part entirely straightforward. One glide was medial:

(95) Reflexes of PHl glides

BHin	*Ha Em*	*LHut*	*Tzha*	*Zdui*	*Bting*
z	z	z	**z**	**z**	z
v	v	hw	**v**	**v**	v
p	f	f	f	f	f

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
z	**z**	**z**	z	z	**z**
v	**v**	**v**	v	v	**v**
f	f	kw	ɣ	f	f

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
j	—	ʒ
v	**v**	v
p	f	f

The following are reconstructed for the two series above:

(96) *hj
*hw
*C-w

As a general rule, the primary change which has occurred in the initial glides is an increase in stricture to the weak fricatives *z* and *v*. It is possible that this was motivated by their preaspiration, which may have provided a percept of frication which became confused with the following glide, becoming susceptible to reanalysis as a fricative via temporal compression. In almost all cases, this change occurred before registrogenesis, creating an environment (voiced obstruents) which would condition low register.

The three exceptions to this scenario are Cunhua, Lauhut (for *hw only), and Baoting. In Cunhua and Baoting, the glides developed as described above except for the fact that they conditioned high register, not the expected low register which occurs in the other registrogenetic languages. I believe the best explanation for the registral behavior in these two languages is merely that they experienced the change from *hj*/*hw* to *z*/*v* after registrogenesis, since as preaspirated fricatives they would have conditioned high register. In the case of Lauhut *hw*, the best explanation is that it is conservative, and preserves the original reflex of PHl *hw. These developments are illustrated below:

(97)

			Registrogenesis		
Cunhua &	*hj	>	hj	>	z
Baoting	*hw	>	hw	>	v
Lauhut	*hj	>	hj	>	z
	*hw	>	hw	>	hw
Other Hlai	*hj	>	**ʝ**	>	**z**
	*hw	>	**v**	>	**v**

I reconstruct the third series as *C-w, since there is evidence for a glottal stop derived from the initial consonant of *C-w in the Meifu branch. In most languages, the presyllable was eventually lost, with medial *w* undergoing fortition to *β* and devoicing to *ɸ* in accordance with the constraint against initial voiced obstruents; it then merged with *f*. The distinction between original *fʰ and *β is preserved in both Bouhin and Yuanmen, where reflexes of PHl *fʰ are aspirated, but those of PHl *C-w are not:

(98)	Bouhin	*fʰ	>	pᶠʰ	>	pʰ		
		*C-w	>	ɸ	>	f	>	p
	Yuanmen	*fʰ	>	pᶠʰ				
		*C-w	>	ɸ	>	f	>	pf

The single exception to the development of *C-w into a labiodental fricative occurs in Meifu, which preserved the original form; this contrasts with the development in the other Hlai languages, where the presyllable was lost, leaving *β* vulnerable to devoicing in initial position (see section 2.2.1):

(99)	Meifu	*C-w	>	*C-w	>	*ʔw	>	kw (CJ)/ɣ (MF)
	Other Hlai	*C-w	>	*β	>	*ɸ	>	f

A Comparison of reconstructions is given below:

(100)		*Matisoff*	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
	(a)	*j	*j	*j	*-j-	*hj
	(b)	*w	*w	*w	*-w-	*hw
	(c)	*fr	*pr	*hw	*-up-	*C-w

Matisoff, Thurgood, and Peiros all reconstruct these two series as *j and *w, respectively. The weakness of this reconstruction is that it doesn't explain the registral behavior in Cunhua and Baoting, or the unique Lauhut reflex of *hw* in the second series.

Ostapirat reconstructs medial *-j- and *-w-, positing intervocalic fortition of sonorants as he does in the case of the nasals and lateral. As in those cases, the fortition of a sonorant intervocalically is rather counter-intuitive.

The third series is reconstructed as *fr by Matisoff, *pr by Thurgood (parallel to their *f and *p, respectively), and *hw by Peiros. I presume that Matisoff and Thurgood both reconstruct an *r cluster to account for the initial in Moyfaw (*ɣ*), which is the regular reflex of either *r or *r clusters in many parts of Kra-Dai, including Hlai (see previous section). However, the Changjiang reflex *kw* (which neither Matisoff nor Thurgood were aware of), when presented next to Moyfaw *ɣ*, indicates that the Meifu reflex is best reconstructed as *ʔw. The principle of Economy can therefore be invoked, since less change is involved between *C-w and the reflexes of the daughter languages than between *fr or *pr and the same reflexes. Ostapirat does also not explain the important distinction between aspirated and unaspirated reflexes in Bouhin and Yuanmen, in that they differentiate between PHl *fʰ and *C-w.

Examples of the PHl glides are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(101) Examples of PHl glides

(a)			***hj**		
蛋/卵	egg		*hjɯ:m		
zɯ:m^1	zɯ:m^1	zɯ:m^1	zɯ:m^4	zu:m^4	zɯ:m^1
zum^1	zunʔ^4	zum^1	zum^1	zum^1	zum^4
老	old		*hja:		
za:^{1}	za:^{1}	za:^{1}	za:^{4}	za:^{4}	za:^{1}
zɔ:^{1}	zaʔ^4	za:^{4}	za:^{1}	za:^{1}	za:^{4}
羊	sheep		*hja:ŋ		
za:ŋ^1	ze:ŋ^1	ze:ŋ^1	ze:ŋ^4	ze:ŋ^4	ze:ŋ^1
zɛŋ^1	zɛŋʔ^4	—	ze:ŋ^1	ziaŋ^1	ziaŋ^4
(b)			***hw**		
彎	crooked		*hwə:ŋh		
—	—	hwo:ŋ^2	vo:ŋ^2	vɔ:ŋ^2	vɔ:ŋ^5
vɔŋ^3	vaŋ^2	vɔŋ^2	vɔŋ^2	vɔŋ^2	vɔŋ$^{[4]}$
贊揚	praise		*hwəj		
vaj^1	vaj^1	hwaj^1	vaj^4	vaj^4	vaj^1
vaj^1	vajʔ^4	vaj^4	vaj^1	vaj^1	vaj^4

芭蕉	banana[12]		*hwa:k		
va:ʔ^{7}	ve:ʔ^{7}	hwe:k^{7}	ve:ʔ^{8}	ve:ʔ^{8}	ve:ʔ^{7}
zɛk^{2}	—	ve:ʔ^{7}	vɯ:^{2}	veʔ^{8}	viaʔ^{8}
(c)			***C-w**		
熟	ripe, mature		*C-wuj		
puj^{1}	fuj^{1}	fuj^{1}	fuj^{1}	fuj^{1}	fuj^{1}
fɔj^{1}	fɔj^{1}	kuj^{1}	ɣuj^{1}	foj^{1}	fow^{1}
九	nine		*C-wɯ:ʔ		
pəɰ^{3}	faɰ^{3}	faɰ^{3}	faɰ^{3}	faɰ^{3}	faɰ^{3}
—	faw^{3}	kwaɰ^{3}	ɣəɰ^{3}	faɰ^{3}	faɰ^{3}
村庄	village		*C-wa:n		
—	—	—	fa:n^{1}	fa:n^{1}	fa:n^{1}
fɔn^{1}	fan^{1}	kwa:n^{1}	ɣa:ŋ^{1}	fa:ŋ^{1}	fuan^{1}

2.3.2.6 Interim Summary

A total of four sets of sonorants have been reconstructed in this section: preaspirated and medial nasals, four kinds of laterals, approximants, and preaspirated and medial glides. This half of the initial inventory is shown below:

(102)	*hm	*hn		*hɲ	*hŋ(w)
	*C-m	*C-n		*C-ɲ	*C(u)ŋ
		*hl(j)			
	*m-l	*C-l			
	*ʋ	*(Cu)ɾ	*(Cu)hr		
		*ɾj	*hrj		
	*hw			*hj	
	*C-w				

12 As previously mentioned, the Cunhua initial is irregular, the original *w apparently having been replaced by *j*, under the influence of the rime.

As in the case of the obstruents, there are a number of asymmetries which are of interest. The most glaring is the fact that there is no plain series of nasals and lateral (in initial position), or glides which contrast with the preaspirated series; this is typologically very uncommon (Maddieson 1984: 69).

The second is that the alveolar liquids exist in two varieties: plain and palatalized. In conjunction with this, presyllables with high back rounded vowels are reconstructible in the case of the velar nasal and coronal approximants; there are no corresponding presyllables reconstructible with high front vowels. Altogether, this indicates a preference for palatalization over labialization (the latter which occurs, nevertheless, with the velar nasal, a very common environment (ibid.: 69)

Finally, the only presyllable initial to retain its place of articulation (*p-l* < *m-l) is the most anterior, at the bilabial place of articulation. It may be hypothesized that this occurred because the articulation of the epenthetic stop [p] is independent of the tongue, and that other obstruents, the articulation of which required lingual gestures, debuccalized before [l] which requires one or more lingual constrictions. These asymmetries are discussed further in chapter four.

2.3.3 *Glottal Initials*

There are two kinds of PHl glottals: glottal stops and glottal fricatives. Both the glottal stop and the glottal fricative occur in triplets: plain, preceded by *Ci-, and preceded by *Cu-. The reflexes of these six series are given below:

(103) Reflexes of PHl glottal initials

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*
ʔ	ʔ	ʔ	ʔ	ʔ	ʔ
ʔ	ʔ	ʔj	z	z	ʔj
ʔ	ʔ	ʔw	gw	v	ʔw
h	h	h	h	h	h
h	h	hj	z	z	hj
h	h	hw	gw	v	hw

Cun	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
ʔ	ʔ	ʔ	ʔ	ʔ	ʔ
z	ʔj	z	z	z	z
v	ʔw	kw	ɣ	v	v
h	h	h	h	h	h
ɲ	ŋj	ɲ	ɲ	ɲ	**ɲ**
ŋ	ŋ(w)	ŋ	ŋ	ŋ	**ɱ**

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
ʔ	ʔ	ʔ
ʔ	j	ʒ
ʔ	v	v
h	—	h
h	—	ɲ
h	v	ŋ

The reconstructions I propose for these series of correspondences are glottal stops and voiced fricatives, each plain as well as with with presyllables, the first with a preceding *i*, and the second with a preceding *u*:

(104) *ʔ
*Ciʔ
*Cuʔ
*ɦ
*Ciɦ
*Cuɦ

2.3.3.1 Glottal Stops

The first series of reflexes is absolutely uniform throughout the daughter languages, and I reconstruct it as *ʔ. I reconstruct the second and third series as *Ciʔ and *Cuʔ. The development of these two initials has paralleled that of the coronal approximants and glottal fricatives quite closely, in that the presyllables have been completely lost in Bouhin and Ha Em, but have left traces because of vocalic transfer in Central Hlai:

(105)

*Ciʔ
*ʔ *Ciʔ
ʔ ʔ *Ciʔj
BH HE CHl

*Cuʔ
*ʔ *Cuʔ
ʔ ʔ *Cuʔw
BH HE CHl

Deglottalization has occurred in reflexes of both in six CHl languages, and for the palatal glide in Tongzha.[13] In the majority of languages, when deglottalization has occurred, the glides have undergone an additional fortition to voiced

13 Note that deglottalization must have happened after registrogenesis in all languages in which it occurred, since none of the tonal reflexes indicate voiced initials.

fricatives, merging with the reflexes of the preaspirated glides (but being distinguished by register in most CHl languages).

In Meifu, *ʔw* followed two different paths: in Changjiang, it was reanalyzed as *gw* and devoiced to *kw*; in Moyfaw, it lost its glottal constriction while giving rise to the velar fricative *ɣ*, through deletion of the labial part of the original labiovelar coarticulation:

(106) *ʔw

*gw | *ʔɣ
kw | ɣ

CJ | MF

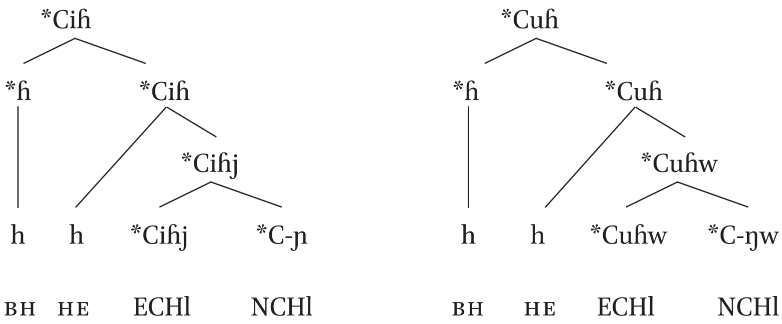
The reflexes of *ʔw in the Meifu branch are especially important, as they provide important information in the reconstruction of presyllables in PHl *C-w, *Cuɾ, and (with Run and Cunhua) *Cuhr above.

2.3.3.2 Glottal Fricatives

I reconstruct *ɦ for the first series of correspondences in this group. Although this initial patterns in many ways with the class of approximants, the true approximants have in general developed into initials which conditioned low register at the time of registrogenesis. PHl *ɦ, on the other hand, did not condition low register in any languages. The reason that there is such an asymmetry in registral behavior when *ɦ is compared with *ʋ and *ɾ is apparently that while *ʋ and *ɾ were true approximants, this fricative (as an obstruent) fit the environment for devoicing, with *ɦ becoming *h* across the board. The reason that this series of correspondences is not reconstructed merely as *h is that it interlocks into a system with *Ciɦ and *Cuɦ, both of which are shown below as being necessarily voiced.

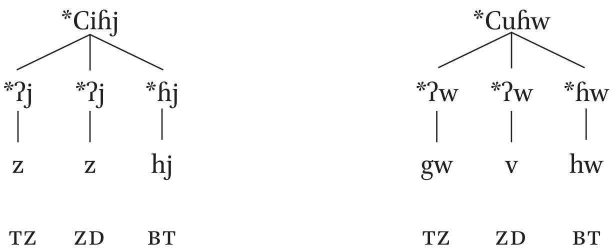
There are two things which suggest a reconstruction of *Ciɦ and *Cuɦ for the second and third series. The first is external evidence, to be treated in chapter four. The other, which Matisoff (1988) notes, is that the place of articulation for these two initials (palatal and labiovelar) is very marked for obstruents or nasals, but typical of glides; he therefore suggests that the nasal reflexes in NCHl are the result of rhinoglottophilia, a phenomenon in which the percept of nasalization is usually triggered in the environment of laryngeals, leading to the phonologization of an actual nasal (Matisoff 1975). This is the solution adopted here, where PHl *Ciɦ and *Cuɦ (after the application of CHl vocalic transfer, rendering *Ciɦj and *Cuɦw) were confused with *ʔɲ and *ʔŋw, the percept of nasalization originating in the temporal compression across the stop from the presyllable and the glottal fricative, but the place features being cued by the following glides. Bouhin and Ha Em did not participate in vocalic transfer, and the reflexes of *Ciɦ and *Cuɦ merged with those of *ɦ. These paths of change are outlined below:

(107)



In ECHl, *Ciɦj and *Cuɦw followed roughly the same trajectory as *ɦ, losing the presyllable stop and devoicing to *hj* and *hw*. There is variation in the reflexes for *Ciɦj and *Cuɦw in Qi; in Tongzha and Zandui, *Ciɦj and *Cuɦw merged with *Ciʔj and *Cuʔw, yielding *ʔj* and *ʔw* respectively; in Baoting, on the other hand, *Ciɦj and *Cuɦw merely lost the presyllable and devoiced to *hj* and *hw*:[14]

(108)



A comparison of reconstructions is given below:

(109)

	Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
(a)	*ʔ	*ʔ	*ʔ	*ʔ	*ʔ
(b)	*xj	—	*ʔj	*-iʔ-	*Ciʔ
(c)	*xw	*xw	*ʔw	*-uʔ-	*Cuʔ
(d)	*x	*x	*h	*-k-	*ɦ
(e)	*hj	*hɲʔ	*hɲ	*-ik-	*Ciɦ
(f)	*hw	*hŋwʔ	*hŋw	*-uk-	*Cuɦ

14 In my own fieldwork, the initials produced by my Baoting consultant were still voiced *ɦ*.

There is complete unanimity in reconstructing *ʔ for the first series.

Matisoff reconstructs the second and third series as *xj and *xw, while Thurgood does not reconstruct anything for the second but reconstructs the third as *xw. It is unclear to me what the motivation is for Matisoff and Thurgood to reconstruct initial velar fricatives for these correspondence sets, as a change from *x* to *ʔ* is not a normal one typologically and a clear violation of Directionality (as well as Commonality). Peiros's reconstruction of preglottalized glides is similar to the present reconstruction, the difference being that it is equivalent with post-vocalic transfer Central Hlai. Ostapirat reconstructs medial *-iʔ- and *-uʔ-, which is only different from the present reconstruction notationally.

Matisoff and Thurgood reconstruct *x and Peiros *h for the first series; the uniform high register reflexes in the daughter languages are likely the main reason for Matisoff, Thurgood and Peiros all reconstruct this series with an original voiceless reflex. If *x is reconstructed, however, it presupposes complete debuccalization throughout all of the daughter languages, violating Commonality. Ostapirat reconstructs medial *-k-, which has a place in his system where intervocalic stops undergo affrication.

For the last two series, Matisoff reconstructs *hj and *hw, Thurgood *hɲʔ and *hŋwʔ, and Peiros *hɲ and *hŋw. Matisoff's reconstruction is typologically reasonable when one assumes rhinoglottophilia, a phenomenon which he relies upon to explain the NCHl reflexes (as is done here). Thurgood and Peiros's reconstruction of a series of preaspirated nasals is very suspect, on the other hand, as they are the only preaspirated nasals in either of their reconstructions, and they occur at marked places of articulation. Ostapirat reconstructs medial *-k- preceded by *i and *u respectively (*-ik-, *-uk-). Although I disagree with his choice of consonants, our reconstructions agree in positing preceding high vowels.

Examples of the PHl glottals are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(110) Examples of PHl glottals

(a) ***ʔ**

烤火 warm by fire *ʔɯmɦ

ʔɯm²	ʔɯm²	ʔɯm²	ʔɯm⁵	ʔum⁵	ʔum⁵
ʔom⁵	ʔun²	ʔom²	ʔom²	ʔom²	ʔom⁵

吹	blow		*ʔu:ɦ		
ʔow^{2}	ʔow^{2}	ʔow^{2}	ʔow^{5}	ʔow^{5}	ʔow^{5}
ʔow^{5}	ʔɛw^{2}	ʔow^{2}	ʔow^{2}	ʔow^{2}	ʔow^{5}
下飯	go with (food)		*ʔu:ɲ		
ʔu:n^{1}	ʔu:n^{1}	ʔweɲ^{1}	ʔu:n^{1}	ʔu:n^{1}	ʔu:n^{1}
ʔuən^{1}	ʔun^{1}	ʔon^{1}	ʔun^{1}	ʔun^{1}	ʔun^{1}
(b)			***ɦ**		
苦	bitter		*ɦə:m		
ham^{1}	ho:m^{1}	ho:m^{1}	ho:m^{1}	hɔ:m^{1}	hɔ:m^{1}
ham^{1}	hɔn^{1}	ho:m^{1}	ho:m^{1}	huam^{1}	huam^{1}
屎	excrement		*ɦa:jʔ		
ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}
ha:(j)^{3}	haj^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	huaj^{3}
下巴	chin		*ɦa:ŋ		
ha:ŋ^{1}	he:ŋ^{1}	he:ŋ^{1}	he:ŋ^{1}	he:ŋ^{1}	he:ŋ^{1}
hɛŋ^{1}	heŋ^{1}	he:ŋ^{1}	he:ŋ^{1}	hiaŋ^{1}	hiaŋ^{1}
(c)			***Ciʔ**		
椰子	coconut		*Ciʔunɦ		
ʔun^{2}	ʔun^{2}	ʔjun^{2}	zun^{5}	zun^{5}	ʔjɯn^{5}
—	ʔjɛn^{2}	—	—	(zoŋ^{5})	zən^{5}
吞	swallow		*Ciʔə:mɦ		
ʔo:m^{2}	ʔo:m^{2}	ʔjo:m^{2}	zo:m^{5}	zɔ:m^{5}	ʔjɔ:m^{5}
zam^{5}	ʔjon^{2}	zo:m^{2}	zo:m^{2}	zuam^{2}	zuam^{5}

打滚	roll		*Ciʔoŋʔ		
ʔuŋ3	ʔuŋ3	ʔjoŋ3	zoŋ3	zoŋ3	ʔjɔŋ3
zɔŋ3	—	zɔŋ3	zɔŋ3	zɔŋ3	zɔŋ3
(d)			***Ciɦ**		
田埂	field dike		*Ciɦə:n		
han1	ho:n1	hjo:n1	zo:n1	zɔ:n1	hjɔ:n1
ɲan1	ɲɔn1	ɲo:ŋ1	ɲo:ŋ1	ɲuaŋ1	ɲu:n4
茅草	thatch grass		*Ciɦa:		
ha:1	ha:1	hja:1	za:1	za:1	hja:1
ɲɔ:1	ŋja:1	ɲɛ:1	ɲa:1	ɲa:1	ɲa:4
虫	insect		*Ciɦənɦ		
hen2	han2	hjan2	zan5	zan5	hjan5
ɲan5	ŋjen2	ɲan2	ɲaŋ2	ɲaŋ2	ɲan2
(e)			***Cuʔ**		
起來	get up		*Cuʔɯ:ɦ		
ʔəɰ2	ʔaɰ2	ʔwaɰ2	gwaɰ5	vaɰ5	ʔwaɰ5
—	—	—	ɣəɰ2	vaɰ2	vaɰ5
碗	bowl/basin		*Cuʔa:w		
ʔa:w1	ʔa:w1	ʔwa:w1	gwa:w1	va:w1	ʔwa:w1
va:w1	ʔwa1	—	ɣa:w1	va:w1	va:w1
汗	sweat		*Cuʔən		
ʔen1	ʔan1	ʔwom3	(ʔwan1)	van1	ʔwan1
von1	ʔwan1	van1	ɣaŋ1	vaŋ1	van1

(f) ***Cuɦ**

搾	handlength		*Cuɦɯp		
hɯp^7	hɯp^7	hwɯp^7	hɯp^7	vup^7	hɯp^7
ŋup^2	ŋɛʔ^4	ŋap^7	ŋop^7	ŋop^8	mop^8
身體	body		*Cuɦu:n		
hu:n^1	hu:n^1	hu:n^1	hu:n^1	hu:n^1	hu:n^1
ŋuən^1	ŋun^1	ŋuŋ^1	ŋuŋ^1	ŋuŋ^1	ɱun^4
毛	body hair		*Cuɦun		
hun^1	hun^1	hun^1	hun^1	hun^1	hun^1
ŋən^1	ŋɛn^1	ŋoŋ^1	ŋoŋ^1	ŋoŋ^1	ɱən^4

2.3.3.3 Interim Summary

There are two kinds of glottal initials which have been reconstructed in this section: stops and fricatives. These are both reconstructible with two kinds of presyllables, shown below:

(111)	*ʔ	*ɦ
	*Ciʔ	*Ciɦ
	*Cuʔ	*Cuɦ

Unlike the other classes of initials discussed above, the glottals are perfectly symmetrical, each existing in one of three configurations: plain, preceded by *Ci, and preceded by *Cu.

2.4 Conclusion

This chapter has presented arguments for the reconstruction of the various manner classes of Proto-Hlai initials. It was proposed in the beginning of this chapter that the three primary classes into which most sound changes could be grouped were temporal compression, onset fortition, and systemic realignment. Temporal compression is a process which seems to have been occurring steadily in Hlai for a very long time, beginning at the Pre-Hlai stage (see chapter four).

The outcome of temporal compression is normally the reduction of complex onsets to a single segment. This may occur through either the deletion of one part of a complex initial (by which is meant a cluster, a preglottalized or preaspirated consonant, or a consonant with a secondary articulation), or otherwise the coalescence of the features of two parts of a complex initial into a single segment. Onset fortition seems to have operated as a general mechanism to reduce sonority and increase stricture at the left edge of words, thereby increasing their general acoustic saliency. Finally, systemic realignment was a category preserving change, and either led to the merger of one category with another pre-existing category or to the repopulation of a previously vacated category.

Two interrelated kinds of sound change were also highlighted, which had an especially large effect on the initial inventories of the Hlai languages. These were the ongoing process of initial obstruent devoicing, and registrogenesis, which was probably a sound change which diffused into the Hlai-speaking area through contact with Hainanese, but which did not affect all Hlai languages. Registrogenesis did, however, record the voicing status of initials before the most recent initial obstruent devoicing and other relevant changes (such as the loss of glottal stop and preaspiration before sonorants) in the languages in which it did occur.

The full Proto-Hlai inventory of initials is given below:

(112) Proto-Hlai Initial Inventory

*p^{h}	*t^{h}	*(Cu)ʈʂ^{h}	*tç^{h}	*k^{h}	
*ɓ	*ɗ		*tç	*k	*(Ci/u)ʔ
*f^{h}(j)	*s^{h}				
*hm	*hn		*hɲ	*hŋ(w)	
*C-m	*C-n		*C-ɲ	*C(u)ŋ	
	*hl(j)				
*m-l	*C-l				
*ʋ	*(Cu)ɾ	*(Cu)hr			*(Ci/u)ɦ
	*ɾj	*hrj			
*hw			*hj		
*C-w					

In terms of place, this inventory is fairly normal typologically, with initial series represented at the bilabial, alveolar, retroflex, palatal, velar, and glottal places of articulation. There are several gaps in the retroflex series, and the fricative inventory is also skewed, being represented at the anterior places of articulation but not the posterior ones (with the exception of the glottal fricative) as discussed in section 2.3.1.4. The fact that the voiced glottal fricative *ɦ does not co-occur with a voiceless counterpart *h is very normal (Maddieson 1984: 57).

There are four coarticulated initials reconstructed for PHl. The only coarticulated obstruent, *fʰj, was uncommon, with only one (and possibly two more, based on the Jiamao evidence given in chapter five) example. Amongst the sonorants, *hŋ had a counterpart *hŋw, and the tap *ɾ, lateral *hl and rhotic *hr had palatalized counterparts *ɾj, *hlj and *hrj.

There is also evidence for a set of sesquisyllabic forms with presyllables in various parts of the initial inventory. Besides the most conspicuous case of *m-l, the evidence for these is often found in the Central Hlai languages, where vocalic transfer from high vowels became coarticulations on sonorants and glottal segments. Additional evidence is found in the nasal and lateral series, where the high register of most registrogenetic languages indicates the presence of a former syllable which eventually conditioned glottal constriction on the sonorant itself.

In terms of manner, strictly speaking, the PHl inventory is unremarkable. There is an opposition between aspirated and non-aspirated obstruents, a contrast in voice onset time which Maddieson (1984: 39) describes as the most common distinction if there are two series of obstruents (with a third series normally being 'glottalic', i.e. either ejective or implosive—in PHl, the implosive and plain series are in complimentary distribution as noted in section 2.3.1.4). However, one very striking aspect of the inventory is that aspiration extends to the sonorant series. That is, the glottis is only rarely in a neutral state, being either spread or constricted in most cases. It is not the abundance in glottal specification that makes the PHl initial inventory seem strange per se; note the initial inventory of modern Sui, another Kra-Dai language of the Kam-Sui branch, which exhibits a system which seems quite similar to the Hlai inventory:

(113) Sui initial inventory (Edmondson, et al. (2001))

p	t	ts	tç	k	q	ʔ
pʰ	tʰ	tsʰ	tçʰ	kʰ	qʰ	
mb	nd			g	ɢ	
ʔb	ʔd			ʔg		
m	n		ɲ	ŋ		
hm	hn		hɲ	hŋ		
ʔm	ʔn		ʔɲ	ʔŋ		
f		s	ç	x		h
v	l	z	j	ɣ	ʁ	
ʔw			ʔj	ʔɣ		

The one crucial difference is that in Sui, there are neutral segments which contrast with the ones specified for either spread or constricted glottis; for example, Sui has both preaspirated and preglottalized nasals, but it also has a plain series. Proto-Hlai, on the other hand, lacks plain members in the case of the nasals, lateral, and glides. The historical events in Pre-Hlai which led to this situation in PHl are examined in some detail in chapter four, section 4.3.

The reconstruction presented here has been compared with the reconstructions of Matisoff (1988), Thurgood (1994), Peiros (1998), and Ostapirat (2004); the differences between the present reconstruction and these alternative reconstructions have been discussed, and an argument presented for the former when it differs from the latter. The three reconstructions are provided in (114) below for reference, so that the similarities and differences between them may be easily compared (category labels are taken from the present reconstruction).

(114) *Summary of Reconstructed Systems*

(a) Aspirated Stops

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*pʰ	*pʰ	*pʰ	*(ʔ)p	*pʰ
*tʰ	*tʰ	*tʰ	*(ʔ)t	*tʰ
*kʰ	*kʰ	*kʰ	*k	*kʰ

(b) Aspirated Affricates

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
—	—	—	*-t-	*ʈʂʰ
*sr	*sr	*sw	*-ut-	*Cuʈʂʰ
*tsʰ	*tsʰ	*cʰ	*c	*tçʰ

(c) Fricatives

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*f	*p	*f	*-p-	*fʱ
—	—	—	*-ip-	*fʱj
*s	*s	*s	*s	*sʰ

(d) Implosives and Plain Obstruents

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*ɓ	*ɓ	*ʔb	*(ʔ)b	*ɓ
*ɗ	*ɗ	*ʔd	*(ʔ)d	*ɗ
*ts	*ts	*c	*ɟ	*tç
*k	*k	*k	*g	*k

(e) Preaspirated Sonorants

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*mb	*mʔ	*m	*-m-	*hm
*nd	*nʔ	*n	*-n-	*hn
*ndz	—	*ɲ	*-ɲ-	*hɲ
*ŋg	*ŋʔ	*ŋ	*-ŋ-	*hŋ
—	—	—	—	*hŋw

(f) Medial Nasals

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*m	*m	*C-m	*m	*C-m
*n	*n	*C-n	*n	*C-n
*ɲ	*ɲ	*C-ɲ	*ɲ	*C-ɲ
*ŋ	*ŋ	*C-ŋ	*ŋ	*C-ŋ
*ŋw	*ŋw	*C-ŋw	*ŋw	*Cuŋ

(g) Laterals

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*ɬ	*ɬʔ	*hl	*-l-	*hl
*l	*l	*C-l	*l	*C-l
*z	*ljʔ	*z	*-il-	*hlj
*pl	*pl	*pl	*p-l	*m-l

(h) Glides

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*j	*j	*j	*-j-	*hj
*w	*w	*w	*-w-	*hw
*fr	*pr	*hw	*-up-	*C-w

(i) Approximants

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*v	*wʔ	*v	*-ʋ-	*ʋ
*r	*rʔ	*r	*-r-	*ɾ
—	—	—	*-ir-	*ɾj
*vr	*prʔ	*zw	*-ur-	*Cuɾ
*ɮ/*ɣ	*ɮʔ/*ɣ	*rw/*ɣ	*-ʀ-/*–g-	*hr
—	—	—	*-ir-	*hrj
*ɣw	*ɣw	*ɣw	*-uʀ-/*-ug-	*Cuhr

(j) Glottals

Matisoff	*Thurgood*	*Peiros*	*Ostapirat*	*PHl*
*ʔ	*ʔ	*ʔ	*ʔ	*ʔ
*xj	—	*ʔj	*-iʔ-	*Ciʔ
*xw	*xw	*ʔw	*-uʔ-	*Cuʔ
*x	*x	*h	*-k-	*ɦ
*hj	*hɲʔ	*hɲ	*-ik-	*Ciɦ
*hw	*hŋwʔ	*hŋw	*-uk-	*Cuɦ

The first advantage which the present reconstruction has over those of Matisoff, Thurgood, Peiros, and in two instances Ostapirat, is the addition of several phonemes to the PHl inventory. Some of these were absent from their reconstructions because of lack of data—Changjiang in the case of Thurgood and Peiros, and Changjiang as well as Cunhua and Nadouhua in the case of Matisoff. Others were apparently overlooked.

Other specific systemic problems can be discussed more easily when the initial inventories are organized and inspected. In doing so, I do my best to arrange the PHl phonemes in such a way as best represents the respective author's understanding of the overall system, and take full responsibility for any misanalysis. Matisoff's PHl initial inventory is shown below:

(115) Matisoff's PHl inventory

*pʰ	*tʰ	*tsʰ	*kʰ	
*ɓ	*ɗ	*ts	*k	*ʔ
*f(r)	*ɬ	*s(r)	*x(j/w)	
*v(r)	*ɮ	*z	*ɣ(w)	
*mb	*nd	*ndz	*ŋg	
*m	*n	*ɲ	*ŋ(w)	

*hw		*hj
*w	*l	*j
	*pl	
	*r	

Matisoff reconstructs an inventory with four main places of articulation (presuming an alignment between the sibilant and palatal initials), plus a glottal stop. It is generally symmetrical, with the following exceptions. The first is that there is a group of *C-r clusters which are all fricative-initial (*fr, *sr, and *vr); it is strange that there are no *C-r clusters which begin with stops. As in the present system, labiovelar coarticulations are optional throughout much of the velar series; however, there is only a single palatal coarticulation (*xj). Finally, it is noticeable that the plain stop *p occurs in the cluster *pl, but there is no plain counterpart *p.

(116) Thurgood's PHl inventory

*pʰ	*tʰ	*tsʰ	*kʰ		
*p(l/r)		*ts	*k		*ʔ
*prʔ					
*ɓ	*ɗ				
		*s(r)	*x(w)		
			*ɣ(w)		
*m	*n	*ɲ	*ŋ(w)		
*mʔ	*nʔ	*hɲʔ	*ŋʔ	*hŋwʔ	
	*ɬʔ				
	*ɮʔ				
	*ljʔ				
	*rʔ				
*w	*l	*j			
*wʔ					

Thurgood also reconstructs an inventory with four main places of articulation plus glottal stop. The first noticeable gap in this system is in the plain stops, where there is a conspicuous lack of a plain alveolar stop. There is a very pronounced asymmetry in the set of liquid clusters—with the sole exception of the typologically rare *sr, all liquid clusters begin with *p. Finally, there are a set of post-laryngealized initials which Thurgood represents with a final glottal stop, meant to indicate that the initial caused laryngealization across the entire syllable. Although I do not reconstruct post-laryngealization, these initials (with the exception of *ɬʔ) would all form a natural class of voiced sonorants in the present system; in Thurgood's system, the post-laryngealized initials do not seem to form a natural class, and the feature must therefore be stipulated. Complicating the situation, in the series of post-laryngealized nasals, there is a curious asymmetry between those with preaspiration (palatal and labiovelar) and those without it, which also seems to have no explanation.

(117) Peiros's PHl inventory

*p^{h}	*t^{h}	*c^{h}	*k^{h}		
*ɓ	*ɗ	*c	*k		*ʔ(j/w)
*pl					
*m	*n	*ɲ	*ŋ		
		*hɲ		*hŋw	
*C-m	*C-n	*C-ɲ	*C-ŋ(w)		
		*C-l			
*f	*ɬ	*s(w)			*h(w)
*v		*z(w)	*ɣ(w)		
*w	*r(w)	*j			

Peiros reconstructs a system with five places of articulation including the glottal segments. It is generally symmetrical, and the primary strength of Peiros's system is the recognition of the distinction between an initial and medial sonorant series. The main weakness is the strange reconstruction of two preaspirated nasals at marked places of articulation. There is also quite widespread optional labiovelar coarticulation, but only one instance of palatal coarticulation (on the glottal stop).

(118) *Ostapirat's PHl inventory*

*(ʔ)p	*(ʔ)t	*c	*k	*ʔ
*-(i/u)p-	*-(u)t-		*-(i/u)k-	*-(i/u)ʔ-
*(ʔ)b	*(ʔ)d	*ɟ	*g	
	*s			
*m	*n	*ɲ	*ŋ(w)	
*-m-	*-n-	*-ɲ-	*-ŋ-	
	*l			
*p-l	*-(i)l-			
*-ʋ-	*-(i/u)r-		*–(u)g-/*-(u)ʀ-	
*-w-		*-j-		

Ostapirat's system has several strengths. The primary one is the reconstruction of a distinction between initial and medial consonants. The latter are often reconstructed with preceding high vowels, which undergo vocalic transfer at stages subsequent to PHl. He also has a developed hypothesis of intervocalic affrication and fortition, for both obstruents and sonorants. The problem with this hypothesis is that the intervocalic changes which Ostapirat posits are often typologically odd, particularly in the case of fortition, where lenition is the norm intervocalically. The other significant weakness in my estimation is in the obstruent series, where Ostapirat posits optional preglottalized *ʔp, *ʔt, *ʔb, and *ʔd based on the Jiamao evidence. My primary reservation about this is due to the fact that I think the Jiamao variation does not reflect actual variation in the proto-language, but instead is due to layers of loanwords at different periods (see chapter five). Aside from this, while preglottalized voiced stops have been recorded in other Southeast Asian languages (see the Sui initial inventory above), preglottalized voiceless stops, to the best of my knowledge, are an anomaly.

In summary, the main advantages of the reconstruction proposed here are the addition of the retroflex series, the absence of awkward *C-r clusters, the existence of presyllables before sonorants, some of which contained high vowels which conditioned vocalic transfer in Central Hlai, and an overall symmetry in both place and manner with few unexpected gaps.

The reconstructed inventory shown above in (112) was reconstructed, and some of the inconsistencies of the other systems of reconstruction avoided, through the use of the four principles outlined in chapter one: Directionality, Commonality, Economy, and Symmetry. Directionality is particularly important in constraining potential changes in manner, as in the case of the fricatives. Commonality is important in maintaining the line between the reconstruction of a proto-language, and internal reconstruction of an earlier stage of that language. Economy is important in a similar way, in that it constrains reconstruction of initials so that they explain all, and only, the reflexes of the daughter languages, avoiding speculation about stages earlier than the proto-language. Finally, Symmetry is an important constraint on the reconstructed inventory as a whole, suggesting gaps which are available to be filled, and otherwise highlighting asymmetries of the system which should be verified with typological data.

The purpose of the next chapter will be the reconstruction of the PHl system of rimes. The tone inventory will be treated first, after which the segmental portions of the rimes will be reconstructed and their subsequent paths of change outlined.

CHAPTER 3

Reconstruction of Proto-Hlai Rimes

The primary goal of this chapter is to present the sets of rime correspondences which have been used to reconstruct the PHl inventory of rimes, and explain reflexes of PHl rimes in the daughter languages if they have followed divergent paths. This will be done first for the PHl tone categories, and then for the segmental rimes. The reconstruction of the latter will also be compared with those of Thurgood (1994) and Ostapirat's revised (2004) reconstruction, and these alternative reconstructions will be considered and discussed. Although Peiros (1998) technically gives a reconstruction of the PHl rimes, he does not provide an overall system or give correspondence sets, so I am unfortunately unable to include his reconstruction in my comparison. The main objective of this chapter is to motivate the reconstruction of Proto-Hlai rimes proposed herein in a way that will allow further comparative work to be based on these results.

As with chapter two, the reconstruction in this chapter will be of Proto-Hlai, as opposed to Pre-Hlai which will be reconstructed in the following chapter. The reconstruction of the Proto-Hlai system of rimes in this chapter will result in an inventory which is not as exotic as the PHl inventory of initials, but which nevertheless has its own idiosyncracies. The discussion of Pre-Hlai in the next chapter will demonstrate how this system originated in an earlier system which was ultimately simpler.

Before a discussion of specific natural classes of rimes is initiated, a further discussion of the currently adopted theory of sound change is necessary, accompanied by a discussion of how specific sound changes have interacted with each other. With this background, we will be in a position to properly examine the various classes of rimes themselves and the evolution of their individual members into their current forms in the daughter languages.

3.1 Sound Change: Rimes

In the reconstruction of Proto-Hlai rimes undertaken in this chapter, the following criteria described in chapter one are again adhered to:

(i) Directionality of change: typologically natural changes are referred to and used as a model whenever possible; changes are assumed to occur one feature at a time unless evidence forces a different analysis.

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(ii) Commonality of features: phonemes are reconstructed based on the features common between reflexes of daughter languages; greater heterogeneity of reflexes is taken to indicate greater complexity of the protophoneme.
(iii) Economy: a phoneme is reconstructed to the extent that it satisfactorily accounts for the posited change(s) between it and the reflexes of the daughter languages, and reconstructions assuming more changes than necessary are avoided.
(iv) Symmetry: the reconstructed inventory is checked to make sure that no symmetries have been overlooked in natural classes, either in place or in manner; it is accepted that parts of the inventory may be asymmetrical, and these are checked for typological naturalness.

Within the syllable, the rime is qualitatively different from the initial, and the method of analysis must be modified accordingly; there are several ways in which vowels in particular undergo change which lack direct parallels with the initials. There is one parallel to be found with the initials, however, in the changes that involve final glottal segments. In the same way that glottal settings in the initial can affect pitch values (thereby controlling register), glottal settings in the coda can affect pitch values and trajectories. The way this occurs, as in the case of the initials, is through the medium of phonation. Thurgood (2002) provides a discussion of final laryngeals, and gives examples of laryngeals which either raise pitch or lower pitch at the end of a syllable. In the former case, abrupt glottal stop and non-breathy *h* are correlated with pitch raising or high pitch; in the latter case, creaky glottal stop and breathy *ɦ* are correlated with pitch lowering or low pitch. Kingston (2005) augments this with Athabaskan data, in which he argues that final glottal stop can condition either high or low pitch, depending on whether it is abrupt (conditioning tense voice on the preceding nucleus, leading to level high tone) or creaky (conditioning creaky voice, and depressing the tone). The changes just described which are applicable to the upcoming discussion of Hlai tonogenesis are shown below in (1a). Segmental changes posited here involving final glottal segments include the devoicing of final breathy *ɦ*, the development of a creaky glottal stop from an abrupt glottal stop, and the loss of a glottal stop coarticulated with a final oral stop, all shown in (1b):

(1)	(a)	*vʔ	>	v̄ʔ (high level)
		*vh	>	v̄h (high level)
		*vɦ̤	>	v̀ɦ̤ (falling)
		*vʔ̰	>	v̀ʔ̰ (falling)

(b)	*vɦ	>	vh
	*vʔ	>	vʔ̰
	*vʔ͡C	>	vC

The critical changes which have affected the rimes are (1) diphthongization, (2) peripheralization, (3) lengthening/shortening, (4) rounding/unrounding, (5) final weakening, and (6) systemic realignment (the last of which is the same as the change so-called in chapter two). These will each be explained and illustrated below.

3.1.1 *Diphthongization*

Diphthongization refers to any change which creates a salient sonority contour between a rime nucleus and coda, particularly if one does not exist at all prior to the change (2a). The most important constraint on this change is that the sonority of the nucleus must always be higher than that of the coda, and never vice versa; this is a favored syllable type which disfavors high nuclei. Diphthongization is one way to maximize this distinction, so that a syllable like [kej] with a mid nucleus and high coda is preferable to [ki:], with a high nucleus and no coda.

The most common class of rimes which undergo this change is that of the pure open rimes, particularly the high ones which have a lower sonority profile in their nucleus, and the features of the coda which result from this change are always predicated upon the original features of the vowel. This is true also in the case of closed-syllable diphthongization, where high rimes lead initially to high-mid diphthongs (2b), and low rimes to high-low diphthongs (2c):

(2)	Examples of diphthongization				*Source*
	(a)	u:	>	ow	Several
		o:	>	aw	Cunhua
	(b)	i:ŋ	>	iəŋ	Qi
		u:k	>	uək	Zandui
	(c)	ɛ:ŋ	>	iaŋ	Run
		ɔ:j	>	uaj	Yuanmen

The case in (2b) appears to be a case of feature delinking, where the distinctive features of the long vowel are maintained on the first half of the long vowel, but lost on the second half (3a). The case in (2c) appears to involve the splitting of the feature bundle, where the features [front], [back], and [round] are preserved on the first half of the long vowel, but the feature [low] is preserved on the second half (3b):

(3)	(a)	i:ŋ	>	iəŋ	(b)	ɛ:ŋ	>	iaŋ
		∨		|≠		∨		/ \
		[hi]		[hi]		[front]		[front][low]
		[front]		[front]		[low]		

3.1.2 *Peripheralization*

Peripheralization is the change in a vowel so that it moves from a more central position to a more peripheral position in the vowel space (*peripheral* here is used in the sense of Crothers (1978: 100), indicating vowels which are at the extremes of the acoustic vowel space). This can happen horizontally, as shown in the examples in (4a), or vertically, as in (4b):

(4)	Examples of peripheralization				*Source*
	(a)	a:ŋ	>	ɛ:ŋ	Several
		a:t	>	ɔ:t	Yuanmen
	(b)	e:w	>	i:w	Yuanmen
		ə:j	>	a:j	Bouhin, Qi

It is not always clear why this change happens. It could be argued to enhance contrast, but it must then be recognized that this is not maximally functional, since vowel peripheralization results in the merger of formerly distinct categories at least as many times as it fills gaps in the rime inventory.

3.1.3 *Lengthening/Shortening*

The length of a rime can either be lengthened, as in (5a), or shortened, as in (5b):

(5)	Examples of lengthening and shortening				*Source*
	(a)	ew	>	e:w	Yuanmen
		ik	>	i:k	Tongzha, Zandui
	(b)	e:w	>	ew	Cunhua
		a:m	>	am	Yuanmen

Lengthening may fill a gap in some instances, such as the example above involving Tongzha and Zandui where *ik lengthened to *i:k* after original *i:k had diphthongized to *iək* and subsequently changed to *iaʔ* (also conforming to a general dispreference against short rimes with final velar stops). The same is true for shortening, as in the Yuanmen example above where long *a:m shortened to *am*. Since there was no originally short *am in the inventory, this filled a gap (although *əm eventually lowered, via vowel peripheralization, and merged with it).

3.1.4 *Rounding/Unrounding*

An unrounded nucleus can be rounded, as in (6a), or a rounded nucleus unrounded (6b):

(6) Examples of rounding and unrounding

				Source
(a)	əm	>	om	Lauhut
	ə:j	>	o:j	Several
(b)	uɲ	>	ɯn	Baoting
	ot	>	ət	Cunhua, Yuanmen

In the majority of cases, such as the Lauhut example above, rounding occurred in the environment of a labial (or occasionally velar) coda; conversely, unrounding primarily occurred in the environment of an alveolar or palatal coda. These can both be considered cases of assimilation. The one important exception is in the series of *ə:C rimes, where there was a backing and rounding of the nucleus in all Greater Hlai languages except Cunhua. This can be simultaneously considered a case of vowel peripheralization, where the backing is accompanied by automatic rounding.

3.1.5 *Final Weakening*

The complete deletion of codas occurs occasionally, although it is not common. There are two examples of glide deletion (7a) and one of stop deletion (7b). The debuccalization of final stops is more common, with that of final *k* (7c) being particularly common, but debuccalization of all final stops has occurred in Nadouhua (7d):

(7) Examples of coda deletion

				Source
(a)	iw	>	i:	Nadouhua
	u:j	>	u:	Yuanmen
(b)	a:k	>	ɯ:^{B}	Moyfaw

(c)	ɛ:k	>	ɛ:ʔ	Several
(d)	-p, -t, -k	>	-ʔ	Nadouhua

3.1.6 *Systemic Realignment*

As in chapter two, systemic realignment occurs when there is categorical opportunity for change, either because an original member of the inventory has been vacated (8a), or otherwise because some member already exists, creating a stable category which may be a target for potential merger (8b):

(8) Examples of systemic realignment *Source*

(a)	in	>	iŋ	Baisha, Meifu	(original iŋ > eŋ)
	a:n	>	a:ŋ	Baisha, Meifu	(original a:ŋ > ɛ:ŋ)
(b)	u:ɲ	>	u:n	Several	(u:n already in inventory)
	a:c	>	a:t	Several	(a:t already in inventory)

It is important to reiterate that these changes are not considered to be motivated by some 'hidden hand'; that is, a language will not anthropomorphically 'try' to fill a gap in an inventory in some directed way. Rather, it is the case that a certain amount of variation is always inherent within the speech community, and certain changes may be innovated and adopted as conventions depending on the potential amount of impedence generated by such functional considerations as maintaining category discreteness.

3.2 Tonogenesis

In traditional Kra-Dai historical linguistics (e.g. Gedney (1989), Edmondson & Solnit (1988, 1997)), it has been customary to represent the four tone categories by assigning the letters A–D, and to designate these categories as such in reconstructions, allowing the researcher to remain agnostic about the original values of the tone categories themselves. This is because the modern reflexes of these original values are always pitch contours carried on the nucleus of the syllable, occasionally accompanied by some sort of secondary phonation or constriction. Based on evidence in other Southeast Asian languages and language families, there is a speculative consensus which has developed that A and D were unmarked categories[1] (differentiated by the presence or absence of oral stop codas), and that the two marked tone categories B and C have arisen from marked glottal configurations in the rime of the syllable, via an intermediate stage of contrasting phonations. Although direct proof of this is often hard to come by, there has been some indirect evidence which suggests that words in category B were somehow associated with spread glottis and that words in category C were associated with constricted glottis.

This presents an interesting symmetry with registrogenesis, where the register split is also correlated with laryngeal distinctions. The similarities and differences are compared in the following chart (these are idealized simplifications for exposition—for a full discussion see Thurgood (2002)):

(9) TABLE 3 *Comparison of Registrogenesis and Tonogenesis*

	Registrogenesis		**Tonogenesis**	
Syllable edge of origin	Left (initial)		Right (coda)	
General domain	Across rime		Right edge of rime	
Correlated with	Voicing		Glottal stricture	
Laryngeal opposition	Voiceless	Voiced	Constricted	Spread
Effect on pitch	High	Low	High	Low
Resulting in	High vs low pitch range		Rising vs falling contour	

The modern Hlai languages do not preserve any segmental reflexes or phonation contrasts which could directly serve in the reconstruction of original laryngeal segments such as the ones described above, although their pitch values are suggestive. Based on this evidence alone, there is no compelling reason to reconstruct anything more than the traditional tone categories B and C. However, there are split reflexes in the rimes of Greater Hlai, the Qi and NCHl branches, and Cunhua which are correlated with tone category, and which provide rather direct evidence that final glottal segments need to be reconstructed for PHl. This is because there is little evidence that mere pitch differences themselves could condition segmental changes of the kind discussed shortly (apparent exceptions to this, such as Shuijingping Hmong (Mortensen 2006) and Fuzhouhua (Myers & Tsay 2003), have alternative explanations, as shown

1 It will be shown below that the situation in category D is more complex.

by Mortensen (ibid.)); however, these changes can be explained in a straightforward way if final glottal constituents of codas are assumed.

It might be suggested that these changes occurred during a stage of Hlai during which only phonation contrasts remained as evidence of former final laryngeals (as opposed to their simultaneous occurrence with them). The problem with this suggestion is that words in categories B and C pattern together segmentally in the evolution of rimes (at different times and in different subgroups and languages), and pattern against category A. If a phonation contrast was responsible, it is likely that the different phonations of categories B and C would affect rime nuclei differently, which is definitely not the case. An alternative hypothesis, which would group B and C together in contrast to A, is that original laryngeal segments existed in Proto-Hlai, and that these segments only conditioned pitch contours (and segmental changes) after the breakup into daughter languages.

One problem which this hypothesis might encounter is the lack of a typological example, where in some language these laryngeal segments exist as part of the rime and do not have to be inferred. It does seem to be the case that if the general tonogenetic mechanism under discussion here is valid, there must have been many such systems which existed historically in East and Southeast Asia, but which have since evolved into other types of systems (principally tone systems, although this is simplifying) and are no longer extant. One example which does exist, however, is Chepang, a Tibeto-Burman language of south-central Nepal discussed in Weidert (1987: 8–9), which has the following system of syllable rimes:

(10)	(a)	V	Vm	Vn	Viŋ	Vŋ	Vl	Vr	Vj	Vw
	(b)	V^{ɦ}	Vm^{ɦ}	Vn^{ɦ}	—	Vŋ^{ɦ}	Vl^{ɦ}	Vr^{ɦ}	Vj^{ɦ}	Vw^{ɦ}
	(c)	V^{ʔ}	Vm^{ʔ}	Vn^{ʔ}	Viŋ^{ʔ}	Vŋ^{ʔ}	Vl^{ʔ}	Vr^{ʔ}	Vj^{ʔ}	Vw^{ʔ}
	(d)	Vs	Vp	Vt	Vik	Vk				

This system mirrors the structure of the Hlai (and ultimately Kra-Dai) tone categories in that the first series (10a) and the fourth series (10d) could be considered laryngeally unmarked, whereas the second and third series (10b–c) are laryngeally marked categories, corresponding to spread and constricted glottis, respectively. Also, Weidert says of the second series that '[T]he rhymes with breathy phonation [-^{ɦ}] quickly fade into voicelessness', indicating that voicing is not sustained as long as spread glottis in this environment. Recognizing the potential variation in the phonetic realization of syllable-final laryngeal gestures, Chepang can thus be taken as a general model of rime structure for present purposes.

The first set of evidence for final laryngeal segments within Hlai is found in the Greater Hlai branch. High vowels which were otherwise open underwent two distinct paths of development, depending on whether or not they were closed by laryngeal segments. Those which were closed by laryngeals diphthongized, in contrast to those which weren't that remained pure (although they diphthongized at a later point in time):

(11)		*PHl*		*GHl*
	(a)	*i:	>	i:
		*i:ɦ	>	əjɦ
		*i:ʔ	>	əjʔ
	(b)	*ɯ:	>	ɯ:
		*ɯ:ɦ	>	əɰɦ
		*ɯ:ʔ	>	əɰʔ
	(c)	*u:	>	u:
		*u:ɦ	>	əwɦ
		*u:ʔ	>	əwʔ

The original *u: rimes in categories B and C became further differentiated in Cunhua (12a), Zandui (12b), and Baoting (12c), presumably conditioned by these laryngeal segments or their successors. More specifically, it is entirely possible that during the process of tonogenesis, the final laryngeal -*ɦ* (category B) conditioned breathy phonation back into the rime, (possibly mirrored by -*ʔ* (category C) conditioning creaky voice in Cunhua in the same environment), which in turn affected the perception of the rimes and subsequent reanalysis (a phenomenon very common in e.g. Mon-Khmer). The following paths of change are inferred, and are intended to be the most parsimonious explanation for the derivation of these disparate reflexes:

(12)	(a)	*u:	>	u:	>	u:	>	ow
		*u:ɦ	>	əwɦ	>	ə̤wɦ	>	ə:^{B} > a:^{B}
		*u:ʔ	>	əwʔ	>	əɰ̰ʔ	>	aj^{C}
	(b)	*u:	>	u:	>	u:	>	ow
		*u:ɦ	>	əwɦ	>	ə̤wɦ	>	o:^{B}
		*u:ʔ	>	əwʔ	>	əwʔ	>	aw^{C}

(c)	*u:	>	u:	>	u:	>	ow
	*u:ɦ	>	əwɦ	>	ə̤wɦ	>	o:^{B} > ɔ:^{B}
	*u:ʔ	>	əwʔ	>	əwʔ	>	aw^{C}/ow^{C}

The PHl diphthong *əw underwent monophthongization in the Qi and NCHl branches (possibly excluding Cunhua) if it was closed by a final laryngeal, but remained a diphthong if it was open:

(13)	*əw	>	*əw
	*əwɦ	>	*o:ɦ
	*əwʔ	>	*o:ʔ

Cunhua also shows variation its reflexes of PHl *ən, between *on* in category A (14a) and *an* in categories B/C (14b):

(14) *Examples of split Cunhua reflexes of PH *ən by tone category*

(a)	*Gloss*	*PHl*	*Cun*	(b)	*Gloss*	*PHl*	*Cun*
	dream	*f^{h}ən	fon^{1}		long clsfr	*ɗənɦ	ɗan^{5}
	hungry	*ɾən	lon^{4}		insect	*Ciɦənɦ	ɲan^{5}
	silver	*hŋən	kon^{4}		waterwheel	*ʋənɦ	van^{5}
					yesterday	*p^{h}ənʔ	p^{h}an^{3}
					wet	*hmənʔ	ɓan^{4}
					grass	*hŋənʔ	kan^{4}

In other words, lowering of the vowel occurred when the coda included a laryngeal segment; otherwise, rounding occurred instead.

In the GHl, Qi/Run, and Cunhua examples shown above, it is preferable to hypothesize that conditioning environments were created via the presence/absence of a final glottal segment, not merely by pitch contour. This is the primary reason that I reconstruct final glottal segments, which only later develop into pitch contours.

The second reason for doing so is the lack of uniformity in the reflexes of the four tone categories amongst the modern daughter languages. If Hlai tone categories consisted merely of pitch contour alone at the PHl stage, then a certain degree of similarity might be expected amongst daughter languages. This is, however, not the case. The reflexes of the modern languages are given below, using the standard Chao pitch system where the lowest pitch is 1 and the highest is 5:

(15)

Tone	Register	Bhin Cun	HaEm Nadou	Lhut Cjiang	Tzha Mfaw	Zdui Baisha	Bting Ymen
A	High	454	53	53	33	33	44
		35	11	53	53	11	42
	Low	—	—	—	11	11	22
		13	21ʔ	15ʔ	—	—	11
B	High	24	55	55	51	42	53
		21	25	44	55	31	51
	Low	—	—	—	121	21	31
		—	—	—	—	—	131
C	High	11	11	11	55	35	35
		42	42	22	24	33	44
	Low	—	—	—	14	213	213
		13	—	—	—	—	13
D	High	45	55	55	55	42	53/44
		33	21ʔ	15ʔ	55	11	55
	Low	—	—	—	13	21	31
		13	—	—	—	—	13

In reconstructing the pre-tonal system of PHl and its subgroups, I make the following crucial assumptions:

(1) In sibling languages, tones of the same contour (even if they occur at different relative heights) may be assumed to have descended from a parent language with the same contour tone. If there are different tone contours within the same category, then the tones of the daughter language must have developed independently from a segment and/or phonation type in the parent language.

(2) Following Thurgood (2002), I make the assumption that high or rising tones (i.e. tones with a high pitch target) are derived from an abrupt glottal stop *ʔ* or a voiceless glottal fricative *h*. Low or falling tones (i.e. tones with a low pitch target) are derived from former creaky voice or breathy voice/voiced glottal fricative *ɦ*. Dovetailing this model is Kingston (2005), which argues that an original final glottal stop can condition either high or low pitch, depending on whether or not it conditions tense voice or creaky voice in the preceding vowel.

(3) Category D tones can have either high targets or otherwise mid to low targets. I follow Thurgood (2002) in positing that a tone D word with a

high pitch target indicates that the final stop of that word was articulated with simultaneous glottal closure; conversely, an item with a mid to low pitch target did not have this accompanying glottal closure.

(4) I take as a model Honda (2005) which shows that in the Vietic branch of Mon-Khmer, tonogenesis occurred earlier in category C than it did in category B. I therefore do not make the assumption that tonogenesis occurred simultaneously in all categories in all languages.

Based on the pitch contours given above, it seems as though tone categories have developed at least partly on an areal basis, in three general groups. These are: Group 1: Bouhin, Ha Em, Lauhut, and Meifu; Group 2: Qi and Run, and Group 3: NWCHl.

3.2.1 *Tonogenetic Group One*

The tones of the first group are repeated below:

(16)

Tone	*Bhin*	*HaEm*	*Lhut*	*Mfaw*	*Cjiang*
A	454	53	53	53	53 (high register)/15ʔ (low register)
B	24	55	55	55	44
C	11	11	11	24	22
D	45	55	55	55	15ʔ

Before discussing the specific nature of the B and C categories, it will be useful to have an overview of the entire system. There is a discernible pattern in the tone categories of this group: category A is high falling, categories B and D are high level, and category C is low level (there are exceptions to each of these generalizations, which are assumed to be the result of later change and are treated below).

The first observation which can be made is that there is an opposition between the categories with high pitch (A, B, and D), and that with low pitch (C). This suggests an initial height-based pitch opposition, indicating that C is marked in some way, probably as a result of a phonation difference:

(17) Reconstructed Group One pitch trajectories

High (unmarked)	Low (marked)
A: *53	C: *11
B: *55	
D: *55	

The second observation is that categories B and D pattern together in a nearly identical way (Changjiang being the one exception). This suggests that the two categories shared some similarity, and the most likely candidate for this similarity is closure by a voiceless coda:

(18) Reconstructed Group One tone categories

High	Low
A: *V^{53}	C: *V^{11}
B: *VC^{55}	
D: *VC^{55}	

In general, the pitch at the left edge of the rime can be hypothesized to have been raised to the high end of the pitch range, in order to maximize contrast with the low pitch onset in category C. The differences between the pitch trajectories in the high category can be explained in this way by suggesting that level high pitch was maintained when closed by a voiceless coda, but that lack of such a coda led to natural pitch declination and ultimately to a falling tone.

Based on the criteria stipulated at the beginning of this section, there are two interpretations for both categories B and C. The first possibility in category B is that it ended in a voiceless laryngeal fricative *h*, and the second is that it ended in a glottal stop. The first possibility in category C is that the phonation was creaky, and the second that it was breathy.

Based on the Moyfaw evidence discussed below, it will be tentatively assumed that pitch was lowered in category C due to creaky voice. The decision between final *h* and *ʔ* in category B is therefore made tentatively in favor of the former, under the assumption that the creaky voice of category C originated in a former glottal stop. The initial state for tonogenetic group one is therefore the following:

(19) Reconstructed Group One tone category precursors

High	Low
A: *V^{53}	C: *V̰^{11}
B: *Vh^{55}	
D: *Vʔ͡C^{55}	

The changes in the individual languages can now be treated. The Ha Em and Lauhut systems preserved the pitch values in (16) above, and therefore do not need to be discussed further save to point out that the postulated final glottal stop in category B and creaky voice in category C were both eventually lost, leaving only the pitch distinction behind.

The Bouhin differences can be explained in two steps. The first was that, after the eventual deletion of the glottal coda in category B, the height of the pitch was no longer constrained on the right edge, and the pitch drifted downward, causing a distinction between categories B and D. The second step was the addition of an initial rise in the high tones to the top of the pitch range, something which served to shorten the duration of the falling tone in category A, leading to a circumflex tone. This is an interesting example of what Pittayaporn (2007) calls *peak-sliding*, in which the peak of a tonal contour slides rightward, the only difference here being that high level tones (categories B and D) are affected as well as the contour tone (category A). These two changes are shown below:

(20) *Bouhin*

A	*V^{53}	>	V^{53}	>	V$^{4–54}$
B	*Vh^{55}	>	V^{44}	>	V$^{2–4}$
C	*V̰^{11}	>	V^{11}	>	V^{11}
D	*Vʔ͡C^{55}	>	VC^{55}	>	VC$^{4–5}$

The only additional change which occurred in Moyfaw was in category C, in which a rising tone developed. I propose that the motivation for this was the development of creaky voice into a final glottal stop, which then proceeded to raise the pitch at the end of the rime. The entire tone then underwent raising after the loss of creaky voice:

(21) *Moyfaw*

C V̰^{11} > V̰ʔ^{13} > V^{24}

The situation in Changjiang is the most complex. There was no change in category A, and what appears to have happened in categories B and C is that the pitch 'centralized', lowering in B and raising in C, after the loss of final *h and creaky voice respectively. The most dramatic reflex of category D exists in Changjiang, where the glottal constriction can be heard in the modern language and is very pronounced, having raised the pitch to an extraordinarily high level.

The development of a register distinction in unique in this group, and Changjiang register patterns closely with Nadouhua, indicating that speakers of Changjiang became disassociated with Group One after tonogenesis and closer to Group Three by the time of registrogenesis. The fact that a register split is only extant in category A indicates that registrogenesis was probably blocked in the other three categories. Thurgood (1991: 4–8) proposes that in

Nadouhua, originally voiced initials conditioned laryngealization which bled into the nucleus and was ultimately reanalyzed as glottal constriction. This is also an acceptable hyptothesis for Changjiang, which shows the same basic pattern. It can then be suggested that this laryngealization (which was probably originally breathy voice) successfully spread through the rime in category A, but was blocked by pre-existing glottal codas in categories B and D and by creaky voice in category C. The reanalysis of a final glottal stop in category A led to a merger with words in category D (the *ɦ* in the examples in low register represents the voicing of the original onset):

(22) *Changjiang*

High Register						*Low Register*					
A1	V^{53}	>	V^{53}	>	V^{53}	A2	V^{53}	>	ɦV̤^{53}	>	Vʔ^{15}
B1	Vh^{55}	>	V^{55}	>	V^{44}	B2	Vh^{55}	>	ɦVh^{55}	>	V^{44}
C1	V̰^{11}	>	V^{11}	>	V^{22}	C2	V̰^{11}	>	ɦV̰^{11}	>	V^{22}
D1	Vʔ͡C^{55}	>	Vʔ͡C^{55}	>	Vʔ͡C^{15}	D2	Vʔ͡C^{55}	>	ɦVʔ͡C^{55}	>	Vʔ͡C^{15}

3.2.2 *Tonogenetic Group Two*

The tones of the group two languages are repeated below:

(23)

	Register	*Baisha*	*Ymen*	*Tzha*	*Zdui*	*Bting*
A	High	11	42	33	33	44
	Low		11	11	11	22
B	High	31	51	51	42	53
	Low		131	121	21	31
C	High	33	44	55	35	35
	Low		13	14	213	213
D	High Long	11	55	55	42	53 (long)/44 (short)
	Low		13	13	21	31

Although there are exceptions, an overview of this group indicates that the following general pattern can be posited as the initial state in the four tone categories:

(24) Reconstructed Group Two pitch trajectories

A: *33
B: *51
C: *55
D: *55

It can be safely assumed that mid level tone existed in category A simply because it was unmarked. The falling tone in category B indicates a tone depressor at the right edge of the rime, which in the parameters established above can be either breathy voice (*-ɦ) or a creaky glottal stop (*-ʔ̰). Categories C and D pattern together (although this has been obscured somewhat by later changes), and the high level tone reconstructed in these categories is taken here to reflect tense voice, correlated with a final voiceless glottal stop. If this is so, then the choice for the final element in category B can be tentatively suggested to be *-ɦ:

(25) Reconstructed Group Two tone category precursors

A: *V^{33}
B: *Vɦ^{51}
C: *V̱ʔ^{55}
D: *V̱ʔ͡C^{55}

With this original configuration as a hypothesis, it is possible to examine changes in the individual languages. Beginning with Baisha, there are two differences which stand out when compared to the rimes in (25) above. The first is that category D is the same as category A, not category C, and the second is that all of the pitch levels are quite low compared to their counterparts in other languages. I propose that the reason for the first difference is the loss of simultaneous glottal closure associated with final oral stops (and as a result, the tense voice which accompanied it). The reason for the second is that, for some reason, the whole pitch system was 'downstepped', so that the relationships between the tones remained identical, but they became low when compared with other Hlai languages:

(26) Evolution of Baisha tone categories

A: *V^{33}	>	V^{33}	>	V^{11}
B: *Vɦ^{51}	>	Vɦ^{51}	>	V^{31}
C: *V̱ʔ^{55}	>	V̱ʔ^{55}	>	V^{33}
D: *V̱ʔ͡C^{55}	>	VC^{33}	>	VC^{11}

This downstep can actually be verified through Wang & Qian's (1951) data, where they give the following values for the Baisha tone categories:

(27) Baisha tone values from Wang & Qian (1951)
A: 33
B: 53 ~ 31
C: 55
D: 33

In Yuanmen, the trajectory of pitch in category A became falling, although the reasons for this are unclear. After the loss of the glottal stop in category C, there was a slight declination in the overall pitch in category C. Registrogenesis seems to have occurred before these changes applied, as it acted upon a system quite similar to the one reconstructed in (25). The convex tone in the low register of category B is the result of the depression of pitch by the voiced initial, which then needed to rise to a mid target before it could fall again:

(28) Evolution of Yuanmen tone categories

High register							*Low register*						
A1	*V^{33}	>	V^{33}	>	V^{42}		A2	*V^{33}	>	ɦV^{11}	>	V^{11}	
B1	*Vɦ^{51}	>	Vɦ^{51}	>	V^{51}		B2	*Vɦ^{51}	>	ɦVɦ$^{1-31}$	>	V^{131}	
C1	*V̠ʔ^{55}	>	Vʔ^{55}	>	V^{44}		C2	*V̠ʔ^{55}	>	ɦVʔ^{13}	>	V^{13}	
D1	*V̠ʔ͡C^{55}	>	V̠ʔ͡C^{55}	>	VC^{55}		D2	*V̠ʔ͡C^{55}	>	ɦVʔ͡C^{13}	>	VC^{13}	

The Tongzha situation is very similar to the Yuanmen one, suggesting that they were in close interaction during the process of tonogenesis. The only significant changes were the slight raise in pitch targets in the low register of category C, and the lowering of the peak of the circumflex tone in the low register of category B (what Pittayaporn (2007) refers to as *contour reduction*):

(29) Evolution of Tongzha tone categories

High register							*Low register*						
A1	*V^{33}	>	V^{33}	>	V^{33}		A2	*V^{33}	>	ɦV^{11}	>	V^{11}	
B1	*Vɦ^{51}	>	Vɦ^{51}	>	V^{51}		B2	*Vɦ^{51}	>	ɦVɦ$^{1-31}$	>	V^{121}	
C1	*V̠ʔ^{55}	>	V̠ʔ^{55}	>	V^{55}		C2	*V̠ʔ^{55}	>	ɦVʔ^{13}	>	V^{14}	
D1	*V̠ʔ͡C^{55}	>	V̠ʔ͡C^{55}	>	VC^{55}		D2	*V̠ʔ͡C^{55}	>	ɦVʔ͡C^{13}	>	VC^{13}	

The Zandui and Baoting developments were very similar, which indicates that they were also in close contact with each other during tonogenesis. The hypothesized changes which were common to both of them were (1) the loss of the final glottal fricative in category B, which shortened the trajectory of the fall, (2) the loss of tense voice in category C which led to a new rising tone, (3) the development of the final glottal stop in category D to a creaky stop,[2] leading to a falling tone and merging with category B, and (4) the genesis of a convex tone in the low register of category C, as a result of the movement of the low pitch target away from the left edge of the rime. The one change specific to Zandui was the downstep in pitch of the falling tones in categories B and D in both registers:

(30) Evolution of Zandui tone categories

High register						*Low register*					
A1	*V^{33}	>	V^{33}	>	V^{33}	A2	*V^{33}	>	ɦV^{11}	>	V^{11}
B1	*Vɦ^{51}	>	V^{53}	>	V^{42}	B2	*Vɦ^{51}	>	ɦV^{31}	>	V^{21}
C1	*V̱ʔ^{55}	>	Vʔ^{35}	>	V^{35}	C2	*V̱ʔ^{55}	>	ɦVʔ^{13}	>	V$^{2–13}$
D1	*V̱ʔ͡C^{55}	>	Vʔ̰͡C^{53}	>	VC^{42}	D2	*V̱ʔ͡C^{55}	>	ɦVʔ̰͡C^{31}	>	VC^{21}

There were two changes unique to Baoting. The first was the split of category D into two subgroups based on rime length, with the short rimes losing glottal closure and merging with category A. These two tones (A and short rimes in D) then raised in pitch:

(31) Evolution of Baoting tone categories

High register						*Low register*					
A1	*V^{33}	>	V^{33}	>	V^{44}	A2	*V^{33}	>	ɦV^{11}	>	V^{22}
B1	*Vɦ^{51}	>	V^{53}	>	V^{53}	B2	*Vɦ^{51}	>	ɦV^{31}	>	V^{31}
C1	*V̱ʔ^{55}	>	Vʔ^{35}	>	V^{35}	C2	*V̱ʔ^{55}	>	ɦVʔ^{13}	>	V$^{2–13}$
D1L	*V̱:ʔ͡C^{55}	>	V:ʔ̰͡C^{53}	>	V:C^{53}	D2	*V̱ʔ͡C^{55}	>	ɦVʔ̰͡C^{31}	>	VC^{31}
D1S	*V̱ʔ͡C^{55}	>	VC^{33}	>	VC^{44}						

3.2.3 *Tonogenetic Group Three*

The Cunhua and Nadouhua tone systems are repeated below. Both languages have register splits, but Cunhua shows them in all categories except B, whereas Nadouhua only shows a split in A:

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2 This is also what happened to final glottal stops in neighboring Jiamao (see chapter 5).

(32) *Tone values in the NWCHl languages*

Tone	*Register*	*Cun*	*Nadou*
A	High	35	11
	Low	13	21ʔ
B		21	25
C	High	42	42
	Low	13	
D	High	33	21ʔ
	Low	13	

There is significant divergence between these two languages, the only common point being the development of category C in high register. Reconstruction in this small group is admittedly speculative, and based to a large extent on the results of reconstruction in the first two tonogenetic groups. The tentative reconstructed system for this group is as follows:

(33) Reconstructed Group Three tone category precursors

A1	*V^{33}
B1	*V̤ɦ^{21}
C1	*Vʔ̰^{42}
D1	*Vʔ͡C^{55}

In other words, category B is reconstructed with a final breathy laryngeal which has conditioned breathy voice back into the rime nucleus, category C with a creaky glottal stop, and category D with simultaneous glottal closure.

The Cunhua changes are shown below. In high register, category A developed a rising contour, possibly in analogy with the new rising tone which emerged in low register during registrogenesis. Pitch was low in category B due to its breathy phonation, and slightly falling. The creaky glottal stop of category C was lost early, leaving only the pitch contour, and the coarticulated glottal stop in category D was lost. During registrogenesis, the lowering induced by voicing was concentrated at the left edge of the rime, and neutralized the original pitch distinctions in all categories except B, which was not affected (probably because it was still breathy):

(34) Evolution of Cunhua tone categories

High register							*Low register*						
A1	*V^{33}	>	V^{35}	>	V^{35}		A2	*V^{33}	>	ɦV^{13}	>	V^{13}
B1	*V̤ɦ^{21}	>	V̤ɦ^{21}	>	V^{21}		B2	*V̤ɦ^{21}	>	ɦV̤ɦ^{21}	>	V^{21}
C1	*Vʔ̰^{42}	>	V^{42}	>	V^{42}		C2	*Vʔ̰^{42}	>	ɦV^{13}	>	V^{13}
D1	*Vʔ͡C^{55}	>	VC^{33}	>	VC^{33}		D2	*Vʔ͡C^{55}	>	ɦVC^{13}	>	VC^{13}

There were significant changes in Nadouhua. In high register, there seems to have been a drop in pitch in category A to the bottom of the pitch range. In category B, I propose that the breathy segment at the right edge devoiced, reversing the pitch trajectory as it created a new high target. Category C developed in the same way as Cunhua, merely losing the creaky glottal stop. Finally, the final stops in category D became creaky, lowering the pitch.

In low register, initial voicing induced breathy phonation, which was apparently blocked from spreading in categories B–D by final segments (indicating that registrogenesis and tonogenesis were occurring simultaneously and could therefore interact). It spread successfully in category A, however, and the phonation became creaky, lowering pitch and eventually being reinterpreted as a creaky glottal stop. As mentioned above, this register pattern is nearly identical to that of Changjiang, with the exception that Nadouhua developed a creaky glottal stop which lowered pitch, whereas Changjiang developed an abrupt glottal stop which raised it; low register category A rimes merged with category D in both languages.

(35) Evolution of Nadouhua tone categories

High register							*Low register*						
A1	*V^{33}	>	V^{33}	>	V^{11}		A2	*V^{33}	>	ɦV̤^{11}	>	Vʔ̰^{21}
B1	*V̤ɦ^{21}	>	Vh^{25}	>	V^{25}		B2	*V̤ɦ^{21}	>	ɦVh^{25}	>	V^{25}
C1	*Vʔ̰^{42}	>	Vʔ̰^{42}	>	V^{42}		C2	*Vʔ̰^{42}	>	ɦVʔ̰^{42}	>	V^{42}
D1	*Vʔ͡C^{55}	>	Vʔ̰͡C^{21}	>	Vʔ^{21}		D2	*Vʔ͡C^{55}	>	ɦVʔ̰͡C^{21}	>	Vʔ^{21}

3.2.4 *Proto-Hlai*

Moving finally to the Proto-Hlai system, the following reconstruction is proposed based on the evidence from these three groups:

(36) Reconstruction of Proto-Hlai tone category precursors

	PHl	*Group 1*	*Group 2*	*Group 3*
A	*V	*V^{53}	*V^{33}	*V^{33}
B	*Vɦ	*Vh^{55}	*Vɦ^{51}	*V̤ɦ^{21}
C	*Vʔ	*V̰^{11}	*V̱ʔ^{55}	*Vʔ̰^{42}
D	*Vʔ͡C	*Vʔ͡C^{55}	*V̱ʔ͡C^{55}	*Vʔ͡C^{55}

This system is very close to that which has been inferred in much of the Kra-Dai literature (i.e. Gedney (1989), Edmondson & Solnit (1988, 1997)), with the exception that the laryngeal segment in category B is breathy *ɦ as opposed to voiceless *h. This system is essentially identical to that of Chepang noted at the beginning of this section.

The changes between the PHl system and each group will now be briefly discussed. The first two changes which occurred in group one were (1) the breathy fricative *ɦ* devoiced to *h* in category B and (2) the glottal stop in category C became creaky and eventually spread throughout the nucleus, lowering the overall pitch to the bottom of the pitch range. The pitch in categories A, B, and D was raised to the top of the pitch range, presumably to maximize contrast with category C. This high pitch remained level where it was closed by a final glottal (categories B and D), but falling pitch arose in c ategory A as a result of natural declination:

(37) Evolution of tone categories in Group One

A	*V	>	*V	>	*V^{53}
B	*Vɦ	>	*Vh	>	*Vh^{55}
C	*Vʔ	>	*Vʔ̰	>	*V̰^{11}
D	*Vʔ͡C	>	*Vʔ͡C	>	*Vʔ͡C^{55}

In the second group, the only development was that of tense voice (correlated with the presence of glottal stops in categories C and D) which raised the pitch across the nucleus:

(38) Evolution of tone categories in Group Two

A	*V	>	*V^{33}
B	*Vɦ	>	*Vɦ^{51}
C	*Vʔ	>	*V̱ʔ^{55}
D	*Vʔ͡C	>	*V̱ʔC^{55}

Finally, the developments which occurred in group three were the spread of breathy voice back into the rime nucleus in category B (lowering the pitch of the overall rime), and the development of creakiness in the glottal stop which led to a falling contour in category C. This falling contour was raised in pitch to increase contrast with the lower pitch of category B:

(39) Evolution of tone categories in Group Three

A	*V	>	*V	>	*V^{33}
B	*Vɦ	>	*V̤ɦ	>	*V̤ɦ^{21}
C	*Vʔ	>	*Vʔ̰	>	*Vʔ̰^{42}
D	*Vʔ͡C	>	*Vʔ͡C	>	*Vʔ͡C^{55}

3.2.5 *Summary*

Based on the segmental variations within the rime in Greater Hlai and Cunhua, as well as the variation in pitch realization between the three major areal tone groups, the reconstruction of PHl final glottal segments is deemed to be necessary. Once this has been recognized, the tone values in the individual languages are seen to be rich in information which can be used to reconstruct the PHl pre-tone system, as well as its intermediate stages, following the guidelines provided at the beginning of this section. The PHl pre-tone system has been reconstructed with four categories: unmarked (category A), final voiced glottal fricative (category B), final glottal stop (category C), and final oral stop with glottal closure (category D). Given the typology of tone change outlined in (1), it was seen above that the principles used for segmental reconstruction (Directionality, Commonality, Economy and Symmetry) are of use in the reconstruction of the precursors of the tone categories as well, providing useful constraints on that process.

3.3 Open Rimes

There are a total of five open rimes which can be reconstructed for the PHl inventory. These include three high vowels, the front mid vowel, and one low vowel. Of these five vowels, the vowel *eː is quite rare, and likely occurred in PHl as the result of loans into the proto-language from one or more outside sources. The reflexes of the PHl open rimes are given below; note that the first three sets of reflexes (reconstructed below as high vowels) only occur in tone category A:

(40) *Reflexes of the PHl open rimes*

BHin	*Ha Em*	*Lhut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Mfaw*	*Cjiang*	*Baisha*	*Ymen*
ej	ej	ej	ej	ej	ej	ɛj	ɛj	ej	ej	ej	ej
əɰ	əɰ	əɰ	əɰ	əɰ	əɰ	ow	ɛ(w)	əɰ	əɰ	əɰ	əɰ
ow	ow	ow	ow	ow	ow	ow	ɛw	ow	ow	ow	ow
eː	eː	eː	eː	eː	eː	—	—	eː	eː	eː	eː
aː	aː	aː	aː	aː	aː	ɔː	aː	aː	aː	aː	aː

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
ej	ej	ɛj
ɤɰ	ɤɰ	əɣ
ɐw	aw	ow
ɛː	—	—
aː	aː	aː

The reconstructions for these rimes are given below:

(41) *iː
*ɯː
*uː
*eː
*aː

Although the reconstruction of the high vowels may appear to violate the principle of Commonality (pure high vowels are not generally reflected in the reflexes of the daughter languages), it will be demonstrated below that these vowels must have been monophthongs at the stage of Proto-Hlai, and that high vowel diphthongization was a feature which either occurred independently or diffused between the subgroups.

There is also evidence for PHl high monophthongs in several instances where diphthongization failed to occur. The one relevant here is of four Bouhin examples in which high vowels failed to diphthongize:

(42)

Gloss	*PHl*	*Bouhin*	*Gloss*	*PHl*	*Bouhin*
aunt	*hmiː	miː^1	seven	*tʰuː	tʰuː^1
you	*C-mɯː	mɯː^1	eight	*hruː	ɾuː^1

The category of high vowels is complicated in another way, as they each have two series of reflexes apiece: one in tone category A (shown above in (40)), and one in tone categories B and C; moreover, the vowel *u: has two different sets of reflexes between categories B and C in Zandui, Baoting and Cunhua:

(43) *Reflexes of the PHl high rimes with final glottals*

Bhin	*Ha Em*	*Lhut*	*Tzha*	*Zdui*	*Bting*
ej$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$
əɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$
ow$^{B/C}$	aw$^{B/C}$	[o/a]w$^{B/C}$	aw$^{B/C}$	o:^{B}/aw^{C}	ɔ:^{B}/[o/a]w^{C}
Cun	*Nadou*	*Mfaw*	*Cjiang*	*Baisha*	*Ymen*
aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$	aj$^{B/C}$
ɔ:$^{B/C}$	aw$^{B/C}$	əɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$
a:^{B}/aj^{C}	aw$^{B/C}$	aw$^{B/C}$	aw$^{B/C}$	aw$^{B/C}$	aw$^{B/C}$

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
ej$^{B/C}$	aj$^{B/C}$	a:j$^{B/C}$
ɤɰ$^{B/C}$	ɤɰ$^{B/C}$	a:l$^{B/C}$
ɐw$^{B/C}$	o:^{B}/aw^{C}	ɐw$^{B/C}$

The reconstructions for these rimes in the marked tone categories proposed here are given below:

(44) *i:ɦ/ʔ
*ɯ:ɦ/ʔ
*u:ɦ/ʔ

With the exception of Bouhin, the development of the high vowels was dependent on their tone category. With few exceptions (given shortly), the presence of a final glottal element conditioned diphthongization in Greater Hlai. The differences in development between Bouhin (45) and Greater Hlai (46) are shown below:

(45) *Bouhin*

(a)	*i:	>	i:	(b)	*i:ɦ	>	i:ɦ	(c)	*i:ʔ	>	i:ʔ
	*ɯ:	>	ɯ:		*ɯ:ɦ	>	ɯ:ɦ		*ɯ:ʔ	>	ɯ:ʔ
	*u:	>	u:		*u:ɦ[3]	>	u:ɦ		*u:ʔ	>	u:ʔ

(46) *Greater Hlai*

(a)	*i:	>	*i:	(b)	*i:ɦ	>	*əjɦ	(c)	*i:ʔ	>	*əjʔ
	*ɯ:	>	*ɯ:		*ɯ:ɦ	>	*əɰɦ		*ɯ:ʔ	>	*əɰʔ
	*u:	>	*u:		*u:ɦ	>	*əwɦ		*u:ʔ	>	*əwʔ

This is the central reason for the reconstruction of pure high vowels at the Proto-Hlai stage. If the dipthongs *ej, *əɰ, and *ow were reconstructed, the change to Greater Hlai *əj, *əɰ, and *əw would not only be more awkward, but the *əɰ in category A and the *əɰ in categories B and C would have undergone merger. Since this is clearly not the case, the best solution is the reconstruction of originally pure vowels which underwent two different kinds of diphthongization at two different times.

The consequence of this change was that originally pure high vowels diphthongized and merged with original short diphthongs in Greater Hlai category A, producing the following distribution:

(47) TABLE 4 *Greater Hlai Distribution of Pure Vowels vs. Short Diphthongs*

Rime	**Tone A**	**Tone B**	**Tone C**
*i:	X		
*ɯ:	X		
*u:	X		
*əj	X	X	X
*əɰ		X	X
*əw	X	X	X
Final	-Ø	-ɦ	-ʔ

If this hypothesis is correct, then the first implication is that the diphthongs *əj and *əw in tone category A are original; the same diphthongs in category B and C, however, have two potential sources: original diphthongs and original pure vowels which underwent diphthongization. Since *əɰ does not occur in category A, the second implication is that there was no original Pre-Hlai *əɰ category; all members in this category are derived from an original *ɯ:ɦ/ʔ. The original inventory of pure high vowels and short diphthongs in PHl was therefore the following:

3 An additional reflex of *u:ɦ in Bouhin is *aw*. I assume this to be (as with other variation in Bouhin to be discussed below) due to contact with Ha Em. The reason for this assumption is that in all cases of apparent unconditioned variation in Bouhin, one of the variants is always

(48)	*iː	*ɯː	*uː
	*əj		*əw

The pure high vowels which remained in the Hlai languages after the diphthongization in Greater Hlai then underwent subsequent diphthongization themselves. In most cases of pure vowels in tone category A, the nucleic schwa was colored by the following glide and shifted to the corresponding mid vowel which shared the same feature in frontness/backness. The majority evolution of the high vowels is shown below (49a) and compared with the simultaneous evolution of the short diphthongs in Greater Hlai (49b):

(49)	(a)	*iː	>	ej	(b)	*əj	>	aj
		*ɯː	>	əɰ		*əɰ	>	aɰ
		*uː	>	ow		*əw	>	aw

The only exceptions to the development shown in (49) occurred in Cunhua and Nadouhua, subsequent to diphthongization. In the case of Cunhua, *ɯː rounded and merged with *uː:

(50)	Cunhua:	*ɯː	>	uː	>	əw	>	ow

In the case of Nadouhua, a partial merger occurred, with *ɯː falling into variation between *ɯː* and *uː*; all cases of short *ə* were fronted to *ɛ*, preempting the otherwise ubiquitous assimilation of schwa to the following glide. The final velar glide of *ɛɰ* was then lost, leaving long *ɛː*:

(51)	Nadouhua:	*iː	>	iː	>	əj	>	ɛj	>	ɛj
		*ɯː	>	ɯː~uː	>	əɰ~əw	>	ɛɰ~ɛw	>	ɛː~ɛw
		*uː	>	uː	>	əw	>	ɛw	>	ɛw

A final exception occurred in Moyfaw, where the nucleus of *əɰ remained a mid vowel, failing to lower to *aɰ*.

identical to a Ha Em source, the speech community of which is adjacent to that of Bouhin; this is very reminiscent of the situation with PHl *hr and *Cuhr in chapter 2, where Bouhin shows unconditioned variation between the reflexes *r* and *g*. I also assume that the same explanation applies here, namely that words with the reflex *aw* are loans from Ha Em, with which Bouhin seems to have been in rather direct contact throughout much of its history.

This kind of diphthongization can be found elsewhere in Southeast Asia. A good example of this is Chamic, where the shift from largely penultimate stress in Proto-Malayo-Polynesian (PMP) to final stress brought about the same situation by the time of Proto-Chamic (Thurgood (1999)):

(52) High vowel diphthongization in Proto-Chamic

Gloss	*PMP*		*Pre-Chamic*		*Proto-Chamic*
thorn	*duRi	>	*durí:	>	*durəj
dig	*kali	>	*kalí:	>	*kaləj
man	*laki	>	*lakí:	>	*lakəj

Gloss	*PMP*		*Pre-Chamic*		*Proto-Chamic*
dog	*asu	>	*asú:	>	*ʔasəw
widowed	*balu	>	*balú:	>	*baləw
know; able	*tahu	>	*tahú:	>	*thəw

Further development of *u:ɦ occurred in Zandui and Baoting:

(53) *u:ɦ > əwɦ > o:ɦ

The development of *u: in Cunhua in tone categories B and C was unique:

(54)

*u:	>	u:	>	əw	>	ow
*u:ɦ	>	əwɦ	>	awɦ	>	a:^{B}
*u:ʔ	>	əwʔ	>	aɰʔ	>	aj^{C}

After *u:ɦ/ʔ merged with *əw, the latter developed in Lauhut in two ways depending on the initial it followed, with the nucleus either lowering (55a) or backing under the influence of a preceding labial (55b) (words like *hot* and *handle* had developed secondary articulations by the time of Central Hlai):

(55) Examples of PHl *əwɦ/ʔ in Lauhut
(a) Non-labial(ized) initials (b) Labial(ized) initials

Gloss	*PHl*	*Lauhut*	*Gloss*	*PHl*	*Lauhut*
few	*ɾjəwɦ	raw^{2}	pile	*pʰəwʔ	pʰow^{3}
banyan	*tʰəwʔ	tʰaw^{3}	hot	*Cuʈʂʰəwʔ	fow^{3}
male inlaw	*hjəwʔ	zaw^{3}	handle	*Cuɦəwɦ	hwow^{2}

This was also true of Baoting in *u:ʔ rimes in category C (56a–b):

(56) Examples of PHl *u:ʔ in Baoting

(a) Non-labial(ized) initials (b) Labial(ized) initials

Gloss	*PHl*	*Baoting*	*Gloss*	*PHl*	*Baoting*
ash	*s^{h}u:ʔ	taw^{3}	stab	*p^{h}u:ʔ	p^{h}ow^{3}
two	*hlu:ʔ	ɬaw^{3}	taboo	*C-mu:ʔ	mow^{3}
kill	*ɦu:ʔ	haw^{3}	boil	*ɓu:ʔ	ɓow^{3}

The six exceptions to Greater Hlai diphthongization in categories B and C are the following:

(57)

Gloss	*PHl*	*Gloss*	*PHl*
this	*C-ni:ɦ	tadpole	*hnu:ɦ
thin	*C-li:ʔ	run	*Cuhru:ɦ
point	*s^{h}ɯ:ʔ	blow	*ʔu:ɦ

In addition, the following items may be counterexamples as well; all of them except *one* are found only in Bouhin and Ha Em, *one* being found only in Lauhut and Baisha:

(58)

Gloss	*PHl*	*Gloss*	*PHl*
older sister	*ʔi:ɦ	non-gltns. rice	*C-mɯ:ʔ
trip clsfr	*ɓɯ:ɦ	one	*tç^{h}ɯ:ʔ
shadow	*[hw/ʋ]ɯ:ɦ		

There are also two unique examples of a high vowel which failed to diphthongize at all (59a–b), another example in which the high vowel failed to diphthongize in the majority of languages (59c), and one in which it failed to diphthongize in Qi (59d):

(59)

(a)	三	three	*Cuʈʂ^{h}uʔ		
ts^{h}u:^{3}	ts^{h}u:^{3}	fu:^{3}	ts^{h}u:^{3}	ts^{h}u:^{3}	ts^{h}u:^{3}
fu:^{3}	fo:^{3}	fu:^{3}	fu:^{3}	fu:^{3}	f^{h}u:^{3}
(b)	噴	spray	*p^{h}uɦ		
*p^{h}u:^{2}	*p^{h}u:^{2}	*p^{h}u:^{2}	*p^{h}u:^{5}	—	—
*p^{h}u:^{5}	—	—	—	*p^{h}u:^{5}	*p^{h}u:^{5}

(c)	乳房	breast	*tçi:ɦ		
tsi:^{2}	tsi:^{2}	(tsej^1)	tsi:^{5}	tsi:^{5}	tsi:^{5}
tsɛj^1	tsɛj^1	tsej^1	tsej^1	tsi:^{3}	ti:^{3}

(d)	母親	mother	*hmi:ʔ		
mej^3	(mej^3)	paj^3	pi:^{6}	pʰi:^{6}	pi:^{6}
ɓaj^4	maj^1	—	paj^3	(me:^{1})	(mej^6)

There is very little to note in the development of the non-high vowels. There do not seem to have been any changes correlated with tone category as in the case of the high vowels (but see note on *a:j below). The single change which occurred in the *a: rime category was the backing in Cunhua to *ɔ:*.

The three reconstructions under comparison are presented below:[4]

(60)		*Thurgood*	*Ostapirat*	*PHl*
	(a)	*ei	*i:	*i:
	(b)	*əɯ	*ɨ:	*ɯ:
	(c)	*ou	*u:	*u:
	(d)	*aj	*aj	*i:ɦ/ʔ
	(e)	*aɯ	*al	*ɯ:ɦ/ʔ
	(f)	—/*aw	*ɨw/*aw	*u:ɦ/ʔ
	(g)	—	—	*e:
	(h)	*a	*a:	*a:

In the case of the high vowels in category A, Thurgood reconstructs what I consider to be the final stage in the development of these vowels, although his reconstruction does obey the principle of Commonality. Ostapirat (2004) reconstructs a system similar to the one presented here, the only difference (*ɨ: vs. *ɯ:) being essentially notational.

Neither Thurgood nor Ostapirat distinguish the reflexes of the high vowels in categories B/C from those of the short mid diphthongs; this is almost certainly because the only language which can be used to distinguish between these two series is Bouhin, the witness of which is occasionally compromised because of its contact relationship with Ha Em. Ostapirat's (2004) reconstruction of *al is based on the data in Wang & Qian (1951), in which they transcribe what I assume to have been Baisha *aɰ as *a:l*; my assumption is that this transcription did not reflect a genuine *l*, but is in error due to confusion over the perception of final *ɰ* (for an updated analysis of final *-l see Ostapirat 2009).

4 Since the analysis in Ostapirat (1993) was replaced by Ostapirat (2004), only the latter will be treated here.

The reason for this is that Proto-Kra-Dai final *l is preserved in two other Kra-Dai languages: Saek, a Northern Tai language, and Laha, a Kra language. The following forms show cases in these languages where final *l is preserved, and their Hlai cognates:

(61)

	Saek	*Laha*	*PHl*
body louse	mlɛl⁴	mdalᴬ²	*tʰən
be(come)	pʰal⁴	—	*C-mən
to fly	bɯl¹	—	*ɓin
field dike	ɣal⁴	—	*Ciɦə:n
cry, crow (v)	ɣal⁴	—	*Ciɦə:n
stone	ri:l²	—	*tɕʰi:n
to teach	sɔ:l²	—	*sʰun
wasp	tʰi:l⁴	—	*tʰin
heavy	—	kʰalᶜ¹	*kʰɯn

In these examples, it is apparent that the regular reflex of Kra-Dai final *l is PHl final *n. It is therefore untenable to suggest that the series reconstructed here as *ɯ:h/ʔ be reconstructed with a final lateral in Hlai.

Thurgood doesn't reconstruct anything for the rime I reconstruct as *u:ɦ (which is also relatively rare, with only nine clear examples). Ostapirat (2004) reconstructs the diphthong *ɨw, based partially on Jiamao evidence, but doesn't offer the path by which it would have evolved into the reflexes of the daughter languages; this rather odd change violates Directionality.

Neither Thurgood nor Ostapirat reconstruct a PHl phoneme for the seventh series of correspondences, probably owing to the fact that it is very rare (only three examples, all given below). There is a consensus in reconstructing the final series as *a:.

Examples of the PHl open rimes are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(62) *Examples of PHl open rimes*

(a) ***i:**

榕樹 banyan *hri:

rej¹	gej¹	gej¹	gej⁴	hej⁴	hej⁴
(huj⁴)	ŋɛjʔ⁴	gej⁴	xej¹	xej¹	(tsej⁴)

火	fire		*fʰiː		
(pej^{1})	fej^{1}	fej^{1}	fej^{1}	fej^{1}	fej^{1}
—	fɛj^{1}	fej^{1}	fej^{1}	fej^{1}	fʰej^{1}
螺螄	snail		*tçʰiː		
tsʰej^{1}	tsʰej^{1}	tsʰej^{1}	tsʰej^{1}	tsʰej^{1}	tsʰej^{1}
—	—	—	tsʰej^{1}	tsʰej^{1}	tsʰej^{1}
(b)			***iːh/ʔ**		
被子	blanket		fʰiːʔ		
pej^{3}	faj^{3}	faj^{3}	faj^{3}	faj^{3}	faj^{3}
tθaj^{3}	faj^{3}	faj^{3}	faj^{3}	faj^{3}	(fuj^{3})
疥瘡	scabies		C-niːʔ		
nej^{3}	naj^{3}	naj^{3}	naj^{3}	naj^{6}	naj^{3}
—	—	naj^{3}	naj^{3}	naj^{3}	naj^{6}
哭	weep		C-ŋiːʔ		
ŋej^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{6}	ŋaj^{3}
ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{3}	ŋaj^{6}
(c)			***ɯː**		
葉子	leaf		*ɓɯː		
ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}
ɓow^{1}	ɓɛw^{1}	ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}	ɓəɰ^{1}
要	want		*ɗɯː		
ɗəɰ^{1}	ɗəɰ^{1}	ɗəɰ^{1}	ɗəɰ^{1}	ɗəɰ^{1}	—
tsow^{1}	ɗɛː^{1}	ɗəɰ^{1}	ɗəɰ^{1}	ɗəɰ^{1}	ɗəɰ^{1}

女婿	son-in-law		*hlɯ:		
ɗəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}
tθow^{1}	—	ɬəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}	ɬəɰ^{1}

(d) ***ɯ:h/ʔ**

乾涸	dry		*kʰɯ:ɦ		
kʰəɰ^{2}	kʰaɰ^{2}	kʰaɰ^{2}	kʰaɰ^{5}	kʰaɰ^{5}	kʰaɰ^{5}
kʰɔ:^{5}	kʰaw^{2}	kʰaɰ^{2}	kʰəɰ^{2}	kʰaɰ^{2}	kʰaɰ^{5}
矮	short		*tʰɯ:ʔ		
tʰəɰ^{3}	tʰaɰ^{3}	tʰaɰ^{3}	tʰaɰ^{3}	tʰaɰ^{3}	tʰaɰ^{3}
tʰɔ:^{3}	tʰaw^{3}	tʰaɰ^{3}	tʰəɰ^{3}	tʰaɰ^{3}	tʰaɰ^{3}
輕	light (weight)		*kʰɯ:ʔ		
kʰəɰ^{3}	kʰaɰ^{3}	kʰaɰ^{3}	kʰaɰ^{3}	kʰaɰ^{3}	kʰaɰ^{3}
kʰɔ:^{3}	kʰaw^{3}	kʰaɰ^{3}	kʰəɰ^{3}	kʰaɰ^{3}	kʰaɰ^{3}

(e) ***u:**

斑鳩	dove, pigeon		*kʰu:		
kʰow^{1}	kʰow^{1}	kʰow^{1}	kʰow^{1}	kʰow^{1}	kʰow^{1}
(kʰow^{5})	kʰɛw^{1}	kʰow^{1}	kʰow^{1}	kʰow^{1}	kʰow^{1}
跟	with		*Cuɾu:		
row^{1}	row^{1}	vow^{1}	fow^{4}	—	(vow^{1})
vow^{4}	(ŋɛwʔ^{4})	gow^{4}	ɣow^{1}	(fow^{4})	fow^{1}
黃蜂	wasp		*m-lu:		
low^{1}	low^{1}	plow^{1}	plow^{1}	pow^{1}	plow^{1}
low^{4}	—	pow^{1}	plow^{1}	plow^{1}	plow^{1}

(f)			***u:ɦ**		
沙	sand		*pʰu:ɦ		
(pʰaw^{2})	pʰaw^{2}	pʰow^{2}	pʰaw^{5}	pʰo:^{5}	pʰɔ:^{5}
pʰa:^{5}	pʰaw^{2}	pʰaw^{2}	pʰaw^{2}	pʰaw^{2}	pʰaw^{5}
年	year		*hmu:ɦ		
mow^{2}	paw^{2}	pow^{2}	paw^{2}	pʰo:^{2}	pɔ:^{2}
ɓa:^{5}	paw^{2}	paw^{2}	paw^{2}	paw^{2}	paw^{2}
睡	sleep		*hŋu:ɦ		
ŋow^{2}	kaw^{2}	kaw^{2}	kaw^{2}	kʰo:^{2}	kɔ:^{2}
ka:^{5}	kaw^{2}	kaw^{2}	kaw^{2}	kaw^{2}	kaw^{2}
(g)			***u:ʔ**		
刺	prick (finger)		*pʰu:ʔ		
(pʰaw^{3})	pʰaw^{3}	pʰow^{3}	pʰaw^{3}	pʰaw^{3}	pʰow^{3}
pʰaj^{3}	pʰaw^{3}	pʰaw^{3}	pʰaw^{3}	pʰaw^{3}	pʰaw^{3}
殺	kill		*ɦu:ʔ		
how^{3}	haw^{3}	haw^{3}	haw^{3}	haw^{3}	haw^{3}
haj^{3}	haw^{3}	haw^{3}	haw^{3}	haw^{3}	haw^{3}
二	two		*hlu:ʔ		
ɗow^{3}	ɬaw^{3}	ɬaw^{3}	ɬaw^{3}	ɬaw^{3}	ɬaw^{3}
tθa:(j)^{3}	law^{3}	ɬaw^{3}	ɬaw^{3}	ɬaw^{3}	ɬaw^{3}
(h)			***e:**		
鵝	goose		*C-ŋe:		
ŋe:^{1}	ŋe:^{1}	ŋe:^{1}	—	—	—
—	—	ŋe:^{1}	ŋe:^{1}	—	—

背着手	hands in back		*m-le:		
—	—	ple:^{1}	ple:^{1}	pe:^{1}	ple:^{1}
—	—	—	ple:^{1}	ple:^{1}	ple:^{1}
糍粑	rice cake		*C-ɲe:ɦ		
—	ɲe:^{2}	—	ɲe:^{5}	(ɲe:^{5})	ɲe:^{5}
—	—	—	—	ɲe:^{2}	—
(i)			***a:**		
厚	thick		*C-na:		
na:^{1}	na:^{1}	na:^{1}	na:^{1}	na:^{4}	na:^{1}
nɔ:^{1}	na:^{1}	na:^{1}	na:^{1}	na:^{1}	na:^{4}
眼睛	eye		*ʈʂʰa:		
tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}
hɔ:^{1}	ha:^{1}	tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}	tsʰa:^{1}
種	to plant		*Cuhra:		
ra:^{1}	(ra:^{1})	gwa:^{1}	gwa:^{4}	(va:^{4})	hwa:^{4}
vɔ:^{4}	vaʔ^{4}	kɔ:^{1}	ɣa:^{1}	va:^{1}	va:^{1}

3.3.1 *Interim Summary*

The reconstruction of five open rimes is possible in PHl, with the front mid vowel *e: being marginal:

(63) *i: *ɯ: *u:
(*e:)
*a:

The high vowels have undergone parallel developments in category A, with the original vowels tending towards diphthongization; those in categories B and C developed differently in Bouhin and Greater Hlai, however, and it is this asymmetry between the two highest branches of Hlai which allows the original symmetry of the vowel inventory to be recovered. Due to its low frequency, the front mid vowel is considered to be of probable secondary origin, implying an original four-vowel system which consisted of three high vowels and one low vowel. This type of four-vowel system, while not typologically common, is nevertheless attested in other synchronic language systems (Maddieson 1984: 126).

3.4 Closed Rimes with High Nuclei

To make the treatment of the closed rimes more manageable, they will be divided into those with high nuclei in the present section and those with non-high nuclei in section 3.5. In addition, those rimes in this section will be divided between high front nuclei (3.4.1), high back unrounded nuclei (3.4.2), and high back rounded nuclei (3.4.3).

There are two series of closed rimes with high nuclei. The general pattern is an opposition between short high versus short mid vowels in NCHl, as opposed to short versus long high vowels in other Hlai:

(64)	(a)	*NCHl:*			(b)	*Other Hlai:*		
		iC	vs	eC		i:C	vs	iC
		ɯC	vs	ɤC		ɯ:C	vs	ɯC
		uC	vs	oC		u:C	vs	uC

The two choices for reconstruction are between an original opposition between high and mid vowels (where NCHl would be conservative), and an original opposition in vowel length of high vowels (where other Hlai would be conservative). I have chosen the latter, for two reasons. The first is that of the various branches of Hlai, NCHl has had considerably more interaction with the Non-Hlai languages of Hainan, none of which have an opposition in vowel length to the best of my knowledge. This would therefore be an exotic feature which may be expected to be modified under the pressure of language contact. The second reason is the pattern in (64a) is restricted to a specific subgroup, making it very likely that this was an innovation at the level of Proto-NCHl. In fact, the Baisha data in Wang & Qian (1951) strongly suggest that the change in (64a) above was the result of a chain shift, as the patterns in high vowel rimes they record follow the following pattern:

(65)	i:C	vs	eC
	ɯC	vs	œC
	u:C	vs	oC

In other words, it appears as though the short high rimes first lowered, and that the long high rimes only shortened afterward (apparently beginning with *ɯ:C). It may therefore be suggested that only the short rime lowering occurred at the level of Proto-NCHl, and that long rime shortening proceeded on an individual basis after the breakup of NCHl into daughter branches.

3.4.1 *Rimes with High Front Nuclei*

There are altogether fourteen series of correspondences which may be reconstructed with high front nuclei, seven long and seven short; their correspondences are given below:

(66) Reflexes of rimes with high front nuclei

Bhin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
i:w	i:w	i:w	i:w	iw	i:w	iw	i:	iw	iw	iw	iw
i:m	i:m	i:m	i:m	i:m	i:m	im	in	im	im	im	im
i:n	i:n	i:n	i:n	i:n	i:n	in	in	iŋ	iŋ	iŋ	in
i:ŋ	i:ŋ	i:ŋ	iaŋ	iaŋ	iaŋ	iəŋ	iŋ	iŋ	iŋ	iŋ	iŋ
i:p	i:p	i:p	i:p	i:p	i:p	ip	iʔ	ip	ip	ip	ip
i:t	i:t	i:t	i:t	i:t	i:t	it	iʔ	it	it~ik	it	it
i:ʔ	i:ʔ	i:k	iaʔ	iaʔ	iak	iək	iʔ	iʔ	ik	it	iʔ
iw	iw	iw	iw	iw	iw	ɔj	iw	iw	iw	ew	i:w
im	im	im	im	im	im	em	ɛn	em	em	em	em
in	in	eɲ	en	en	in	en	en	en	en	en	en
iŋ	iŋ	iŋ	iŋ	iŋ	iŋ	eŋ	eŋ	en	en	en	en
ip	ip	ip	ip	ip	ip	ep	eʔ	ep	ep	ep	ep
it	it	ec	et	et	it	et	eʔ	et	et	et	et
ik	ik	ik	i:ʔ	i:ʔ	ik	—	—	—	ik	—	et

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
iw	—	iw
iem	—	i:m
ien	ien	i:ŋ
ieŋ	eŋ	i:ŋ
iep	iep	i:p
iet	iɛt	i:t
i:	eɐk	i:t

iw	iw	ew
—	—	
in	en	en
—	—	—
—	—	(i:p)
it	ɛt	et
ek	—	—

The reconstructions proposed here are therefore the following:

(67)

*i:w	*iw
*i:m	*im
*i:n	*in
*i:ŋ	*iŋ
*i:p	*ip
*i:t	*it
*i:k	*ik

The reconstruction of these rimes is readily constrained by the principle of Symmetry, as is true for all other classes of closed rimes.

3.4.1.1 Long Rimes with High Front Nuclei

As discussed above, long rimes in NCHl languages shortened:

(68) *i:C > iC

There is some evidence that the diphthongs in NCHl were exempted from this otherwise pervasive pattern. The Nadouhua reflex of PHl *i:w is *i:* with the final glide lost after a long nucleus but not after a short one. In addition, the reversal of features in the Cunhua short diphthong may have occurred at the time when the nucleus was still high, allowing the originally long diphthong to shorten only after this change had occurred. In addition, the Meifu short diphthong seems to have not undergone vowel lowering, leading to a merger between the long and short series. These scenarios are shown below:

(69)

Cunhua:	i:w	>	i:w	>	iw
	iw	>	uj	>	oj
Nadouhua:	i:w	>	i:		
	iw	>	iw		
Meifu:	i:w	>	iw		
	iw	>	iw		

In Zandui, the long diphthong merged with its short counterpart as it did in the Meifu branch:

(70)	Zandui	i:w	>	iw	
		iw	>	iw	

There were other changes in stop-closed rimes. In the Qi branch, there was a diphthongization in the rimes with velar finals, where original long *i: broke first to *iə*, and then underwent schwa lowering to *ia*:

(71)	*i:ŋ	>	iəŋ	>	iaŋ
	*i:k	>	iək	>	iak

The nuclei of Cunhua rimes with velar codas also diphthongized to *iə*, following the general Hlai dispreference for short rimes in this environment:

(72)	*i:ŋ	>	iəŋ
	*i:k	>	iək

In Nadouhua, there was an across-the-board merger of labial and alveolar codas; in addition, all final stops debuccalized to a glottal stop:

(73)	*im	>	in
	*in	>	in
	*iŋ	>	iŋ
	*ip	>	iʔ
	*it	>	iʔ
	*ik	>	iʔ

There was a merger of the alveolar nasal with the velar in Moyfaw:

(74)	*in	>	iŋ

Finally, Baisha underwent an interesting cross-merger, where (as in Meifu) the alveolar nasal merged with the velar, but where the velar stop merged with the alveolar, under the influence of the preceding vowel:

(75)	*in	>	iŋ
	*ik	>	it

3.4.1.2 Short Rimes with High Front Nuclei

There were a number of individual developments of short rimes in the Hlai subgroups and daughter languages. The lowering to mid vowels in NCHl mentioned earlier was universal:

(76) *iC > eC

A similar but more restricted change occurred in Lauhut, where alveolar-final rimes became palatalized as the vowel itself lowered to *e*:

(77) *in > eɲ
*it > ec

The Tongzha and Zandui alveolar-final rimes also lowered to *e*, while *ik lengthened to *i:k*, filling the gap left by original *i:k:

(78) *in > en
*it > et
*ik > i:k > i:ʔ
*i:k > iək > iaʔ

The vowel *e* in Moyfaw was raised before the velar stop as well (there are no Changjiang cognates, so it cannot be determined if this occurred at the level of the Meifu branch or not). Since there are only two examples, however, it should be kept in mind that these may have been loans from Lauhut:

(79) ek > ik

A merger of velar final rimes with alveolar-final rimes occurred in NECHl:

(80) eŋ > en

This was mirrored by the same merger of the stops in Yuanmen:

(81) ek > et

Finally, the Yuanmen diphthong lengthened, creating an environment in which raising occurred (see section 4.5.1):

(82) ew > e:w > i:w

A comparison of reconstructions is given below:

(83)		*Thurgood*	*Ostapirat*	*PHl*
	(a)	*i:w	*i:w	*i:w
	(b)	*i:m	*i:m	*i:m
	(c)	*i:n	*i:n	*i:n
	(d)	*iaŋ	*i:ŋ	*i:ŋ
	(e)	*i:p	*i:p	*i:p
	(f)	*i:t	*i:t	*i:t
	(g)	*i:k	*i:k	*i:k
	(h)	*iw	*iw	*iw
	(i)	—	*im	*im
	(j)	*iɲ	*in	*in
	(k)	*iŋ	*iŋ	*iŋ
	(l)	*ip	*ip	*ip
	(m)	*ic	*it	*it
	(n)	*ik	*ik	*ik

While Thurgood's reconstruction agrees with the present one in positing a length distinction, there are three differences between them. The first is that he reconstructs *iaŋ in (83d), based on the Qi evidence. I consider this a secondary development, and it is also at odds with the fact that he reconstructs *i:k instead of *iak for the sixth series, violating Symmetry. The second difference is that he does not reconstruct anything in (83i). Finally, he reconstructs *iɲ and *ic in (83j) and (83m), whereas I consider the palatalization of the codas under the influence of the vowel to be a secondary development in Lauhut.

Ostapirat's (2004) reconstruction agrees with the present one in positing a length distinction, and is otherwise straightforward.

Examples of the PHl closed rimes with high front nuclei are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(84) *Examples of PHl closed rimes with high front nuclei*

(a)			*i:w		
藍色	blue		*khi:w		
k^{h}i:w^{1}	k^{h}i:w^{1}	k^{h}i:w^{1}	k^{h}i:w^{1}	k^{h}iw^{1}	k^{h}i:w^{1}
k^{h}iw^{1}	k^{h}i:^{1}	k^{h}iw^{1}	k^{h}iw^{1}	k^{h}iw^{1}	k^{h}iw^{1}
貓	cat		*C-mi:wh		
mi:w^{2}	mi:w^{2}	mi:w^{2}	mi:w^{5}	miw^{2}	mi:w^{5}
miw^{5}	mi:^{2}	miw^{2}	miw^{2}	(miw^{1})	miw^{2}
賣	sell		*hri:wʔ		
ri:w^{3}	gi:w^{3}	—	gi:w^{6}	hiw^{6}	gi:w^{6}
hiw^{4}	zi:^{3}	giw^{4}	xiw^{3}	xiw^{3}	k^{h}iw^{3}
(b)			*iw		
妻子	wife		*C-liw		
liw^{1}	liw^{1}	liw^{1}	liw^{1}	liw^{4}	liw^{1}
lɔj^{1}	liw^{1}	liw^{1}	liw^{1}	lew^{1}	li:w^{4}
老鼠	mouse		*hniw		
niw^{1}	tiw^{1}	tiw^{1}	tiw^{4}	t^{h}iw^{4}	tiw^{4}
tsɔj^{4}	tiwʔ^{4}	tiw^{4}	tiw^{1}	tew^{1}	ti:w^{4}
尖刀	dagger		*hljiwʔ		
ziw^{3}	ziw^{3}	ziw^{3}	ɬiw^{6}	ɬiw^{6}	ɬiw^{6}
—	(zɛw^{3})	liw^{3}	ziw^{3}	zew^{3}	tsi:w^{6}
(c)			*i:m		
塞	plug up		*tç^{h}i:m		
—	—	ts^{h}i:m^{1}	ts^{h}i:m^{1}	ts^{h}i:m^{1}	ts^{h}i:m^{1}
—	sin^{1}	(ts^{h}im^{2})	ts^{h}i:m^{1}	ts^{h}im^{1}	ts^{h}im^{1}

舔	lick		*hlji:mh		
zi:m^2	zi:m^2	zi:m^2	ɬi:m^2	—	ɬi:m^2
(lɛm^5)	(lin^2)	lim^2	ɲim^2	ɲim^2	—
分贈	give as gift		*hri:mʔ		
(gi:m^3)	gi:m^3	gi:m^3	gi:m^6	hi:m^6	gi:m^6
—	—	—	xim^3	xim^3	kʰim^3
(d)			***im**		
嘗	taste		*tçʰim		
tsʰim^1	tsʰim^1	tsʰim^1	(tsʰem^1)	tsʰim^1	tsʰim^1
—	—	—	tsʰem^1	tsʰem^1	tsʰem^1
項圈	necklet		*kʰim		
kʰim^1	kʰim^1	kʰim^1	kʰim^1	—	—
—	—	—	—	kʰem^1	—
放蠱	to poison		*kimʔ		
kim^3	kim^3	kim^3	kim^3	kim^3	kim^3
kem^3	—	kem^3	kem^3	kem^3	kem^3
(e)			***i:n**		
錢	money		*tçi:n		
tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1	tsi:n^1
tθin^1	tsin^1	tsiŋ^1	tsiŋ^1	tsiŋ^1	tin^1
石頭	stone		*tçʰi:n		
tsʰi:n^1	tsʰi:n^1	tsʰi:n^1	tsʰi:n^1	tsʰi:n^1	tsʰi:n^1
sin^1	sin^1	tsʰiŋ^1	tsʰiŋ^1	(tsʰiŋ^4)	tsʰin^1
舌頭	tongue		*hli:nʔ		

ɗi:n^{3}	ɬi:n^{3}	ɬi:n^{3}	ɬi:n^{3}	ɬi:n^{3}	ɬi:n^{3}
tθin^{3}	lin^{3}	ɬiŋ^{3}	ɬiŋ^{3}	ɬiŋ^{3}	ɬin^{3}
(f)			***in**		
飛	fly		*ɓin		
ɓin^{1}	ɓin^{1}	ɓeɲ^{1}	ɓen^{1}	ɓen^{1}	ɓin^{1}
ɓen^{1}	ɓen^{1}	ɓen^{1}	ɓen^{1}	ɓen^{1}	ɓen^{1}
答應	respond		*t^{h}in		
t^{h}in^{1}	t^{h}in^{1}	t^{h}eɲ^{1}	t^{h}en^{1}	t^{h}en^{1}	t^{h}in^{1}
t^{h}en^{1}	t^{h}en^{1}	t^{h}en^{1}	t^{h}en^{1}	t^{h}en^{1}	t^{h}en^{1}
好	good		*hlin		
ɗin^{1}	ɬin^{1}	ɬeɲ^{1}	ɬen^{1}	ɬen^{1}	ɬin^{1}
tθen^{1}	len^{1}	ɬen^{1}	ɬen^{1}	ɬen^{1}	ɬen^{1}
(g)			***i:ŋ**		
手指	finger		*hlji:ŋh		
zi:ŋ^{2}	zi:ŋ^{2}	zi:ŋ^{2}	ɬiaŋ^{2}	ɬiaŋ^{2}	ɬiaŋ^{2}
—	ziŋ^{2}	ziŋ^{2}	ziŋ^{2}	(ziŋ^{5})	tsiŋ^{2}
吊	hang		*ɾi:ŋʔ		
ri:ŋ^{3}	ri:ŋ^{3}	ri:ŋ^{3}	riaŋ^{6}	liaŋ^{6}	liaŋ^{6}
liəŋ^{4}	liŋ^{3}	—	riŋ^{3}	riŋ^{3}	riŋ^{6}
裂開/縫	crack, split		*t^{h}i:ŋʔ		
t^{h}i:ŋ^{3}	t^{h}i:ŋ^{3}	t^{h}i:ŋ^{3}	t^{h}iaŋ^{3}	t^{h}iaŋ^{3}	t^{h}iaŋ^{3}
ts^{h}iəŋ^{3}	—	t^{h}iŋ^{3}	t^{h}iŋ^{3}	t^{h}iŋ^{3}	t^{h}iŋ^{3}
(h)			***iŋ**		
童山	bare hills		*kiŋ		

kiŋ^{1}	kiŋ^{1}	kiŋ^{1}	kiŋ^{1}	kiŋ^{1}	kiŋ^{1}
—	—	ken^{1}	ken^{1}	ken^{1}	ken^{1}
螞蟥	leech		*hljiŋ		
ziŋ^{1}	ziŋ^{1}	ziŋ^{1}	ɬiŋ^{4}	ɬiŋ^{4}	ɬiŋ^{4}
(liŋ^{4})	zeŋʔ^{4}	—	zen^{1}	zen^{1}	tsen^{4}
稻草	rice straw		*Cuŋiŋʔ		
ŋiŋ^{3}	ŋiŋ^{3}	ŋwiŋ^{3}	ŋiŋ^{3}	ŋiŋ^{6}	ŋiŋ^{3}
ɲeŋ^{3}	ŋwɛn^{3}	ŋen^{3}	ŋen^{3}	ŋen^{3}	ɱen^{6}
(i)			***i:p**		
指甲	fingernail		*C-li:p		
li:p^{7}	li:p^{7}	li:p^{7}	li:p^{7}	li:p^{8}	li:p^{7}
lip^{2}	liʔ^{4}	lip^{7}	lip^{7}	lip^{8}	l/rip^{8}
蜈蚣	centipede		*ɾi:p		
ri:p^{7}	ri:p^{7}	ri:p^{7}	ri:p^{8}	li:p^{8}	li:p^{8}
lip^{4}	—	lip^{7}	rip^{7}	rip^{8}	rip^{8}
秕子	blighted grain		*hli:p		
ɗi:p^{7}	ɬi:p^{7}	ɬi:p^{7}	ɬi:p^{7}	ɬi:p^{7}	ɬi:p^{7}
tθip^{2}	—	(ɬip^{9})	ɬip^{7}	ɬip^{8}	ɬip^{7}
(j)			***ip**		
狗豆子	dogbean		*tɕʰip		
tsʰip^{7}	tsʰip^{7}	tsʰip^{7}	tsʰip^{7}	tsʰip^{7}	tsʰip^{7}
—	—	—	tsʰep^{7}	tsʰep^{8}	tsʰep^{7}
閃電	lightning		*hljip		
zip^{7}	zip^{7}	—	ɬip^{7}	ɬip^{7}	ɬip^{7}
lep^{4}	(fiʔ^{5})	zep^{7}	zep^{7}	—	—

打獵	go hunting		*hrip		
rip^{7}	gip^{7}	gip^{7}	gip^{8}	—	—
—	—	—	—	xep^{8}	—
(k)			***i:t**		
掐	pinch		*C-mi:t		
mi:t^{7}	mi:t^{7}	mi:t^{7}	mi:t^{7}	mi:t^{8}	(mit^{7})
mit^{2}	miʔ^{4}	mit^{7}	mit^{7}	mit^{7}	mit^{8}
粽子	dumpling		*hɲi:t		
—	—	tsi:t^{7}	tsi:t^{8}	ts^{h}i:t^{8}	tsi:t^{8}
tsit^{4}	tsiʔ^{4}	—	tsit^{7}	tsit^{8}	tsit^{8}
舀水	bail water		*hwi:t		
vi:t^{7}	vi:t^{7}	hwi:t^{7}	vi:t^{8}	(vi:ʔ^{8})	vi:t^{7}
—	viʔ^{4}	—	vet^{7}	vit^{8}	vet^{8}
(l)			***it**		
皺紋	wrinkle		*C-ɲit		
(ɲit^{9})	ɲit^{7}	ɲec^{7}	ɲet^{7}	net^{8}	ɲet^{7}
ɲet^{2}	ɲɛʔ^{4}	ɲet^{7}	ɲet^{7}	ɲet^{8}	ɲet^{8}
端	hold (two hands)		*k^{h}it		
k^{h}it^{7}	k^{h}it^{7}	k^{h}ec^{7}	k^{h}et^{7}	k^{h}et^{7}	k^{h}it^{7}
—	—	—	k^{h}et^{7}	k^{h}et^{7}	k^{h}et^{7}
辣	spicy		*hrit		
rit^{7}	git^{7}	gec^{7}	get^{8}	het^{8}	h/git^{8}
het^{4}	(zeʔ^{5})	(git^{7})	xet^{7}	xet^{8}	k^{h}et^{7}

(m)			***i:k**		
魚籠	fish basket		*C-li:k		
li:ʔ^7	li:ʔ^7	li:k^7	liaʔ^7	liaʔ^8	liak^7
liək^2	liʔ^4	liʔ^7	lik^7	lit^8	liʔ^8
翅膀	wing		*pʰi:k		
pʰi:ʔ^7	pʰi:ʔ^7	pʰi:k^7	pʰiaʔ^7	pʰiaʔ^7	pʰiak^7
pʰiək^2	pʰiʔ^4	pʰiʔ^7	pʰik^7	pʰit^8	pʰiʔ^7
滿	full		*thi:k		
tʰi:ʔ^7	tʰi:ʔ^7	tʰi:k^7	tʰiaʔ^7	tʰiaʔ^7	tʰiak^7
tʰiək^2	tʰiʔ^4	tʰiʔ^7	tʰik^7	(tʰiʔ^8)	tʰiʔ^7
(n)			***ik**		
耙/掃	rake/sweep		*hrjik		
zik^7	zik^7	rik^7	ti:ʔ^8	tʰi:ʔ^8	tik^8
—	—	—	—	—	tset^8
肅靜	silence		*ʔik		
—	ʔik^7	ʔik^7	ʔi:ʔ^7	ʔi:ʔ^7	(ʔi:k^7)
—	—	—	(ʔik^7)	—	—
小孩	child		*C-lik		
lik^7	lik^7	lik^7	li:ʔ^7	li:ʔ^8	lik^7
—	—	—	(lik^7)	—	—

3.4.2 *Closed Rimes with High Back Unrounded Nuclei*

The correspondences for the closed rimes with high back unrounded vowels are given below:

(85) Correspondences of closed rimes with high back unrounded nuclei

Bhin	*HaEm*	*Lhut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
ɯ:j	—	ɯ:j	ɯ:j	u:j	ɯ:j	—	—	—	(uj)	—	—
ɯ:m	ɯ:m	ɯ:m	ɯ:m	u:m	ɯ:m	um	un~ɛn	um~ɯm	um~ɯm	um~ɯm	um~om
ɯ:n	ɯ:n	ɯ:n	ɯ:n	ɯ:n	ɯ:n	ɯn	ɛn	ɯŋ	ɯŋ	ɯŋ	ən
ɯ:ŋ	ɯ:ŋ	ɯ:ŋ	ɯ:ŋ	ɯaŋ	ɯ:ŋ	ɯəŋ	ɛŋ	ɯŋ	ɯŋ	ɯŋ	ɯŋ
ɯ:p	ɯ:p	ɯ:p	ɯ:p	u:p	ɯ:p	—	—	up	up	up	up
ɯ:t	ɯ:t	ɯ:t	ɯ:t	ɯ:t	ɯ:t	—	—	—	—	ɯk	—
ɯ:ʔ	ɯ:ʔ	ɯ:k	ɯ:ʔ	ɯaʔ	ɯ:ʔ	ɯək	uʔ~ɛʔ	ɯʔ	ɯk	ɯk	ɯʔ
ɯm	ɯm	ɯm	ɯm	um	ɯm	am~om	un	om~em	om~em	om	om
ɯn	ɯn	ɯn	ɯn	ɯn	ɯn	ɯn~ən	ɛn	əŋ	əŋ	əŋ	ən
ɯŋ	ɯŋ	ɯŋ	ɯŋ	ɯŋ	ɯŋ	—	—	—	əŋ	əŋ	əŋ
ɯp	ɯp	ɯp	ɯp	up	ɯp	up~ɛp	ɛʔ	ap~ep	op~ep	op	op
ɯt	ɯt	ɯt	ɯt	ɯt	ɯt	ɯt~ət	ɛʔ	ət	ək	ək	ət

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
—	—	—
ɯɤm	ɯɤm	u:m~ɯm
ɯɤn	ɯɤn	ɯŋ
ɯɤŋ	ɯɤŋ	ɯŋ
ɯɤp	—	u:p
ɯɤt	—	—
ɯ:	ɯɤk	ɯk
um	—	—
ɯn	—	œŋ
ɯŋ	—	œŋ
—	—	op
ɯt	—	œk

In general, the same patterns which applied to the class of rimes with high front vowels reoccur here. There is considerable variation in NCHl reflexes, presumably due to the marked nature of the high and mid back unrounded vowels. The reconstructions proposed here for these correspondences are given below:

(86) *ɯ:j
*ɯ:m *ɯm
*ɯ:n *ɯn
*ɯ:ŋ *ɯŋ
*ɯ:p *ɯp
*ɯ:t *ɯt
*ɯ:k

3.4.2.1 Long Rimes with High Back Unrounded Nuclei

With the exception of Zandui, there have been very few changes in the long rimes of the non-NCHl languages. The three changes which have occurred in Zandui are that the vowel in the diphthong rounded, probably through dissimilation; the vowels in rimes closed with bilabial stops became rounded under their influence; and the vowels in rimes closed by velar stops have diphthongized, in the same way which occurred for those in section 4.4.1.1 above for the entire Qi branch:

(87) *ɯ:j > u:j

*ɯ:m > u:m
*ɯ:p > u:p

*ɯ:ŋ > ɯəŋ > ɯaŋ
*ɯ:k > ɯək > ɯaʔ

In NCHl, the regular shortening of long rimes occurred:

(88) *ɯ:C > *ɯC

The nucleus of the dipthong apparently rounded in Moyfaw (note, however, that since this is the only reflex of this rime in NCHl, that it may be a loan):

(89) ɯj > uj

The most common place of variation in NCHl is in the bilabial-final rimes, in which there was sporadic rounding of the vowel. This happened in all six NCHl languages, but could not have occurred at the level of Proto-Northern Hlai, since the variation does not hold across identical lexical items:

(90)	ɯm	>	um
	ɯp	>	up

Nadouhua also experienced rounding of the vowel in NCHl *ɯk* rimes, under the influence of a preceding labial or labiovelar:

(91)	*Gloss*	*Proto-Hlai*		*NCHl*		*Nadouhua*
	weave	*Cuʈʂʰɯ:k	>	*ʃʰwɯk	>	fuʔ⁴
	bone	*Cuɾɯ:k	>	*ɾwɯk	>	vuʔ⁴
	tender	*m-lɯ:k	>	*blɯk	>	pjuʔ⁴

In addition, there were two cases of vowel-lowering which occurred, in Nadouhua and in Yuanmen. In Nadouhua, anything which did not undergo secondary rounding shortened (merging with the PHl short *ɯC series) and lowered to a mid vowel, centralizing to schwa. Rimes with schwa, no matter their origin, then fronted to ɛC (there are no examples of original *ɯp* or *ɯt* in Nadouhua):

(92)	ɯm	>	ɤn	>	ən	>	ɛn
	ɯn	>	ɤn	>	ən	>	ɛn
	ɯŋ	>	ɤŋ	>	əŋ	>	ɛŋ
	ɯk	>	ɤk	>	ək	>	ɛʔ

In Yuanmen, the labial-closed rimes which didn't round and the alveolar-closed rimes shortened and lowered to merge with their counterparts from PHl *ɯm/ɯp and *ɯn (there are no Yuanmen examples of original *ɯt):

(93)	ɯm	>	ɤm	>	om
	ɯp	>	ɤp	>	op
	ɯn	>	ɤn	>	ən

3.4.2.2 Short Rimes with High Back Unrounded Nuclei

The only change in this category which occurred in a non-NCHl language was in Zandui, where the vowel became rounded under the influence of a following labial coda:

(94)	*ɯm	>	um
	*ɯp	>	up

In NCHl, the typical short-vowel lowering applied, with an additional centralization of the vowel in many cases; note that this was only possible after the lowering of original schwa nuclei (see section 4.5.2):

(95)	*ɯC	>	əC
	*əC	>	aC

In Cunhua, the following variation occurs in *əm from earlier *ɯm:

(96)	*əm	>	*om/əm	>	om/am

There is only one example of original NCHl *əm in Nadouhua, the reflex of which is *um*. In all other cases, the following shift occurred:

(97)	əp	>	ɛʔ
	ən	>	ɛn
	ət	>	ɛʔ

The following changes occurred in the Meifu branch:

(98)	əm	>	om/em
	əp	>	ap/ep (Changjiang), op/ep (Moyfaw)
	ən	>	əŋ
	ət	>	ək (Moyfaw)

Finally, the following occurred in the Run branch:

(99)	əm	>	om	
	əp	>	op	
	ən	>	əŋ	(Baisha)
	ət	>	ək	(Baisha)

A comparison of reconstructions is given below:

(100)		*Thurgood*	*Ostapirat*	*PHl*
	(a)	—	(*ɨːj)	*ɯːj
	(b)	*uam (b)	*ɨːm	*ɯːm
	(c)	*uːn (b)	*ɨːn	*ɯːn
	(d)	*uːŋ (b)	*ɨːŋ	*ɯːŋ
	(e)	*uap (b)	*ɨːp	*ɯːp
	(f)	—	—	*ɯːt
	(g)	*uak (b)	*ɨːk	*ɯːk

(h)	—	*ɨm	*ɯm
(i)	—	*ɨn	*ɯn
(j)	—	—	*ɯŋ
(k)	—	*ɨp	*ɯp
(l)	—	*ɨt	*ɯt

Thurgood doesn't reconstruct anything in (100h–l). For the first six series (excluding the first and the sixth, for which there is only one clear example of each), he reconstructs a series of either pure long u:C rimes or diphthongized uaC rimes. These are all labeled with a (b) in his system, because they contrast with other rimes which are reconstructed identically based on other series of correspondences. These are assumed to be loans (Thurgood 1991: 19). It is unclear why there is an asymmetry between the rimes with velar codas, with a pure vowel being reconstructed for the third series (*u:ŋ), but a diphthong for the sixth series (*uak), another violation of Symmetry.

Ostapirat's (2004) reconstruction is identical with the one proposed here, save for the fact that he reconstructs high central vowels instead of high back vowels. He does not reconstruct anything in (99f) or (99j) as each is supported by only a single example, and his reconstruction of the first series is tentative (also based on only one example).

Examples of the closed rimes with high back unrounded vowels are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(101) *Examples of closed rimes with high back unrounded vowels*

(a)			***ɯ:j**		
竹子	bamboo		*m-lɯ:jɦ		
lɯ:j²	—	plɯ:j²	plɯ:j⁵	pu:j⁵	plɯ:j⁵
—	—	—	(puj²)	—	—
(b)			***ɯ:m**		
飽	sated		*kʰɯ:m		
kʰɯ:m¹	kʰɯ:m¹	kʰɯ:m¹	kʰɯ:m¹	kʰu:m¹	kʰɯ:m¹
kʰum¹	kʰɛn¹	kʰɯm¹	kʰɯm¹	kʰɯm¹	kʰom¹

蛋/卵	egg		*hjɯ:m		
zɯ:m^{1}	zɯ:m^{1}	zɯ:m^{1}	zɯ:m^{4}	zu:m^{4}	zɯ:m^{1}
zum^{1}	zunʔ^{4}	zum^{1}	zum^{1}	zum^{1}	zum^{4}
爬	crawl		*Cuɦɯ:m		
hɯ:m^{1}	hɯ:m^{1}	hwɯ:m^{1}	hɯ:m^{1}	vu:m^{1}	hɯ:m^{1}
ŋum^{1}	—	ŋɯm^{1}	ŋɯm^{1}	ŋɯm^{1}	ɱom^{4}
(c)			***ɯm**		
烤火	roast over fire		*ʔɯmɦ		
ʔɯm^{2}	ʔɯm^{2}	ʔɯm^{2}	ʔɯm^{5}	ʔum^{5}	(ʔɯm^{5})
ʔom^{5}	ʔun^{2}	ʔom^{2}	ʔom^{2}	ʔom^{2}	ʔom^{5}
不知道	not know		*hlɯmʔ		
ɗɯm^{3}	ɬɯm^{3}	ɬɯm^{3}	ɬɯm^{3}	ɬum^{3}	ɬɯm^{3}
tθam^{3}	—	ɬem^{3}	ɬem^{3}	ɬom^{3}	ɬom^{3}
烘	bake		*Cuhrɯmʔ		
rɯm^{3}	gɯm^{3}	gɯm^{3}	gɯm^{6}	—	hɯm^{6}
—	—	kum^{1}	ɣum^{3}	—	—
(d)			***ɯ:p**		
鱉	pt-nosed turtle		*t^{h}ɯ:p		
t^{h}ɯ:p^{7}	t^{h}ɯ:p^{7}	t^{h}ɯ:p^{7}	t^{h}ɯ:p^{7}	t^{h}u:p^{7}	t^{h}ɯ:p^{7}
—	—	—	t^{h}up^{7}	t^{h}up^{8}	t^{h}up^{7}
搓洗	scrub		*f^{h}ɯ:p		
(pɯ:p^{7})	fɯ:p^{7}	fɯ:p^{7}	fɯ:p^{7}	fu:p^{7}	fɯ:p^{7}
—	—	fup^{7}	fup^{7}	fup^{8}	fup^{7}

稻剪	rice knife		*kʰɯ:p		
—	kʰɯ:p^7	kʰɯ:p^7	—	—	—
—	—	kʰup^7	kʰup^7	kʰup^8	kʰup^7
(e)			***ɯp**		
臭蟲	bedbug		*kɯp		
kɯp^7	kɯp^7	kɯp^7	kɯp^7	kup^7	kɯp^7
kup^2	kɛʔ^4	(kɯp^7)	kep^7	kop^8	kop^7
呷	sip		*tçʰɯp		
tsʰɯp^7	tsʰɯp^7	tsʰɯp^7	tsʰɯp^7	tsʰup^7	tsʰɯp^7
tsʰip^2	seʔ^4	—	tsʰop^7	—	—
搾	handspan		*Cuɦɯp		
hɯp^7	hɯp^7	hwɯp^7	hɯp^7	vup^7	hɯp^7
ŋup^2	ŋɛʔ^4	ŋap^7	ŋop^7	ŋop^8	mop^8
(f)			***ɯ:n**		
閹	castrate		*ɗɯ:n		
ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1
ɗɯn^1	—	ɗɯŋ^1	ɗɯŋ^1	ɗɯŋ^1	ɗən^1
骟子	pheasant		*ɗɯ:n		
ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1
ɗɯn^1	—	ɗɯm^3	ɗɯŋ^1	ɗɯŋ^1	ɗən^1
出/開	exit/open up		*tʰɯ:n		
tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1
tsʰɯn^1	tʰɛn^1	tʰɯn^1	tʰɯŋ^1	tʰɯŋ^1	tʰən^1

(g)			***ɯn**		
重	heavy		*kʰɯn		
kʰɯn^1	kʰun^1	kʰɯn^1	kʰɯn^1	kʰɯn^1	kʰɯn^1
kʰon^1	kʰɛn^1	kʰəŋ^1	kʰəŋ^1	kʰəŋ^1	kʰən^1
淺	shallow		*tʰɯ[:]nʔ		
tʰɯ:n^3	tʰɯn^3	tʰɯn^3	tʰɯn^3	tʰɯn^3	tʰɯn^3
fɯn^3	tʰɛn^3	tʰəŋ^3	tʰəŋ^3	tʰəŋ^3	tʰən^3
刺	thorn		*Cuɦɯnʔ		
hɯn^3	hɯn^3	hwɯn^3	hɯn^3	hun^3	hɯn^3
ŋɯn^3	ŋɛn^3	ŋəŋ^3	ŋəŋ^3	ŋəŋ^3	ɱən^6
(h)			***ɯ:t**		
扒/撓	dig up/scratch		*ɦɯ:t		
hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7
—	—	—	—	hɯk^8	—
(i)			***ɯt**		
曾祖母	pat. grt grndma		*tçɯt		
tsɯt^7	tsɯt^7	tsɯt^7	tsɯt^7	tsɯt^7	—
—	—	—	tsək^7	(tsɯk^7)	tət^7
斷	break (pulling)		*tʰɯt		
—	—	tʰɯt^7	tʰɯt^7	tʰɯt^7	tʰɯt^7
—	—	—	tʰək^7	tʰət^7	tʰət^7
層	layer		*hlɯt		
ɗɯt^7	ɬɯt^7	ɬɯt^7	ɬɯt^7	ɬɯt^7	ɬɯt^7
—	—	ɬət^7	ɬək^7	ɬək^8	ɬət^7

(j)			*ɯ:ŋ		
竹筍	bamboo shoot		*C-nɯ:ŋ		
nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯ:ŋ^{1}	nɯaŋ^{4}	nɯ:ŋ^{1}
nɯəŋ^{1}	neŋ^{1}	nɯŋ^{1}	nɯŋ^{1}	nɯŋ^{1}	nɯŋ^{4}
薑	ginger		*kʰɯ:ŋ		
kʰɯ:ŋ^{1}	kʰɯ:ŋ^{1}	kʰɯ:ŋ^{1}	kʰɯ:ŋ^{1}	kʰɯaŋ^{1}	kʰɯ:ŋ^{1}
—	kʰeŋ^{1}	kʰɯŋ^{1}	kʰɯŋ^{1}	kʰɯŋ^{1}	kʰɯŋ^{1}
放走	release		*pʰɯ:ŋʔ		
pʰɯ:ŋ^{3}	pʰɯ:ŋ^{3}	pʰɯ:ŋ^{3}	pʰɯ:ŋ^{3}	pʰɯaŋ^{3}	pʰɯ:ŋ^{3}
pʰuəŋ^{3}	—	pʰɯŋ^{3}	pʰɯŋ^{3}	pʰɯŋ^{3}	pʰɯŋ^{3}
(k)			*ɯŋ		
緊	pull tight		*kɯŋ		
kɯŋ^{1}	kɯŋ^{1}	kɯŋ^{1}	kɯŋ^{1}	kɯŋ^{1}	kɯŋ^{1}
—	—	(kəŋ^{2})	kəŋ^{1}	(kəŋ^{2})	—
(l)			*ɯ:k		
成熟	ripe		*sʰɯ:k		
tɯ:ʔ^{7}	tɯ:ʔ^{7}	tɯ:k^{7}	tɯ:ʔ^{7}	tɯaʔ ^{7}	tɯ:ʔ^{7}
tθɯək^{2}	feʔ^{4}	sɯʔ^{7}	sɯk^{7}	tsʰɯk^{8}	tsʰɯʔ^{7}
織	weave (fabric)		*Cuʈʂʰɯ:k		
tsʰɯ:ʔ^{7}	tsʰɯ:ʔ^{7}	fɯ:k^{7}	(fɯ:ʔ^{7})	tsʰɯaʔ^{7}	tsʰɯ:ʔ^{7}
fɯək^{2}	fuʔ^{4}	fɯʔ^{7}	fɯk^{7}	fɯk^{8}	fʰɯʔ^{7}
骨頭	bone		*Cuɾɯ:k		
rɯ:ʔ^{7}	rɯ:ʔ^{7}	vɯ:k^{7}	fɯ:ʔ^{8}	fɯaʔ^{8}	fɯ:ʔ^{8}
vɯək^{4}	vuʔ^{4}	kɯʔ^{7}	ɣɯk^{7}	fɯk^{8}	fɯʔ^{8}

3.4.3 *Closed Rimes with High Back Rounded Nuclei*

The correspondences for the closed rimes with high back rounded vowels are given below:

(102) Reflexes of closed rimes with high back vowels in the Hlai languages

Bhin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
u:j	u:j	u:j	u:j	u:j	u:j	uj	uj	uj	uj	uj	uj
u:n	u:n	u:n	u:n	u:n	u:n	uən	un	uŋ	uŋ	uŋ	un
u:n	u:n	u:ɲ	u:n	u:n	u:n	uən	un	un	un	un	un
u:ŋ	u:ŋ	u:ŋ	u:ŋ	uaŋ	u:ŋ	oŋ	uŋ	uŋ	uŋ	uŋ	uŋ
u:t	u:t	u:t	u:t	u:t	u:t	uət	uʔ	uʔ	uk	uk	ut
u:t	u:t	u:c	u:t	u:t	u:t	uət	uʔ	ut	ut	ut	ut
u:ʔ	u:ʔ	u:k	u:ʔ	uaʔ	u:ʔ	ok	uʔ	uʔ	uk	uk	uʔ
uj	uj	uj	uj	uj	uj	ɔj	oj	uj	uj	oj	ow
un	un	un	un	un	un~ɯn	ən	ɛn	oŋ	oŋ	oŋ	ən
un	un	uɲ	un	un	ɯn	—	(u)ɛn	on	on	on	ən
uŋ	uŋ	oŋ	oŋ	uŋ	uŋ	oŋ	oŋ	oŋ	oŋ	oŋ	oŋ
ut	ut	ut	ut	ut	ut~ɯt	ət	—	oʔ	ok	ok	ət
ut	ut	uc	ut	ut	ut	ət	(u)ɛʔ	ət	ot	ot	ət

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
uoj	uj	uj
uon	uon	u:ŋ
—	—	—
uoŋ	uoŋ	u:ŋ
uot	uot	u:k
—	—	—
u:	uok	u:k
uj	uj	oj
un	un	oŋ
ʊn	—	—
uŋ	—	u:ŋ
ut	—	ok
ʊt	—	ot

There are no examples of rimes with bilabial codas; in addition, there does not seem to be any evidence for a final series of correspondences supporting the reconstruction of PHl *uk. The reconstructions proposed here for the series above are the following:

(103) *u:j *uj
*u:n *un
*u:ɲ *uɲ
*u:ŋ *uŋ
*u:t *ut
*u:c *uc
*u:k

3.4.3.1 Long Closed Rimes with High Back Rounded Nuclei

The most sweeping change in this series was the merger of the alveolar-final and palatal-final rimes, which occurred in Bouhin, Ha Em, and Qi:

(104) *u:ɲ > u:n
*u:c > u:t

Besides this, the only other change which occurred outside of NCHl was the now familiar diphthongization of the velar-final rimes in Zandui:

(105) *Diphthongization before velars in Zandui*
*u:ŋ > uəŋ > uaŋ
*u:k > uək > uak

In NCHl, the regular high vowel shortening occurred:

(106) *u:C > uC

There was also a loss of palatal codas throughout NCHl. However, unlike other branches in which the final palatals merged with the final alveolars, the distinction between palatals and alveolars has been preserved by an initial merger of the final alveolars with the velars in Baisha and the Meifu branch:

(107) *un > uŋ
*ut > uk

*uɲ > un
*uc > ut

Besides this, the only other changes were in NWCHl. In Cunhua, these rimes diphthongized before final alveolars, but lowered before final velars:

(108)	*un	>	uən
	*ut	>	uət
	*uɲ	>	uən
	*uc	>	uət
	*uŋ	>	oŋ
	*uk	>	ok

In Nadouhua, the palatals merged with the alveolars, and all oral stops lenited to glottal stop:

(109)	*un	>	un
	*uɲ	>	un
	*uŋ	>	uŋ
	*ut	>	uʔ
	*uc	>	uʔ
	*uk	>	uʔ

3.4.3.2 Short Closed Rimes with High Back Rounded Nuclei

In Bouhin, Ha Em and Qi, the same merger of alveolar and palatal codas occurred that was illustrated for the long rimes:

(110)	*uɲ	>	un
	*uc	>	ut

Baoting has the following reflexes; the causes underlying the variation are unclear:

(111)	*un	>	un~ɯn
	*uɲ	>	ɯn
	*ut	>	ut~ɯt
	*uc	>	ut

In Lauhut and Tongzha, *u lowered to *o* before the velar coda:

(112)	*uŋ	>	oŋ

The regular NCHl vowel lowering occurred in this series:

(113) *uC > oC

The distinction between the PHl *uŋ and *oŋ series was maintained in NCHl by maintaining a height distinction:

(114) *uŋ > oŋ
*oŋ > ɔŋ

The diphthong *uj never lowered in the Meifu branch, in parallel with *iw:

(115) *uj > uj

The same diphthong lengthened in Yuanmen (in parallel with *ew*), raising but in this case losing the final glide:

(116) *uj > oj > o:j > u:j > u: > ow

The same organizing principle which maintained the distinction between original alveolar and palatal codas in Baisha and the Meifu branch occurred here as well, as original alveolars merged with velars and original palatals became alveolars:

(117) *un > oŋ
*ut > ok

*uɲ > on
*uc > ot

In NWCHl and Yuanmen, the final alveolars and palatals underwent the following mergers

(118) (a) Cunhua and Yuanmen
on > ən
ot > ət
oɲ > ən
oc > ət

(b) Nadouhua:

on	>	uən	>	(u)ɛn
ot	>	(no examples)		
oɲ	>	uən	>	(u)ɛn
oc	>	uət	>	(u)ɛʔ

A comparison of reconstructions is given below:

(119)		*Thurgood*	*Ostapirat*	*PHl*
	(a)	*u:j	*u:j	*u:j
	(b)	*u:n (a)	*u:n	*u:n
	(c)	—	—	*u:ɲ
	(d)	*u:ŋ (a)	*u:ŋ	*u:ŋ
	(e)	*u:t	*u:t	*u:t
	(f)	*u:c	*u:c	*u:c
	(g)	*uak (a)	*u:k	*u:k
	(h)	*uj	*uj	*uj
	(i)	*un	*un	*un
	(j)	—	—	*uɲ
	(k)	*oŋ	*uŋ	*uŋ
	(l)	*ut	*ut	*ut
	(m)	*uc	*uc	*uc

For long rimes, Thurgood reconstructs a similar pattern to the one proposed here, with the exception of the lack of a reconstruction in (119c) and the reconstruction of a diphthong in (119g). Those rimes marked with an (a) are in contrast with the same rime reconstructed in other sections. The reconstruction of *uak violates both Symmetry and Directionality, since a change from *u:k > *uak* is much more likely than one from *uak > *u:k*. For short rimes, Thurgood's reconstruction is again similar to the present one, with the exception that he presents no reconstruction in (119j) (mirroring the lack of one in (119c)), and the reconstruction of *oŋ where I reconstruct *uŋ. This is likely due to the fact that the series with final palatal nasals are very rare—only three examples of long rimes, and four examples of short.

Ostapirat's (2004) reconstruction is identical with the one presented here except for the fact that the rimes ending in palatal nasals are still not reconstructed.

Examples of closed rimes with high back rounded vowels are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(120) *Examples of closed rimes with high back rounded vowels*

(a)			***u:j**		
鞭子	whip		*tçu:jʔ		
tsu:j^{3}	tsu:j^{3}	tsu:j^{3}	tsu:j^{3}	tsu:j^{3}	tsu:j^{3}
—	tsuj^{3}	—	tsuj^{3}	tsuj^{33}	tuj^{3}
棉花	cotton		*ɓu:jʔ		
ɓu:j^{3}	ɓu:j^{3}	ɓu:j^{3}	ɓu:j^{3}	ɓu:j^{3}	ɓu:j^{3}
(ɓu:(j)^{3})	ɓuj^{3}	ɓuj^{3}	ɓuj^{3}	ɓuj^{3}	ɓuj^{3}
肥胖	fat		*hru:jʔ		
ru:j^{3}	gu:j^{3}	gwej^{3}	gu:j^{6}	hu:j^{6}	hu:j^{6}
huj^{4}	vuj^{3}	guj^{3}	xuj^{3}	xuj^{3}	kʰuj^{3}
(b)			***uj**		
賊	thief		*ɓuj		
ɓuj^{1}	ɓuj^{1}	ɓuj^{1}	ɓuj^{1}	ɓuj^{1}	ɓuj^{1}
ɓɔj^{1}	ɓoj^{1}	ɓuj^{1}	ɓuj^{1}	ɓoj^{1}	ɓow^{1}
腐爛	rotten		*tʰuj		
tʰuj^{1}	tʰuj^{1}	tʰuj^{1}	tʰuj^{1}	tʰuj^{1}	tʰuj^{1}
tʰoj^{1}	tʰoj^{1}	tʰuj^{1}	tʰuj^{1}	tʰoj^{1}	tʰow^{1}
醉	drunk		*hmuj		
muj^{1}	puj^{1}	puj^{1}	puj^{4}	pʰuj^{4}	puj^{4}
ɓɔj^{4}	pojʔ^{4}	puj^{1}	puj^{1}	poj^{1}	pow^{4}

(c)			***u:n**		
野	wild		*sʰu:n		
tu:n^{1}	tu:n^{1}	tu:n^{1}	tu:n^{1}	tu:n^{1}	—
tθuən^{1}	fun^{1}	suŋ^{1}	suŋ^{1}	tsʰuŋ^{1}	tsʰun^{1}
身體	body		*Cuɦu:n		
hu:n^{1}	hu:n^{1}	hu:n^{1}	hu:n^{1}	hu:n^{1}	hu:n^{1}
ŋuən^{1}	ŋun^{1}	ŋuŋ^{1}	ŋuŋ^{1}	ŋuŋ^{1}	ɱun^{4}
先/從前	first/before		*kʰu:nɦ		
kʰu:n^{2}	kʰu:n^{2}	kʰu:n^{2}	kʰu:n^{5}	kʰu:n^{5}	kʰu:n^{5}
kʰuan^{5}	kʰun^{2}	—	kʰuŋ^{2}	kʰuŋ^{2}	kʰun^{5}
(d)			***un**		
官	official		*C-mun		
mun^{1}	mun^{1}	mun^{1}	mun^{1}	mun^{4}	mun^{1}
mən^{1}	muɛn^{1}	mon^{1}	moŋ^{1}	moŋ^{1}	mən^{4}
語言	language		*tʰun		
tʰun^{1}	tʰun^{1}	tʰun^{1}	tʰun^{1}	tʰun^{1}	tʰun^{1}
tsʰən^{1}	tʰɛn^{1}	tʰoŋ^{1}	tʰoŋ^{1}	tʰoŋ^{1}	tʰən^{1}
毛	fur		*Cuɦun		
hun^{1}	hun^{1}	hun^{1}	hun^{1}	hun^{1}	hun^{1}
ŋən^{1}	ŋɛn^{1}	ŋoŋ^{1}	ŋoŋ^{1}	ŋoŋ^{1}	ɱən^{4}

(e)			***u:t**		
發芽	to sprout		ʔu:t		
ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}
ʔuət^{2}	—	ʔuʔ^{7}	ʔuk^{7}	—	—
織	weave (net)		*kʰu:t		
kʰu:t^{7}	kʰu:t^{7}	kʰu:t^{7}	kʰu:t^{7}	kʰu:t^{7}	kʰu:t^{7}
kʰuat^{2}	—	kʰuʔ^{7}	kʰuk^{7}	kʰuk^{8}	kʰut^{7}
細	thin		ʔu:t		
(ʔu:t^{9})	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}	ʔu:t^{7}
—	ʔuʔ^{4}	ʔuʔ^{7}	ʔuk^{7}	ʔuk^{8}	ʔut^{7}
(f)			***ut**		
消除	eliminate		fʰut		
pʰut^{7}	fut^{7}	fut^{7}	fut^{7}	fut^{7}	fut^{7}
—	—	—	—	fot^{7}	fət^{7}
曾祖父	pat. grt grndfa		*pʰut		
pʰut^{7}	pʰut^{7}	pʰut^{7}	pʰut^{7}	pʰut^{7}	pʰut^{7}
—	—	—	pʰok^{7}	pʰok^{7}	pʰət^{7}
釘	to nail		*tʰut		
tʰut^{7}	tʰut^{7}	tʰut^{7}	tʰut^{7}	—	tʰut^{7}
—	—	—	tʰok^{7}	(tʰok^{7})	tʰət^{7}
(g)			***u:ɲ**		
脫	take off		*ku:ɲ		
ku:n^{1}	ku:n^{1}	ku:ɲ ^{1}	ku:n^{1}	ku:n^{1}	ku:n^{1}
—	—	—	kun^{1}	kun^{1}	kun^{1}

穿插	alternate		*sʰu:ɲ		
tu:n^{1}	tu:n^{1}	tu:ɲ^{1}	tu:n^{1}	tu:n^{1}	tu:n^{1}
—	—	sun^{1}	sun^{1}	tsʰun^{1}	tsʰun^{1}

下飯	go with		*ʔu:ɲ		
ʔu:n^{1}	ʔu:n^{1}	ʔweɲ^{1}	ʔu:n^{1}	ʔu:n^{1}	ʔu:n^{1}
ʔuən^{1}	ʔun^{1}	ʔon^{1}	ʔun^{1}	ʔun^{1}	ʔun^{1}

(h) ***uɲ**

逃脫	get away		*C-luɲʔ		
lun^{3}	lun^{3}	luɲ^{3}	lun^{3}	(lun^{3})	lɯn^{3}
—	—	lun^{3}	lon^{3}	lon^{3}	lən^{6}

背脊	back (of body)		*tçʰuɲʔ		
tsʰun^{3}	tsʰun^{3}	tsʰuɲ^{3}	tsʰun^{3}	tsʰun^{3}	tsʰɯn^{3}
—	sɛn^{3}	—	tsʰon^{3}	tsʰun^{3}	tsʰun^{3}

噗	puff		*ɾjuɲʔ		
zun^{3}	zun^{3}	—	tun^{6}	tʰun^{6}	tɯn^{6}
—	—	(ɗun^{3})	(tan^{1})	ton^{3}	tən^{3}

(i) ***u:c**

螢火蟲	firefly		*ku:c		
—	—	kuc^{7}	ku:t^{7}	—	—
kuat^{5}	kuʔ^{5}	—	kut^{7}	—	kut^{7}

瘊子	wart		*sʰu:c		
tu:t^{7}	tu:t^{7}	tu:c^{7}	tu:t^{7}	—	tu:t^{7}
tsʰuət^{2}	—	—	sut^{7}	tsʰut^{8}	tsʰut^{7}

吻	kiss		*ɾju:c		
zu:t^{7}	zu:t^{7}	ru:c^{7}	tu:t^{8}	(tu:t^{8})	tu:t^{8}
(lu:t^{2})	—	tut^{7}	—	—	tut^{7}
(j)			***uc**		
尾巴	tail		*tɕ^{h}uc		
ts^{h}ut^{7}	ts^{h}ut^{7}	ts^{h}uc^{7}	ts^{h}ut^{7}	ts^{h}ut^{7}	ts^{h}ɯt^{7}
ts^{h}ət^{2}	sɛʔ^{4}	ts^{h}ət^{7}	ts^{h}ot^{7}	ts^{h}ot^{8}	ts^{h}ət^{7}
螞蟻	ant		*hmuc		
mut^{7}	put^{7}	puc^{7}	put^{8}	p^{h}ut^{8}	put^{8}
ɓət^{4}	puɛʔ^{4}	pət^{7}	pot^{7}	pot^{8}	pət^{8}
針	needle		*hŋuc		
ŋut^{7}	kut^{7}	kuc^{7}	kut^{8}	k^{h}ut^{8}	kut^{8}
kət^{4}	kɛʔ^{4}	kət^{7}	kot^{7}	kot^{8}	kət^{8}
(k)			***u:ŋ**		
劈	split		*ɓu:ŋ		
ɓu:ŋ^{1}	ɓu:ŋ^{1}	ɓu:ŋ^{1}	ɓu:ŋ^{1}	ɓuaŋ^{1}	ɓu:ŋ^{1}
ɓoŋ^{1}	ɓuŋ^{1}	ɓuŋ^{1}	ɓuŋ^{1}	ɓuŋ^{1}	ɓuŋ^{1}
蚊子	mosquito		*C-ɲu:ŋ		
ɲu:ŋ^{1}	ɲu:ŋ^{1}	ɲu:ŋ^{1}	ɲu:ŋ^{1}	nuaŋ^{4}	ɲu:ŋ^{1}
ɲoŋ^{1}	ɲiw^{1}	ɲuŋ^{1}	ɲuŋ^{1}	ɲuŋ^{1}	ɲuŋ^{4}
洞	hole		*tɕ^{h}u:ŋʔ		
ts^{h}u:ŋ^{3}	ts^{h}u:ŋ^{3}	ts^{h}u:ŋ^{3}	ts^{h}u:ŋ^{3}	ts^{h}uaŋ^{3}	ts^{h}u:ŋ^{3}
ts^{h}oŋ^{3}	suŋ^{3}	ts^{h}uŋ^{3}	ts^{h}uŋ^{3}	ts^{h}uŋ^{3}	ts^{h}uŋ^{3}

(l)			***uŋ**		
(長)大	big, grow up		*C-luŋ		
luŋ^1	luŋ^1	loŋ^1	loŋ^1	luŋ^4	luŋ^1
loŋ^1	loŋ^1	(luŋ^1)	loŋ^1	luŋ^1	luŋ^4
搖	shake		*C-ɲuŋɦ		
ɲoŋ^2	ɲuŋ^2	ɲoŋ^2	ɲoŋ^5	nuŋ^2	ɲuŋ^5
—	—	ɲoŋ^2	ɲoŋ^2	ɲɔŋ^2	ɲɔŋ^2
圈	animal pen		*C-luŋɦ		
luŋ^2	luŋ^2	loŋ^2	loŋ^5	luŋ^2	luŋ^5
—	loŋ^2	loŋ^2	loŋ^2	loŋ^2	lɔŋ^2
(m)			***u:k**		
窩	nest		*ɾu:k		
ru:ʔ^7	ru:ʔ^7	ru:k^7	ru:ʔ^8	luaʔ^8	lu:ʔ^8
lok^4	luʔ^4	luʔ^7	ruk^7	ruk^8	ruʔ^8
包	wrap		*t^{h}u:k		
t^{h}u:ʔ^7	t^{h}u:ʔ^7	t^{h}u:k^7	t^{h}u:ʔ^7	t^{h}uaʔ^7	t^{h}u:ʔ^7
ts^{h}ok^2	t^{h}uʔ^4	t^{h}uʔ^7	t^{h}uk^7	t^{h}uk^8	t^{h}uʔ^7
腦	brain[5]		*hlu:k		
ɗu:ʔ^7	ɬu:ʔ^7	ɬu:k^7	ɬu:ʔ^7	ɬuaʔ^7	ɬu:ʔ^7
tθok^2	nuʔ^4	ɬuʔ^7	ɬuk^7	ɬuk^8	ɬuʔ^7

3.4.4 *Interim Summary*

A total of three groups of rimes with high vowels have been reconstructed here: those with high front nuclei, those with high back unrounded nuclei, and those with high back rounded nuclei. Each of these series in turn has two subsets of rimes: those with long nuclei and those with short nuclei. The rimes which have been reconstructed in this section are repeated below:

(121)		*ɯ:j	*u:j
	*i:w		
	*i:m	*ɯ:m	
	*i:n	*ɯ:n	*u:n
			*u:ɲ
	*i:ŋ	*ɯ:ŋ	*u:ŋ
	*i:p	*ɯ:p	
	*i:t	*ɯ:t	*u:t
			*u:c
	*i:k	*ɯ:k	*u:k
			*uj
	*iw		
	*im	*ɯm	
	*in	*ɯn	*un
			*uɲ
	*iŋ	*ɯŋ	*uŋ
	*ip	*ɯp	
	*it	*ɯt	*ut
			*uc
	*ik		

There are two notable asymmetries in the rimes shown above, where the rimes with unrounded nuclei pattern in opposition to the rimes with rounded nuclei. The first is that unrounded nuclei can be followed by bilabial codas, but rounded nuclei cannot; the second is that rounded nuclei can be followed by palatal codas, but unrounded nuclei cannot (with the exception of the very marginal rime *ɯ:j, which has only one example). In other words, there are natural co-occurrence constraints preventing round vowels before bilabial codas, and non-round vowels before palatal codas.

In addition to this, short rimes with velar stop codas are strongly disfavored (although *ik is reconstructible, it is very marginal in the actual lexical inventory). It is possible that original short rimes with high vowels underwent lengthening before velar stops, but this must remain speculation unless new evidence surfaces in favor of this hypothesis.

3.5 Closed Rimes with Non-High Nuclei

This section is subdivided into the following four subsections: closed rimes with front mid vowels (3.5.1), closed rimes with central mid vowels (3.5.2), closed rimes with back mid vowels (3.5.3), and finally, closed rimes with low vowels (3.5.4).

3.5.1 *Closed Rimes with Front Mid Nuclei*

Although the patterns are robust enough to merit reconstruction, this category has far fewer examples than most other categories (as is the case with open front mid rimes in section 3.3 above). It is difficult to say whether or not there are velar-final series represented in this category, due to the fact that the *a:K series and the putative *e:K series have merged in all languages except for Bouhin, and words in Bouhin with an *e:K rime may be loans from Ha Em (see section 3.5.4). Given the low frequency of the other rimes, it is statistically likely that there are a few actual *e:K rimes which can be reconstructed, but that the majority of rimes in which Bouhin has an *e:K reflex are probably *a:K rimes where Bouhin has borrowed from Ha Em. All cases of *e:K rimes below will therefore be placed in parentheses, and reconstructions will place the vowel in brackets to indicate its indeterminacy.

(122) Reflexes of closed rimes with mid front vowels

Bhin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*	*S. Hlai* (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
e:w	e:w	e:w	e:w	e:w	e:w	ew	ɛw	e:w	e:w	iaw	i:w	—	—	—
e:m	e:m	e:m	e:m	e:m	e:m	—	—	—	e:m	em	em	ɛm	—	—
e:p	e:p	e:p	e:p	e:p	e:p	ɛp	—	e:p	e:p	iap	—	ɛp	—	—
e:n	e:n	e:n	e:n	e:n	e:n	ɛn	en	e:n	e:n	ian	i:n	—	—	—
—	—	—	—	—	—	et	eʔ	—	—	et	i:t	—	—	—
(e:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	ɛŋ	ɛŋ	e:ŋ	e:ŋ	iaŋ	iaŋ)	(ɛŋ	ɛŋ	iaŋ)
(e:ʔ	e:ʔ	e:k	e:ʔ	e:ʔ	e:ʔ	ɛk	ɛʔ	e:ʔ	ɯ:	eʔ	iaʔ)	(ɛ:	ɛk	eʔ)

5 The Nadouhua form in this lexical set is irregular due to apparent spread of nasalization from the preceding member of the compound it is a part of, *ŋɔ:*^{3} *nuʔ*^{4} (literally 'head-brain').

The reconstructions proposed for these correspondence series are given below:

(123)	*e:w
	*e:m
	*e:p
	*e:n
	*e:t
	(*e:ŋ)
	(*e:k)

There have been few changes in these rimes, and those which have occurred all fall within NCHl. In NWCHl, there was a shortening which happened in all rimes:

(124)	*e:C	>	eC/ɛC

In Baisha, the following asymmetrical development occurred:

(125)	*e:w	>	ɛ:w	>	iaw
	*e:m	>	em	>	em
	*e:p	>	ɛ:p	>	iap
	*e:n	>	ɛ:n	>	ian
	*e:t	>	et	>	et
	(*e:ŋ	>	ɛ:ŋ	>	iaŋ)
	(*e:k	>	ek	>	eʔ)

In Yuanmen, the *m*-final rime was shortened, but the diphthong and alveolar-final rimes remained long and underwent raising; the velar final rimes (if legitimate) lowered and diphthongized:

(126)	*e:w	>	i:w
	*e:m	>	em
	*e:p	>	(no examples)
	*e:n	>	i:n
	*e:t	>	i:t
	(*e:ŋ	>	iaŋ)
	(*e:k	>	iaʔ)

No comparison of reconstructions is given here, since neither Thurgood nor Ostapirat reconstruct anything for this series of rimes, the one exception being the putative *e:K series, which Ostapirat (1993) reconstructed as *-j-aŋ and *-j-ak, respectively, and the nasal final member for which Thurgood reconstructs *i:ŋ.

Examples of these rimes are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(127) Examples of closed rimes with mid front vowels

(a) ***e:w**

鐵鏟 iron shovel *tʰe:w

—	—	—	—	tʰe:w^{1}	—
—	—	tʰe:w^{1}	tʰe:w^{1}	—	—

刀鈎 knifehook *ɗe:wɦ

—	ɗe:w^{2}	ɗe:w^{2}	—	—	—
—	—	—	ɗe:w^{2}	—	—

鸚䳍 parrot (green) *ɗe:wɦ

ɗe:w^{2}	ɗe:w^{2}	ɗe:w^{2}	ɗe:w^{5}	ɗe:w^{5}	ɗe:w^{5}
—	—	ɗe:w^{2}	ɗe:w^{2}	ɗiaw^{2}	ɗi:w^{5}

(b) ***e:m**

癬 ringworm *C-le:mɦ

—	—	le:m^{2}	le:m^{2}	le:m^{5}	le:m^{5}
—	—	—	—	—	—

撮 pick *tçe:mʔ

tse:m^{3}	tse:m^{3}	tse:m^{3}	tse:m^{6}	—	—
—	—	—	tse:m^{3}	tem^{3}	tem^{3}

(c)			***e:p**		
瘪	shrunken		*ɓe:p		
ɓe:p^{7}	—	ɓe:p^{7}	ɓep^{7}	ɓe:p^{7}	ɓe:p^{7}
—	—	—	—	—	—
夾	press		*ɦe:p		
he:p^{7}	he:p^{7}	he:p^{7}	he:p^{7}	—	he:p^{7}
—	—	—	he:p^{7}	—	—
疊	pile (clfr)		*C-le:p		
le:p^{7}	le:p^{7}	le:p^{7}	le:p^{7}	—	le:p^{7}
—	—	—	—	liap^{7}	—
(d)			***e:n**		
扁	flat		*ɓe:nɦ		
ɓe:n^{2}	ɓe:n^{2}	ɓe:n^{2}	ɓe:n^{5}	—	—
ɓɛn^{2}	ɓen^{2}	—	—	ɓian^{2}	ɓi:n^{5}
木板	board		*ɓe:nɦ		
ɓe:n^{2}	ɓe:n^{2}	ɓe:n^{2}	ɓe:n^{5}	ɓe:n^{5}	ɓe:n^{5}
—	ɓen^{2}	ɓe:n^{2}	ɓe:n^{2}	—	—
(e)			***e:t**		
擦/塗抹	wipe/erase		*ʔe:t		
—	—	—	—	—	—
ʔet^{2}	ʔeʔ^{4}	—	—	ʔet^{8}	ʔi:t^{7}

(f)			***[e]:ŋ**		
寬	wide		*ɓ[e]:ŋ		
ɓe:ŋ^{1}	ɓe:ŋ^{1}	ɓe:ŋ^{1}	ɓe:ŋ^{1}	ɓe:ŋ^{1}	ɓe:ŋ^{1}
ɓɛŋ^{1}	ɓɛŋ^{1}	ɓe:ŋ^{1}	ɓe:ŋ^{1}	ɓiaŋ^{1}	ɓiaŋ^{1}
甜	sweet		*ɗ[e]:ŋ		
ɗe:ŋ^{1}	ɗe:ŋ^{1}	ɗe:ŋ^{1}	ɗe:ŋ^{1}	ɗe:ŋ^{1}	ɗe:ŋ^{1}
tsɛŋ^{1}	ɗɛŋ^{1}	ɗe:ŋ^{1}	ɗe:ŋ^{1}	ɗiaŋ^{1}	ɗiaŋ^{1}
上衣	clothes		*ʋ[e]:ŋʔ		
ve:ŋ^{3}	ve:ŋ^{3}	ve:ŋ^{3}	fe:ŋ^{6}	ve:ŋ^{6}	ve:ŋ^{3}
vɛŋ^{4}	vɛŋ^{3}	ve:ŋ^{3}	ve:ŋ^{3}	viaŋ^{3}	viaŋ^{6}
(g)			***[e]:k**		
得到	get		*C-m[e]:k		
me:ʔ^{7}	me:ʔ^{7}	me:k^{7}	me:ʔ^{7}	—	me:ʔ^{7}
—	—	—	mɯ:^{2}	—	—
干飯	dry rice		*C-m[e]:k		
me:ʔ^{7}	me:ʔ^{7}	me:k^{7}	me:ʔ^{7}	me:ʔ^{8}	me:ʔ^{7}
—	mɛʔ^{4}	—	—	meʔ^{8}	—
尋找	search		*k[e]:k		
ke:ʔ^{7}	ke:ʔ^{7}	ke:k^{7}	ke:ʔ^{7}	ke:ʔ^{7}	ke:ʔ^{7}
—	—	—	—	—	—

3.5.2 *Closed Rimes with Mid Central Nuclei*

As in the case of rimes with high nuclei, there are both long and short rimes with mid central vowels, reflexes of which are given below:

6 The parentheses around the final glides in Cunhua indicates that these glides are pronounced in connected speech, but deleted in isolation. See Ouyang (1998: 19).

(128) Reflexes of closed rimes with mid central vowels

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
a:j	o:j	o:j	a:j	a:j	a:j	ɔ:(j)[6]	ɔj	o:j	o:j	uaj	u:j
am	o:m	o:m	o:m	ɔ:m	ɔ:m	am	ɔn	o:m	o:m	uam	uam
an	o:n	o:n	o:n	ɔ:n	ɔ:n	an	ɔn	o:ŋ	o:ŋ	uaŋ	u:n
aŋ	o:ŋ	o:ŋ	o:ŋ	ɔ:ŋ	ɔ:ŋ	aŋ	ɔŋ	o:ŋ	o:ŋ	uaŋ	uaŋ
ap	o:p	o:p	o:p	ɔ:p	ɔ:p	ap	ɔʔ	o:p	o:p	uap	uap
at	o:t	o:t	o:t	ɔ:t	ɔ:t	at	ɔʔ	o:ʔ	o:k	oʔ	u:t (~ət)
ak	o:ʔ	o:k	o:ʔ	ɔ:ʔ	ɔ:ʔ	ak	ɔʔ	o:ʔ	o:k	oʔ~ɔʔ	oʔ~ɔʔ
aj	aj	aj	aj	aj	aj	aj	aj	aj	aj	aj	aj
aw	aw	aw	aw	aw	aw	aw	aw	aw	aw	aw	aw
aw$^{B/C}$	aw$^{B/C}$	ow/aw$^{B/C}$	o:$^{B/C}$	o:$^{B/C}$	ɔ:$^{B/C}$	aw$^{B/C}$	ɔ:$^{B/C}$	o:$^{B/C}$	o:$^{B/C}$	o:$^{B/C}$	o:$^{B/C}$
om	am	om	am	am	am	am	an	am	am	am	am
en	an	an	an	an	an	on/an$^{B/C}$	an	aŋ	aŋ	aŋ	an
an	an	aɲ	an	an	an	ian	an	an	an	an	an
oŋ	aŋ	aŋ	aŋ	aŋ	aŋ	eŋ	aŋ	aŋ	aŋ	aŋ	ɔŋ
op	ap	op	op	ap	ap	ap	aʔ	ap	ap	ap	ap
et	at	at	at	at	at	at	aʔ	aʔ	ak	ak	at
at	at	ac	at	at	at	iat	aʔ	at	at	at	at
ok	ak	ak	ak	ak	ak	ak	aʔ	—	ɔk~a:k	ak	ak

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
aj	aj	uaj
am	ɔm	(om)
ɐn	ɔn	—
aŋ	ɔŋ	uaŋ
ap	—	uap
ɐt	ɔt	—
ɐk	ɔ:	u:ʔ
aj	aj	aj
aw	aw	ɐw
aw	o:	o:
om	am	am
en	an	aŋ
an	—	—
oŋ	aŋ	aŋ

op	ap	ap
et	at	ak
at	—	at
—	—	—

The reconstructions proposed here for these correspondences are the following:

(129)	*ə:j	*əj
		*əw
		*əwɦ/ʔ
	*ə:m	*əm
	*ə:n	*ən
		*əɲ
	*ə:ŋ	*əŋ
	*ə:p	*əp
	*ə:t	*ət
		*əc
	*ə:k	*ək

3.5.2.1 Long Rimes with Mid Central Nuclei

In the case of the one long diphthong, the nucleus either lowered, backed and rounded, or in a few cases did both. In Cunhua, *ə:j would have been expected to lower to *a:j*; however, the failure of original PHl *a:j to back to *ɔ:j* apparently prevented this, forcing a shift instead of *ə:j to *ɔ:j*. Both diphthongs lost their glide in isolation, retaining it only in connected speech as the first member of a compound word:

(130)	*ə:j	>	ɔ:j	>	ɔ:(j)
	*a:j	>	a:j	>	a:(j)

The most common change in the stop-closed rimes was backing/rounding to long *o*:; this failed to occur only in Cunhua and Bouhin:

(131) *ə:C > o:C

The nucleus in Zandui, Baoting, and Nadouhua lowered further to ɔ::

(132) o:C > ɔ:C

There were unique developments in the Run branch, which paralleled those of the front mid rimes in the last section. Although there were parallel developments in Baisha and Yuanmen in the bilabial-final and velar-final rimes, the development of the alveolar-final rimes was quite different. In Baisha (133a), the alveolar-nasal final rimes merged with the velar-nasal final rimes (only partial merger occurred in the case of original *ə:t, as variation between oʔ and ɔʔ developed in the rime which backed from original *ə:k). In Yuanmen (133b), on the other hand, the alveolar-final rimes remained distinct from the velars after the backing of the vowel, and then underwent the raising of long mid vowels which occurred throughout the Yuanmen rime inventory. There are two examples which have *ət*, in which case it can be assumed that Yuanmen *o:t* shortened to *ot*, which then underwent the regular change to *ət*:

(133) *Evolution of *ə:C in Run*

(a) Baisha

*ə:j	>	ɔ:j	>	uaj
*ə:m	>	ɔ:m	>	uam
*ə:n	>	ɔ:ŋ	>	uaŋ
*ə:ŋ	>	ɔ:ŋ	>	uaŋ
*ə:p	>	ɔ:p	>	uap
*ə:t	>	o:k	>	oʔ
*ə:k	>	o:k~ɔ:k	>	oʔ~ɔʔ

(b) Yuanmen

*ə:j	>	o:j	>	u:j
*ə:m	>	ɔ:m	>	uam
*ə:n	>	o:n	>	u:n
*ə:ŋ	>	ɔ:ŋ	>	uaŋ
*ə:p	>	ɔ:p	>	uap
*ə:t	>	o:t (~ot)	>	u:t (~ət)
*ə:k	>	o:k~ɔ:k	>	oʔ~ɔʔ

Finally, there was a non-identical development in both Cunhua and Bouhin which had the same end result, leading to the merger in several categories between long *ə:C and short *əC. In Cunhua (134a), *ə:C lowered to a:C, and then shortened. In Bouhin (134b), *ə:C first shortened to əC, and then lowered:

(134) *Shortening and lowering of *əːC in Cunhua and Bouhin*

(a)	*əːC	>	aːC	>	aC
	*əC	>	aC	>	aC
(b)	*əːC	>	əC	>	aC
	*əC	>	aC	>	aC

3.5.5.2 Short Rimes with Mid Central Nuclei

The normal trajectory for the short diphthongs in tone category A was for the nucleus to lower to *a*:

(135)	*əj	>	aj
	*əw	>	aw

There are no reconstructible PHl rimes of the type *əjɦ or *əjʔ (see the next chapter for a possible explanation involving changes in Pre-Hlai). The development of *əwɦ/ʔ was rather different, in that monophthongization occurred in Qi as well as in NCHl:

(136)	*əwɦ	>	oːɦ
	*əwʔ	>	oːʔ

The tone category-conditioned split in reflexes in Cunhua *ən was treated in section 3.2 above. Yet another unique development in Cunhua was that rimes with final velar nasals fronted and lengthened:

(137) *əŋ > eːŋ

There was an interesting transfer in Cunhua of palatal features from the coda to the nucleus in rimes with palatal codas:

(138)	*əɲ	>	aɲ	>	ian
	*əc	>	ac	>	iat

Yuanmen, Moyfaw, and Tongzha all have a single rime which underwent unpredicted backing and rounding, always before grave stops:

(139) *Idiosyncratic backing and rounding*

Yuanmen:	*əŋ	>	*ɔŋ
Moyfaw:	*ək	>	*ɔk
Tongzha:	*əp	>	op

Lauhut rimes backed and rounded when closed by a bilabial stop:

(140)	*əm	>	om
	*əp	>	op

Finally, the development of the nucleus in Bouhin was dependent upon the place of the final stop, as shown below:

(141)	*əm	>	om
	*əp	>	op
	*ən	>	en
	*ət	>	et
	*əɲ	>	an
	*əc	>	at
	*əŋ	>	oŋ
	*ək	>	ok

A comparison of reconstructions is given below:

(142)		*Thurgood*	*Ostapirat*	*PHl*
	(a)	*o:j	*ə:j	*ə:j
	(b)	*uam (a)	*əm	*ə:m
	(c)	*o:n	*ən	*ə:n
	(d)	*uaŋ	*əŋ	*ə:ŋ
	(e)	*uap (a)	*əp	*ə:p
	(f)	*o:t	*ət	*ə:t
	(g)	*o:k	*ək	*ə:k
	(h)	*aj	*aj	*əj
	(i)	*aw	*aw	*əw
	(j)	*o:	*əw	*əwɦ/ʔ
	(k)	*am	*am	*əm
	(l)	*an	*an	*ən
	(m)	*aɲ	*aɲ	*əɲ
	(n)	*aŋ	*aŋ	*əŋ
	(o)	*ap	*ap	*əp
	(p)	*at	*at	*ət
	(q)	*ac	*ac	*əc
	(r)	—	—	*ək

For the long series of correspondences, Thurgood reconstructs a combination of *o*: and *ua* rimes (violating both Symmetry and Directionality). The rimes marked with an (a) contrast with the identical rimes which were reconstructed in section 3.4.2.3. For the short series, Thurgood reconstructs short rimes with *a*, which I consider to be a later stage after the PHl nucleus lowered (and which fails to account for the Bouhin reflexes). He reconstructs the pure vowel *o*: for the third member of this series, not recognizing the correlation with tone category.

Ostapirat (2004) reconstructs rimes with *ə* in the first series, and rimes with *a* in the second. This reconstruction is closer to the present one in vowel quality, but it still fails to explain the length difference between the two series, and especially the chain shift in Bouhin. His reconstruction in (143j) (*əw) is identical with the present one.

Examples are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(143) Examples of closed rimes with mid central nuclei

(a)			***ə:j**		
繩子	rope		*ɗə:j		
ɗa:j^{1}	ɗo:j^{1}	ɗo:j^{1}	ɗa:j^{1}	ɗa:j^{1}	ɗa:j^{1}
ɗɔ:(j)^{1}	ɗɔj^{1}	ɗo:j^{1}	ɗo:j^{1}	ɗuaj^{1}	ɗu:j^{1}
多	many		*hlə:j		
ɗa:j^{1}	ɬo:j^{1}	ɬo:j^{1}	ɬa:j^{1}	ɬa:j^{1}	ɬa:j^{1}
tθɔ:(j)^{1}	lɔj^{1}	ɬo:j^{1}	ɬo:j^{1}	ɬuaj^{1}	ɬu:j^{1}
網	net		*hrə:jʔ		
ra:j^{3}	go:j^{3}	go:j^{3}	ga:j^{6}	ha:j^{6}	ha:j^{6}
hɔ:(j)^{4}	ŋɔj^{3}	go:j^{3}	xo:j^{3}	xuaj^{3}	kʰu:j^{3}
(b)			***əj**		
雞	chicken		*kʰəj		
kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}
kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}	kʰaj^{1}

黎族	Hlai		*hləj		
ɗaj^{1}	ɬaj^{1}	ɬaj^{1}	ɬaj^{1}	ɬaj^{1}	ɬaj^{1}
tθaj^{1}	laj^{1}	ɬaj^{1}	ɬaj^{1}	ɬaj^{1}	ɬaj^{1}
耳朵	ear		*hljəj		
zaj^{1}	zaj^{1}	zaj^{1}	ɬaj^{4}	ɬaj^{4}	ɬaj^{4}
laj^{4}	najʔ^{4}	zaj^{4}	zaj^{1}	zaj^{1}	tsaj^{4}
(c)			***əw**		
臼	mortar		*ɾəw		
raw^{1}	raw^{1}	raw^{1}	raw^{4}	law^{4}	law^{4}
law^{4}	lawʔ^{4}	law^{4}	raw^{1}	raw^{1}	raw^{4}
鍋	pot		*t^{h}əw		
t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}
ts^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}	t^{h}aw^{1}
角	horn		*ɦəw		
haw^{1}	haw^{1}	haw^{1}	haw^{1}	haw^{1}	haw^{1}
haw^{1}	haw^{1}	haw^{1}	haw^{1}	haw^{1}	haw^{1}
(d)			***əwh/ʔ**		
明年/天	next year/tmrw		*ɦəwɦ		
haw^{2}	haw^{2}	haw^{2}	ho:^{5}	ho:^{5}	hɔ:^{5}
hiaw^{5}	ho:^{2}	ho:^{2}	ho:^{2}	ho:^{2}	ho:^{5}
山	mountain		*Cuɦəwʔ		
haw^{3}	haw^{3}	hwow^{3}	go:^{3}	vo:^{3}	hɔ:^{3}
ŋaw^{3}	ŋɔj^{3}	ŋo:^{3}	ŋo:^{3}	ŋo:^{3}	ɱo:^{6}

頭	head		*Cuhrəwʔ		
raw^{3}	gaw^{3}	gwow^{3}	go:^{6}	ho:^{6}	hɔ:^{6}
vaw^{3}	ŋɔ:^{3}	go:^{3}	ɣo:^{3}	vo:^{3}	vo:^{3}
(e)			***ə:m**		
鋒利	sharp		tçʰə:m		
tsʰam^{1}	tsʰo:m^{1}	tsʰo:m^{1}	tsʰo:m^{1}	tsʰɔ:m^{1}	tsʰɔ:m^{1}
tsʰam^{1}	sɔn^{1}	tsʰo:m^{1}	tsʰo:m^{1}	tsʰuam^{1}	tsʰuam^{1}
果子	fruit		*ʈʂʰə:m		
tsʰam^{1}	tsʰo:m^{1}	tsʰo:m^{1}	tsʰo:m^{1}	tsʰɔ:m^{1}	tsʰɔ:m^{1}
ham^{1}	hɔn^{1}	(ham^{1})	tsʰo:m^{1}	tsʰuam^{1}	tsʰuam^{1}
苦	bitter		*ɦə:m		
ham^{1}	ho:m^{1}	ho:m^{1}	ho:m^{1}	hɔ:m^{1}	hɔ:m^{1}
ham^{1}	hɔn^{1}	ho:m^{1}	ho:m^{1}	huam^{1}	huam^{1}
(f)			***əm**		
黑色	black		*ɗəmʔ		
ɗom^{3}	ɗam^{3}	ɗom^{3}	ɗam^{3}	ɗam^{3}	(ɗəm^{3})
—	ɗan^{3}	ɗam^{3}	ɗam^{3}	ɗam^{3}	ɗam^{3}
水	water		*C-nəmʔ		
nom^{3}	nam^{3}	nom^{3}	nam^{3}	nam^{6}	nam^{3}
nam^{3}	nan^{3}	nam^{3}	nam^{3}	nam^{3}	nam^{6}
嘴巴	mouth		*hm[ə/o]mʔ		
mom^{3}	pam^{3}	pom^{3}	pam^{6}	pʰam^{6}	pam^{6}
ɓoŋ^{4}	puɛn^{3}	pɔm^{3}	pɔm^{3}	pom^{3}	pɔm^{6}

(g)			***ə:p**		
摔	throw		*sʰə:p		
tap^{7}	to:p^{7}	to:p^{7}	to:p^{7}	tɔ:p^{7}	tɔ:p^{7}
—	—	so:p^{7}	so:p^{7}	tsʰuap^{8}	tsʰuap^{8}
鱗	fish scale		*C-lə:p		
lap^{7}	lo:p^{7}	lo:p^{7}	lo:p^{7}	lɔ:p^{8}	lɔ:p^{7}
lap^{2}	lɔʔ^{4}	lo:p^{7}	lo:p^{7}	luap^{8}	luap^{8}
堆砌	pile up		*hrə:p		
(go:p^{7})	go:p^{7}	go:p^{7}	go:p^{8}	hɔ:p^{8}	hɔ:p^{8}
—	ŋɔʔ^{4}	go:p^{7}	xo:p^{7}	xuap^{8}	kʰuap^{7}
(h)			***əp**		
熄滅	die out		*tçəp		
—	tsap^{7}	tsop^{7}	tsop^{7}	tsap^{7}	tsep^{7}
—	tsaʔ^{4}	tsap^{7}	tsap^{7}	tsap^{8}	tap^{7}
縫	sew		*C-ɲəp		
ɲop^{7}	ɲap^{7}	ɲop^{7}	ɲop^{7}	nap^{8}	ɲap^{7}
ɲap^{2}	—	ɲap^{7}	ɲap^{7}	ɲap^{8}	ɲap^{8}
晚	late		*tçʰəp		
tsʰop^{7}	tsʰap^{7}	tsʰop^{7}	tsʰop^{7}	tsʰap^{7}	tsʰap^{7}
—	saʔ^{4}	tsʰap^{7}	tsʰap^{7}	tsʰap^{7}	tsʰap^{7}
(i)			***ə:n**		
睡	sleep		*tçə:n		
(tso:n^{1})	tso:n^{1}	tso:n^{1}	tso:n^{1}	tsɔ:n^{1}	tsɔ:n^{1}
tsan^{1}	tsɔn^{1}	tso:ŋ^{1}	tso:ŋ^{1}	tsuaŋ^{1}	tu:n^{1}

田埂	field dike		*Ciɦə:n		
han^{1}	ho:n^{1}	hjo:n^{1}	zo:n^{1}	zɔ:n^{1}	hjɔ:n^{1}
ɲan^{1}	ɲɔn^{1}	ɲo:ŋ^{1}	ɲo:ŋ^{1}	ɲuaŋ^{1}	ɲu:n^{4}
竹子	bamboo (big)		*ɾə:nɦ		
ran^{2}	ro:n^{2}	ro:n^{2}	ro:n^{1}	lɔ:n^{2}	lɔ:n^{2}
la:n^{5}	lɔn^{2}	lo:ŋ^{2}	ro:ŋ^{2}	ruaŋ^{2}	ru:n^{2}
(j)			***ən**		
秧/種	seed		*fʰən		
pʰen^{1}	fan^{1}	fan^{1}	fan^{1}	fan^{1}	fan^{1}
fon^{1}	fan^{1}	faŋ^{1}	faŋ^{1}	faŋ^{1}	fan^{1}
銀	silver		*hŋən		
ŋen^{1}	kan^{1}	kan^{1}	kan^{4}	kʰan^{4}	kan^{4}
kon^{4}	kanʔ^{4}	kaŋ^{4}	kaŋ^{1}	kaŋ^{1}	kan^{4}
日	day		*hŋwən		
ven^{1}	van^{1}	hwan^{1}	van^{4}	van^{4}	van^{1}
hon^{4}	vanʔ^{4}	van^{4}	vaŋ^{1}	vaŋ^{1}	van^{4}
(k)			***ə:t**		
跳蚤	flea		hmə:t		
mat^{7}	po:t^{7}	po:t^{7}	po:t^{8}	pʰɔ:t^{8}	pɔ:t^{8}
ɓat^{4}	(paʔ^{4})	(pət^{9})	(po:t^{9})	poʔ^{8}	(pət^{8})
啃	gnaw		*Cuɦə:t		
hat^{7}	ho:t^{7}	hwo:t^{7}	go:t^{7}	hɔ:t^{7}	hɔ:t^{7}
—	(ŋaʔ^{5})	ŋo:ʔ^{7}	ŋo:k^{7}	ŋoʔ^{8}	—

蓋子	lid		hŋə:t		
—	ko:t^7	ko:t^7	ko:t^8	k^{h}ɔ:t^8	kɔ:t^8
kat^4	kɔʔ^4	ko:ʔ^7	ko:k^7	kɔt^8	ku:t^8
(l)			***ət**		
穿	wear		*tç^{h}ət		
ts^{h}et^7	ts^{h}at^7	ts^{h}at^7	ts^{h}at^7	ts^{h}at^7	ts^{h}at^7
ts^{h}at^2	saʔ^4	ts^{h}aʔ^7	ts^{h}ak^7	ts^{h}ak^8	ts^{h}at^7
鼻子	nose		*k^{h}ət		
k^{h}et^7	k^{h}at^7	k^{h}at^7	k^{h}at^7	k^{h}at^7	k^{h}at^7
k^{h}at^2	k^{h}aʔ^4	k^{h}aʔ^7	k^{h}ak^7	k^{h}ak^7	k^{h}at^7
取/娶	take/marry		*hmət		
—	pat^7	pat^7	pat^8	p^{h}at^8	pat^8
ɓat^4	paʔ^4	paʔ^7	pak^7	—	—
(m)			***əɲ**		
打噴嚏	sneeze		*ɗəɲ		
—	ɗan^1	ɗaɲ^1	ɗan^1	ɗan^1	ɗan^1
ɗian^1	—	—	—	ɗan^1	ɗan^1
選擇	choose		*hləɲ		
—	ɬan^1	ɬaɲ^1	ɬan^1	ɬan^1	ɬan^1
—	—	ɬan^1	ɬan^1	ɬan^1	ɬan^1
脫	remove		*C-ləɲʔ		
lan^3	lan^3	laɲ^3	lan^3	—	lan^3
—	—	—	lan^3	lan^3	lan^6

(n)			***əc**		
淡	weak (taste)		*ɗəc		
(ɗat^{9})	ɗat^{7}	ɗac^{7}	ɗat^{7}	ɗat^{7}	ɗat^{7}
tsiat^{2}	ɗaʔ^{4}	ɗat^{7}	ɗat^{7}	ɗat^{8}	ɗat^{7}
白藤	white rattan (sm)		*kəc		
(kat^{9})	kat^{7}	kac^{7}	kat^{7}	kat^{7}	kat^{7}
kiat^{2}	kaʔ^{4}	kat^{7}	kat^{7}	kat^{8}	kat^{7}
買	buy		*tɕʰəc		
tshat^{7}	tshat^{7}	tshac^{7}	tshat^{7}	tshat^{7}	tshat^{7}
hiat^{2}	—	tshiet^{7}	tshat^{7}	tshat^{8}	tshat^{7}
(o)			***əːŋ**		
樹漿	sap		*tʰəːŋ		
tʰaŋ^{1}	tʰoːŋ^{1}	tʰoːŋ^{1}	tʰoːŋ^{1}	tʰɔːŋ^{1}	tʰɔːŋ^{1}
tsʰaŋ^{1}	tʰɔŋ^{1}	tʰoːŋ^{1}	tʰoːŋ^{1}	tʰuaŋ^{1}	tʰuaŋ^{1}
皮膚	skin		*C-nəːŋ		
naŋ^{1}	noːŋ^{1}	noːŋ^{1}	noːŋ^{1}	nɔːŋ^{4}	nɔːŋ^{1}
naŋ^{1}	nɔŋ^{1}	noːŋ^{1}	noːŋ^{1}	nuaŋ^{1}	nuaŋ^{4}
相同	same		*tʰəːŋʔ		
tʰaŋ^{3}	tʰoːŋ^{3}	tʰoːŋ^{3}	tʰoːŋ^{3}	tʰɔːŋ^{3}	tʰɔːŋ^{3}
tsʰaŋ^{3}	tʰɔn^{3}	—	tʰoːŋ^{3}	tʰuaŋ^{3}	tʰuaŋ^{3}
(p)			***əŋ**		
臉/前面	face/front		*ɗəŋ		
ɗoŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}
tseːŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗaŋ^{1}	ɗɔŋ^{1}

鼓	drum		*C-ləŋ		
loŋ^{1}	laŋ^{1}	laŋ^{1}	laŋ^{1}	laŋ^{4}	laŋ^{1}
leŋ^{1}	—	laŋ^{1}	laŋ^{1}	laŋ^{1}	lɔŋ^{4}
田(野)	field (wild)		*ʔəŋ		
ʔoŋ^{1}	ʔaŋ^{1}	ʔaŋ^{1}	ʔaŋ^{1}	ʔaŋ^{1}	ʔaŋ^{1}
ʔeŋ^{1}	—	ʔaŋ^{1}	ʔaŋ^{1}	ʔaŋ^{1}	ʔɔŋ^{1}
(q)			***ə:k**		
捉	catch		*hmə:k		
mak^{7}	po:ʔ^{7}	po:k^{7}	po:ʔ^{8}	p^{h}ɔ:ʔ^{8}	pɔ:ʔ^{8}
ɓa:k^{4}	pɔʔ^{4}	po:ʔ^{7}	po:k^{7}	pɔʔ^{8}	pɔʔ^{8}
洗	wash		*s^{h}ə:k		
tak^{7}	to:ʔ^{7}	to:k^{7}	to:ʔ^{7}	tɔ:ʔ^{7}	tɔ:ʔ^{7}
tθak^{2}	fɔʔ^{4}	so:ʔ^{7}	so:k^{7}	ts^{h}ɔʔ^{8}	ts^{h}ɔʔ^{7}
深	deep		*hlə:k		
ɗak^{7}	ɬo:ʔ^{7}	ɬo:k^{7}	ɬo:ʔ^{7}	ɬɔ:ʔ^{7}	ɬɔ:ʔ^{7}
tθak^{2}	lɔʔ^{4}	ɬo:ʔ^{7}	ɬo:k^{7}	ɬoʔ^{8}	ɬoʔ^{7}
(r)			***ək**		
剁	chop		*hnək		
(tak^{7})	tak^{7}	tak^{7}	—	t^{h}ak^{8}	tak^{8}
ɗak^{2}	toʔ^{5}	—	—	—	tak^{8}
食指	index finger		*tç[ə/o]k		
(tsak^{9})	tsak^{7}	tsak^{7}	tsak^{7}	tsoʔ^{8}	tsok^{7}
tsak^{4}	—	—	tsɔk^{7}	tsɔʔ^{8}	—

貼	stick to[7]		*pʰək		
pʰak⁷	pʰak⁷	pʰa:k⁷	pʰak⁷	pʰak⁷	pʰak⁷
—	—	—	pʰa:k⁷	pʰak⁷	pʰak⁷

3.5.3 *Short Rimes with Mid Back Rounded Nuclei*

The correspondences for short rimes with mid back rounded vowels are given below:

(144) Examples of short rimes with mid back rounded vowels

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
om	om	om	om	om	um	om	on	om	om	om	om
oŋ	uŋ	oŋ	oŋ	oŋ	ɔŋ	ɔŋ	aŋ	ɔŋ~uaŋ	ɔŋ	ɔŋ	ɔŋ
op	op	op	op	op	ɔp	op	oʔ	op	op	op	op
ok	uk	ok	ok	oʔ	ɔk	ɔk	aʔ	ɔʔ	ɔk	ɔk	ɔk

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
om	om	om
oŋ	oŋ	ɔŋ
—	—	op
ok	ok	ɔk

The reconstructions proposed here for these series are the following:

(145) *om
*op
*oŋ
*ok

This class of rimes is defective in that it has no members with non-grave codas. I propose that if these additional rimes existed, they underwent regular peripheral vowel raising (see next chapter), which was blocked by grave finals:

(146)	*Pre-Hlai*		*Proto-Hlai*	*Pre-Hlai*		*Proto-Hlai*
	*on	>	*un	*oɲ	>	*uɲ
	*ot	>	*ut	*oc	>	*uc

7 The Lauhut and Moyfaw rimes in this example are irregularly long.

As mentioned in section 4.4.3, there was a shift at the level of NCHl from mid back vowels to low back vowels before velar codas, which aided in keeping it distinct from the original *uC class, which lowered to *oC in NCHl:

(147)	*oŋ	>	ɔŋ
	*ok	>	ɔk

There was sporadic dissimilation of the nucleus in Cunhua before bilabial codas:

(148)	*om	>	om/əm	>	om/am
	*op	>	op/əp	>	op/ap

There are also three cases of fronting in Cunhua, two of them possibly conditioned by the initial:

(149)	*Gloss*	*PHl*	*Cunhua*
	bamboo	*ɗom	tsem^1
	six	*hnom	tsem^4
	thunder	*ʔom	ʔem^1

In Changjiang, there was sporadic lengthening of *ɔŋ to *ɔːŋ, later diphthongizing to *uaŋ:

(150)	*ɔŋ	>	ɔŋ~ɔːŋ	>	ɔŋ~uaŋ

Raising before velar codas occurred in Ha Em:

(151)	*oŋ	>	uŋ
	*ok	>	uk

Finally, the Baoting rimes ending in *-m raised to *u*, whereas the other three rimes lowered to *ɔ*:

(152)	*om	>	um
	*op	>	ɔp
	*oŋ	>	ɔŋ
	*ok	>	ɔk

A comparison of reconstructions is given below:

(153)

	Thurgood	Ostapirat	PHl
(a)	*om	*um	*om
(b)	*oŋ	*uŋ	*oŋ
(c)	*op	—	*op
(d)	*ok	*uk	*ok

Thurgood's reconstructions are in agreement with the ones proposed here. Ostapirat (2004) reconstructs these rimes with a short *u*, which violates Economy since these rimes would have to lower twice in NCHl before velar codas; it also violates Commonality by assuming that the rimes in all daughter languages except Ha Em have all independently lowered.

Examples of the PHl rimes with short mid rounded nuclei are given in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(154) Examples of rimes with short mid rounded vowels

(a) ***om**

竹子	bamboo (big)		*ɗom		
ɗom¹	ɗom¹	ɗom¹	ɗom¹	ɗom¹	ɗum¹
tsem¹	—	ɗom¹	ɗom¹	ɗom¹	ɗom¹
瘍	itch		*kʰom		
(kʰum¹)	kʰum¹	kʰom¹	kʰom¹	kʰom¹	kʰum¹
kʰom¹	kʰon¹	kʰom¹	kʰom¹	kʰom¹	kʰom¹
六	six		*hnom		
nom¹	tom¹	tom¹	tom⁴	tʰom⁴	tum⁴
tsem⁴	tonʔ⁴	tom⁴	tom¹	tom¹	tom⁴

(b)			***op**		
抱/背	carry		*ʔop		
—	ʔop^{7}	ʔop^{7}	ʔop^{7}	—	ʔɔp^{7}
ʔop^{2}	ʔoʔ^{4}	ʔop^{7}	ʔop^{7}	ʔop^{8}	ʔop^{7}
拳頭	fist		*Cuhrop		
—	gop^{7}	gop^{7}	gop^{8}	—	gop^{8}
—	—	kap^{7}	ɣap^{7}	vop^{8}	vop^{7}
捧	hold (in hands)		*kʰop		
—	kʰəp^{7}	kʰop^{7}	kʰop^{7}	kʰap^{7}	kʰɔp^{7}
—	—	kʰop^{7}	kʰop^{7}	kʰop^{7}	kʰop^{7}
(c)			***oŋ**		
篩子	sieve (lg)		*ɗoŋʔ		
(ɗuŋ^{3})	ɗuŋ^{3}	ɗoŋ^{3}	ɗoŋ^{3}	ɗoŋ^{3}	ɗɔŋ^{3}
ɗɔŋ^{3}	ɗaŋ^{3}	ɗuaŋ^{3}	ɗɔŋ^{3}	ɗɔŋ^{3}	ɗɔŋ^{3}
房子	house		*m-loŋʔ		
—	luŋ^{3}	ploŋ^{3}	ploŋ^{3}	poŋ^{3}	plɔŋ^{3}
—	pjaŋ^{3}	pɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}	plɔŋ^{3}
脖子	neck		*hljoŋʔ		
zoŋ^{3}	zuŋ^{3}	zoŋ^{3}	ɬoŋ^{6}	ɬoŋ^{6}	ɬɔŋ^{6}
lɔŋ^{4}	zaŋ^{3}	juaŋ^{3}	zɔŋ^{3}	zɔŋ^{3}	tsɔŋ^{6}
(d)			***ok**		
落	fall		*tʰok		
tʰok^{7}	tʰuk^{7}	tʰok^{7}	tʰok^{7}	tʰoʔ^{7}	tʰɔk^{7}
tʰɔk^{2}	tʰaʔ^{4}	tʰɔʔ^{7}	tʰɔk^{7}	tʰɔk^{8}	tʰɔk^{7}

病	sick		*tçʰok		
tsʰok^{7}	tsʰuk^{7}	tsʰok^{7}	tsʰok^{7}	tsʰoʔ^{7}	tsʰɔk^{7}
sɔk^{2}	saʔ^{4}	tsʰɔʔ^{7}	tsʰɔk^{7}	tsʰɔk^{7}	tsʰɔk^{7}
脚	leg		*kʰok		
kʰok^{7}	kʰuk^{7}	kʰok^{7}	kʰok^{7}	kʰoʔ^{7}	kʰɔk^{7}
(kʰok^{2})	(kʰoʔ^{4})	kʰɔʔ^{7}	kʰɔk^{7}	kʰɔk^{8}	kʰɔk^{7}

3.5.4 *Closed Rimes with Long Low Nuclei*

The rimes with low nuclei occur in both long and short forms. The correspondence series for PHl rimes with long low nuclei are given below:

(155) Reflexes of PHl rimes with low vowels

BHin	*HaEm*	*LHut*	*Tzha*	*Zdui*	*Bting*	*Cun*	*Nadou*	*Cjiang*	*Mfaw*	*Baisha*	*Ymen*
a:j$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	a:(j)$^{B/C}$	aj$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	a:j$^{B/C}$	uaj$^{B/C}$
a:w	a:w	a:w	a:w	a:w	a:w	a:w	a(w)	a:w	a:w	a:w	a:w
a:m	a:m	a:m	a:m	a:m	a:m	ɔm	an	a:m	a:m	a:m	am
a:n	a:n	a:n	a:n	a:n	a:n	ɔn	an	a:ŋ	a:ŋ	a:ŋ	uan
a:n	a:n	a:ɲ	a:n	a:n	a:n	ɔn	ɔn	a:n	a:n	a:n	an
a:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	ɛŋ	ɛŋ	e:ŋ	e:ŋ	iaŋ	iaŋ
a:p	a:p	a:p	a:p	a:p	a:p	ɔp	aʔ	a:p	a:p	a:p	ap
a:t	a:t	a:t	a:t	a:t	a:t	ɔt	aʔ	a:ʔ	a:k	a:ʔ	uat
a:t	a:t	a:c	a:t	a:t	a:t	ɔt	aʔ	o:t	o:t	a:t	uat
a:ʔ	e:ʔ	e:k	e:ʔ	e:ʔ	e:ʔ	ɛk	ɛʔ	e:ʔ	ɯ:	eʔ	iaʔ

S. Hlai (*Savina*)	*C. Hlai* (*Savina*)	*Baisha* (*Wang & Qian*)
aj$^{B/C}$	aj$^{B/C}$	a:j$^{B/C}$
aw	aw	aw
am	am	a:m
an	an	a:ŋ
an	an	—
aŋ~ɛŋ	ɛŋ	iaŋ
ap	ap	a:p
at	—	a:ʔ
at	at	uat
a:~ɛ:	ɛk	eʔ

The reconstructions proposed for these are the following:[8]

(156) *a:j$^{B/C}$
*a:w
*a:m
*a:n
*a:ɲ
*a:ŋ
*a:p
*a:t
*a:c
*a:k

The earliest change which seems to have occurred is in the series closed by velar stops, between Bouhin and Greater Hlai. Bouhin remained conservative, maintaining a low central nucleus, whereas the nucleus in Greater Hlai fronted to the front low vowel:

(157) Development of PHl *a:K in Bouhin and Greater Hlai

Bouhin:	*a:ŋ	>	a:ŋ		
	*a:k	>	a:k	(>	a:ʔ)
Greater Hlai:	*a:ŋ	>	ɛ:ŋ		
	*a:k	>	ɛ:k		

These finals then proceeded to develop in various ways, as detailed below. As in several previous cases, Bouhin has two series of reflexes. The first, with the low central nucleus, have been inherited directly into Bouhin (158a); the second, with the mid front nucleus, always have a direct correspondent in Ha Em, and generally reflect loanwords (158b) (although a few may be legitimate cases of PHl *e:K rimes, as discussed in section 3.5.1):

(158) Examples of Bouhin inherited *a:K versus borrowed *a:K

(a)

Gloss	*PHl*	*Bouhin*	*Gloss*	*PHl*	*Bouhin*
name	*pʰa:ŋ	pʰa:ŋ^1	flesh (fruit)	*C-ma:k	ma:ʔ^7
bamboo hat	*hla:ŋʔ	ɗa:ŋ^3	banana	*hwa:k	va:ʔ^7
chin	*ɦa:ŋ	ha:ŋ^1	bad	*ɾja:k	za:ʔ^7

8 PHl *a:j occurred nearly exclusively in tone categories B and C. Evidence will be given in the next chapter that original *a:j in category A merged with *ə:j.

(b)

Gloss	*PHl*	*Bouhin*	*Ha Em*
wide	*ɓ[e]:ŋ	ɓe:ŋ¹	ɓe:ŋ¹
comb	*sʰ[e]:ŋ	te:ŋ¹	te:ŋ¹
stir-fry	*k[e]:ŋ	ke:ŋ¹	ke:ŋ¹
get	*C-m[e]:k	me:ʔ⁷	me:ʔ⁷
phlegm	*ɦ[e]:k	he:ʔ⁹	he:ʔ⁷
mediate	*hr[e]:k	ge:ʔ⁷	ge:ʔ⁷

Note that there are other indications of loans in the examples above, including tone 9 in *phlegm*, as well as the initial *g* in *mediate*, which does not occur in native Bouhin words.

Within NCHl, the following changes occurred. In Cunhua, there was a backing of remaining low vowels in all positions, except in the diphthong where it remained unchanged. All rimes save the diphthong were subsequently shortened:

(159)	*a:j	>	a:j	>	a:(j)
	*a:C	>	ɔ:C	>	ɔC
	*a:K	>	ɛ:K	>	ɛK

In Nadouhua, the low vowel was backed when it preceded the palatal nasal before the palatal merged with the alveolar series. I assume this failed to happen before the palatal stop because it participated in debuccalization before this change, bleeding the environment. All rimes were reduced in length:

(160)	*a:C	>	a:C	>	aC
	*a:ɲ	>	ɔ:ɲ	>	ɔn
	*a:c	>	a:ʔ	>	aʔ
	*a:K	>	ɛ:K	>	ɛK

In the Meifu branch, a shift from alveolar to velar codas filled the gap left by the fronting of the nucleus in original PHl *a:ŋ and *a:k. The timing of the loss of the palatal codas was different, so that the oral stop was lost in time to condition the raising and backing of the vowel, but the nasal coda was lost afterwards. The evolution of PHl *a:k in Moyfaw was highly irregular, ending in present-day *ɯ:*ᴮ. A transition through a final glottal stop, subsequently lost, presumably conditioned its merger with the Tone B category:

(161)	*a:n	>	a:ŋ	>	a:ŋ
	*a:ɲ	>	a:ɲ	>	a:n
	*a:ŋ	>	ɛ:ŋ	>	e:ŋ
	*a:t	>	a:k	>	a:ʔ (CJ)/a:k (MF)
	*a:c	>	ɔ:t	>	o:t
	*a:k	>	ɛ:k	>	e:ʔ (CJ)/iaʔ > ɯ:^{B}(MF)

Baisha alveolar codas also became velars before the loss of the palatal place of articulation in the codas, but after the fronting of the rimes in the original velar coda series. After this fronting occurred, the long vowel dipthongized before the nasal, whereas it shortened before the stop:

(162)	*a:n	>	a:ŋ	>	a:ŋ
	*a:ɲ	>	a:n	>	a:n
	*a:ŋ	>	ɛ:ŋ	>	iaŋ
	*a:t	>	a:k	>	a:ʔ
	*a:c	>	a:t	>	a:t
	*a:k	>	ɛ:k	>	eʔ

Yuanmen *a:c merged with *a:t, and rimes before alveolar codas were backed and raised to *o:T*. *a:ɲ merged with *a:n subsequent to this change, filling the gap left by original *a:n (similar to the Meifu branch above). All low non-central vowels then underwent diphthongization, while rimes with pure *a*: were shortened:

(163)	*a:j	>	ɔ:j	>	uaj
	*a:w	>	a:w	>	a:w
	*a:m	>	a:m	>	am
	*a:n	>	ɔ:n	>	uan
	*a:ɲ	>	a:ɲ	>	an
	*a:ŋ	>	ɛ:ŋ	>	iaŋ
	*a:p	>	a:p	>	ap
	*a:t	>	ɔ:t	>	uat
	*a:c	>	ɔ:t	>	uat
	*a:k	>	ɛ:k	>	iaʔ

The evolution of rimes with long mid central vowels in Yuanmen is repeated here next to their counterparts with low central vowels, so that the changes of these nuclei can be compared. In particular, it can be seen that the shift *a:T > *ɔ:T* blocked the lowering of *o:C (from *ə:T) > *ɔ:C*:

(164) *Development of *ə:C versus *a:C in Yuanmen*

(a)	*ə:j	>	o:j	>	u:j	(b)	*a:j	>	ɔ:j	>	uaj
	*ə:m	>	ɔ:m	>	uam		*a:m	>	a:m	>	am
	*ə:n	>	o:n	>	u:n		*a:n	>	ɔ:n	>	uan
	*ə:ŋ	>	ɔ:ŋ	>	uaŋ		*a:ŋ	>	ɛ:ŋ	>	iaŋ
	*ə:p	>	ɔ:p	>	uap		*a:p	>	a:p	>	ap
	*ə:t	>	o:t (~ot)	>	u:t (~ət)		*a:t	>	ɔ:t	>	uat
	*ə:k	>	ɔ:k~o:k	>	ɔʔ~oʔ		*a:k	>	ɛ:k	>	iaʔ

As in the case of the other palatal-final rimes, there was a complete merger with the alveolar series in Bouhin, Ha Em, and Qi:

(165)

*a:n	>	a:n
*a:ɲ	>	a:n
*a:t	>	a:t
*a:c	>	a:t

A comparison of reconstructions is given below:

(166)

	Thurgood	*Ostapirat*	*PHl*
(a)	*a:j	*a:j	*a:j
(b)	*a:w	*a:w	*a:w
(c)	*a:m	*a:m	*a:m
(d)	*a:n	*a:n	*a:n
(e)	—	—	*a:ɲ
(f)	—	*a:ŋ	*a:ŋ
(g)	*a:p	*a:p	*a:p
(h)	*uat	*a:t	*a:t
(i)	*uac	*a:c	*a:c
(j)	*a:k	*a:k	*a:k

Thurgood generally reconstructs rimes with a long low vowel. He doesn't reconstruct anything in (166e–f) (having reconstructed *i:ŋ where I reconstruct *a:ŋ, which is listed in section 3.5.1 as more equivalent to *e:ŋ), and he reconstructs diphthongs in (166h–i), violating Symmetry.

Ostapirat's (2004) reconstruction is identical to the present one, save for the omission of *a:ɲ (of which there are only four examples altogether).

Examples of rimes with low vowels are given below, in the following order:

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting
Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen

(167) *Examples of PHl rimes with low vowels*

(a) ***a:j**

甘蔗			*C-ma[:]jʔ		
maj^{3}	ma:j^{3}	ma:j^{3}	ma:j^{3}	ma:j^{6}	ma:j^{3}
ma:(j)^{3}	maj^{3}	ma:j^{3}	ma:j^{3}	ma:j^{3}	muaj^{6}
見	see		*C-la:jʔ		
la:j^{3}	la:j^{3}	la:j^{3}	la:j^{3}	la:j^{6}	la:j^{3}
la:(j)^{3}	laj^{3}	la:j^{3}	la:j^{3}	la:j^{3}	luaj^{6}
屎	excrement		*ɦa:jʔ		
ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}
ha:(j)^{3}	haj^{3}	ha:j^{3}	ha:j^{3}	ha:j^{3}	huaj^{3}

(b) ***a:w**

流	flow		*C-ma:w		
ma:w^{1}	ma:w^{1}	ma:w^{1}	ma:w^{1}	ma:w^{4}	ma:w^{1}
ma:w^{1}	maw^{1}	ma:w^{1}	ma:w^{1}	ma:w^{1}	ma:w^{4}
星星	star		*ɾa:w		
ra:w^{1}	ra:w^{1}	ra:w^{1}	ra:w^{4}	la:w^{4}	la:w^{4}
la:w^{4}	laʔ^{4}	la:w^{4}	ra:w^{1}	ra:w^{1}	ra:w^{4}

白	white		*kʰa:w		
kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}
kʰa:w^{1}	kʰaw^{1}	kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}	kʰa:w^{1}

(c)			***a:m**		
抬	lift		*ʈʂʰa:m		
tsʰa:m^{1}	tsʰa:m^{1}	tsʰa:m^{1}	tsʰa:m^{1}	tsʰa:m^{1}	tsʰa:m^{1}
hɔm^{1}	han^{1}	tsʰa:m^{1}	tsʰa:m^{1}	tsʰa:m^{1}	tsʰam^{1}
問	ask		*hra:m		
(ga:m^{1})	ga:m^{1}	ga:m^{1}	ga:m^{4}	ha:m^{4}	ha:m^{4}
hɔm^{4}	ŋanʔ^{4}	ga:m^{4}	xa:m^{1}	xa:m^{1}	kham^{1}
跨	step		*Ciɦa:mɦ		
ha:m^{2}	ha:m^{2}	hja:m^{2}	za:m^{5}	za:m^{5}	za:m^{5}
ɲam^{5}	ŋjɛn^{2}	ɲɛ:m^{2}	ɲa:m^{2}	—	—

(d)			***a:p**		
甲虫	cockroach		*ɾa:p		
ra:p^{7}	ra:p^{7}	ra:p^{7}	ra:p^{8}	la:p^{8}	la:p^{8}
—	laʔ^{4}	la:p^{7}	ra:p^{7}	ra:p^{8}	(ra:p^{8})
挑	carry (shoulder)		*ʈʂʰa:p		
tsʰa:p^{7}	tsʰa:p^{7}	tsʰa:p^{7}	tsʰa:p^{7}	tsʰa:p^{7}	tsʰa:p^{7}
—	haʔ^{4}	tsʰa:p^{7}	tsʰa:p^{7}	tsʰa:p^{8}	tsʰap^{7}
谷粒	grain of rice		*ɦa:p		
ha:p^{7}	ha:p^{7}	ha:p^{7}	ha:p^{7}	ha:p^{7}	ha:p^{7}
hɔp^{2}	—	ha:p^{7}	ha:p^{7}	ha:p^{8}	hap^{7}

(e)			***a:n**		
沸騰	boil		*ɗa:n		
ɗa:n^{1}	ɗa:n^{1}	ɗa:n^{1}	ɗa:n^{1}	ɗa:n^{1}	ɗa:n^{1}
tsɔn^{1}	ɗan^{1}	ɗa:ɲ^{1}	ɗa:ɲ^{1}	ɗa:ɲ^{1}	ɗuan^{1}
月(亮)	month/moon		*C-ɲa:n		
ɲa:n^{1}	ɲa:n^{1}	ɲa:n^{1}	ɲa:n^{1}	na:n^{4}	ɲa:n^{1}
ɲɔn^{1}	ŋjan^{1}	ɲe:n^{1}	ɲa:ɲ^{1}	ɲa:ɲ^{1}	ɲuan^{4}
上	above		*kʰa:n		
kʰa:n^{1}	kʰa:n^{1}	kʰa:n^{1}	kʰa:n^{1}	kʰa:n^{1}	kʰa:n^{1}
kʰɔn^{1}	kʰan^{1}	kʰa:ɲ^{1}	kʰa:ɲ^{1}	kʰa:ɲ^{1}	kʰuan^{1}
(f)			***a:t**		
窮	poor		*ʋa:t		
va:t^{7}	va:t^{7}	va:t^{7}	fa:t^{8}	va:t^{8}	va:t^{7}
—	—	va:ʔ^{7}	va:k^{7}	va:ʔ^{8}	vuat^{8}
粘	sticky		*kʰa:t		
—	kʰa:t^{7}	kʰa:t^{7}	kʰa:t^{7}	kʰa:t^{7}	kʰa:t^{7}
—	kʰaʔ^{4}	kʰa:ʔ^{7}	kʰa:k^{7}	kʰaʔ^{8}	kʰuat^{7}
傳染	infect		*kʰa:t		
—	kʰa:t^{7}	—	kʰa:t^{7}	kʰa:t^{7}	kʰa:t^{7}
—	—	kʰa:ʔ^{7}	kʰa:ʔ^{7}	kʰaʔ^{8}	kʰuat^{7}
(g)			***a:ɲ**		
饞嘴	eat greedily		*C-la:ɲ		
la:n^{1}	la:n^{1}	la:ɲ^{1}	la:n^{1}	la:n^{4}	la:n^{1}
la:n^{1}	lɔn^{1}	la:n^{1}	la:n^{1}	la:n^{1}	lan^{4}

蟒蛇	python		*C-na:ɲʔ		
—	—	na:ɲ^3	—	—	na:n^3
nɔn^3	nɔn^3	—	—	—	—
咬	bite		*hŋ[a:/ə]ɲʔ		
—	ka:n^3	ka:ɲ^3	ka:n^6	k^{h}a:n^6	ka:n^6
—	—	kan^3	kan^3	kan^3	—
(h)			***a:c**		
停	stop (turn off)		*C-ŋa:c		
ŋa:t^7	ŋa:t^7	ŋa:c^7	ŋa:t^7	ŋa:t^8	ŋa:t^7
ŋɔt^2	—	ŋo:t^7	ŋo:t^7	ŋa:t^8	ŋuat^8
血	blood		*hla:c		
ɗa:t^7	ɬa:t^7	ɬa:c^7	ɬa:t^7	ɬa:t^7	ɬa:t^7
tθɔt^2	laʔ^4	ɬo:t^7	ɬo:t^7	ɬa:t^8	ɬuat^7
(i)			***a:ŋ**		
名字	name		*p^{h}a:ŋ		
p^{h}a:ŋ^1	p^{h}e:ŋ^1	p^{h}e:ŋ^1	p^{h}e:ŋ^1	p^{h}e:ŋ^1	p^{h}e:ŋ^1
p^{h}ɛŋ^1	p^{h}eŋ^1	p^{h}e:ŋ^1	p^{h}e:ŋ^1	p^{h}iaŋ^1	p^{h}iaŋ^1
剥	skin (a cow)		*ɗa:ŋʔ		
ɗa:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗe:ŋ^3
ɗɛŋ^3	ɗeŋ^3	ɗe:ŋ^3	ɗe:ŋ^3	ɗiaŋ^3	ɗiaŋ^3
羊	sheep		*hja:ŋ		
za:ŋ^1	ze:ŋ^1	ze:ŋ^1	ze:ŋ^4	ze:ŋ^4	ze:ŋ^1
zɛŋ^1	zɛŋʔ^4	—	ze:ŋ^1	ziaŋ^1	ziaŋ^4

(j)			***a:k**		
高	high		*p^{h}a:k		
p^{h}a:ʔ^{7}	p^{h}e:ʔ^{7}	p^{h}e:k^{7}	p^{h}e:ʔ^{7}	p^{h}e:ʔ^{7}	p^{h}e:ʔ^{7}
p^{h}ɛk^{2}	p^{h}ɛʔ^{4}	p^{h}e:ʔ^{7}	p^{h}ɯ:^{2}	p^{h}eʔ$^{[8]}$	p^{h}iaʔ^{7}
皮	skin (of fruit)		*f^{h}a:k		
p^{h}a:ʔ^{7}	fe:ʔ^{7}	fe:k^{7}	fe:ʔ^{7}	fe:ʔ^{7}	fe:ʔ^{7}
fɛk^{2}	fɛʔ^{4}	fe:ʔ^{7}	fɯ:^{2}	feʔ^{8}	fiaʔ^{7}
水獺	otter		*hna:k		
na:ʔ^{7}	te:ʔ^{7}	te:k^{7}	te:ʔ^{8}	t^{h}e:ʔ^{8}	te:ʔ^{8}
tsɛk^{4}	—	—	tɯ:^{2}	teʔ^{8}	tiaʔ^{8}

3.5.5 *Interim Summary*

Four series of rimes with non-high nuclei have been reconstructed in this section, listed below:

(168)		*ə:j		*a:j
	*e:w			*a:w
	*e:m	*ə:m		*a:m
	*e:n	*ə:n		*a:n
				*a:ɲ
	(*e:ŋ)	*ə:ŋ		*a:ŋ
	*e:p	*ə:p		*a:p
	*e:t	*ə:t		*a:t
				*a:c
	(*e:k)	*ə:k		*a:k
		*əj		
		*əw		
		*əm	*om	
		*ən		
		*əɲ		
		*əŋ	*oŋ	
		*əp	*op	
		*ət		
		*əc		
		*ək	*ok	

There are several asymmetries which exist, both regular and idiosyncratic. In the case of the former, it can be seen that no *e:C rimes occur with palatal finals, a natural co-occurrence constraint; the lack of *ow can be explained the same way. There are noticeable gaps of rimes with palatal endings in the *ə:C and *oC series; there are also gaps for *ə:w and alveolar-final rimes in the *oC series. Finally, there is an obvious distribution asymmetry in length, where *e:C and *a:C occur only long, and *oC occurs only short (in this case grave codas blocked peripheral vowel raising).

3.6 Conclusion

The entire reconstructed system of PHl rimes is given and discussed in this section. A broader comparison of the three alternate systems of reconstruction is provided as well.

3.6.1 *The Present Reconstruction*

The system proposed here is given below. Any rimes which are reconstructed on the evidence of three or fewer examples are placed in brackets to indicate their marginality in the system. The rime categories are displayed according to coda (or lack thereof):

(169) **Open Rimes**

*i:	*ɯ:	*u:
*[e:]		
	*a:	

Final Glides

Labiovelar		*Palatal*	
*i:w		*[ɯ:j]	*u:j
*iw			*uj
*[e:w]		*ə:j	
	*əw	*əj	
	*a:w	*a:j	

Final Stops (Oral and Nasal)

	Labials			*Alveolars*	
*i:m/*i:p	*ɯ:m/*ɯ:p		*i:n/*i:t	*ɯ:n/*[ɯ:t]	*u:n/*u:t
*im/*ip	*ɯm/*ɯp		*in/*it	*ɯn/*ɯt	*un/*ut
[e:m]/[e:p]	*ə:m/*ə:p		*[e:n]/*[e:t]	*ə:n/*ə:t	
	*əm/*əp	*om/*op		*ən/*ət	
	*a:m/*a:p			*a:n/*a:t	

	Palatals			*Velars*	
		*u:ɲ/*u:c	*i:ŋ/*i:k	*ɯ:ŋ/*ɯ:k	*u:ŋ/*u:k
		*uɲ/*uc	*iŋ/*[ik]	*[ɯŋ]	*uŋ
			*[e:ŋ]/[*e:k]	*ə:ŋ/*ə:k	
	*əɲ/*əc			*əŋ/*[ək]	*oŋ/*ok
	*a:ɲ/*a:c			*a:ŋ/*a:k	

Final Laryngeals

*ɦ

*ʔ

This system of rimes can be characterized generally as one with three levels of height and backness, a length distinction, glide codas at two places of articulation and stop (both nasal and oral) codas at four places of articulation. There are seven vowels, a number which is not highly marked (Maddieson 1984: 126). There are a number of gaps in the system, some of which are systematic, others of which are more idiosyncratic. These will be discussed in turn.

The most obvious gaps in the system are in the mid front and mid back vowels. The mid front vowels are exclusively long, few in number, and are generally very marginal within the system (see next chapter for more details). The mid back vowels on the other hand are robust and are of Kra-Dai etymological origin; however, there are only short rimes in this category, creating a sharp asymmetry and a typologically rare situation since mid vowels tend to be long compared with their lower counterparts (ibid.: 129). There are no high back rounded vowels preceding labial finals, due to a natural co-occurrence constraint (see section 3.4.4). Palatal finals occur only after high back vowels, short mid central vowels, and low vowels; it is unclear why there is an asymmetry in the mid central vowel category in this way. Short rimes with final velar stops exist, but are quite rare (particularly before oral velar stops). This reflects a strong preference for long nuclei before velar codas, and it is possible that some formerly short rimes lengthened in this environment. Finally, it is unclear why the rime *ɯ:t is so rare, as there is nothing about the overall system which indicates that it should be so.

The reconstruction presented here has been compared with the reconstructions of Thurgood (1994) and Ostapirat (2004); the differences between the present reconstruction and these alternative reconstructions have been discussed in previous sections, and an argument presented for the former when it differs from the latter. The three reconstructions are provided below for reference, so that the similarities and differences between them may be easily compared (category labels are taken from the present reconstruction). As in the previous chapter, I do my best to arrange the system in question according to how I perceive the author's understanding of the system as a whole. Any mistakes in interpretation are my own.

(170) Summary of Reconstructed Systems

(a) Open rimes

Thurgood	*Ostapirat*	*PHl*
*ei	*i:	*i:
*əɯ	*ɨ:	*ɯ:
*ou	*u:	*u:
*aj	*aj	*i:ɦ/ʔ
*aɯ	*al	*ɯ:ɦ/ʔ
—	*ɨw	*u:ɦ
*aw	*aw	*u:ʔ
—	—	*e:
*a	*a:	*a:

(b) Closed rimes with high front nuclei

Thurgood	*Ostapirat*	*PHl*
*i:w	*i:w	*i:w
*i:m	*i:m	*i:m
*i:n	*i:n	*i:n
*iaŋ	*i:ŋ	*i:ŋ
*i:p	*i:p	*i:p
*i:t	*i:t	*i:t
*i:k	*i:k	*i:k

*iw	*iw	*iw
—	*im	*im
*iɲ	*in	*in
*iŋ	*iŋ	*iŋ
*ip	*ip	*ip
*ic	*it	*it
*ik	*ik	*ik

(c) Closed rimes with high back unrounded nuclei

Thurgood	*Ostapirat*	*PHl*
—	(*ɨ:j)	*ɯ:j
*uam (b)	*ɨ:m	*ɯ:m
*u:n (b)	*ɨ:n	*ɯ:n
*u:ŋ (b)	*ɨ:ŋ	*ɯ:ŋ
*uap (b)	*ɨ:p	*ɯ:p
—	—	*ɯ:t
*uak (b)	*ɨ:k	*ɯ:k
—	*ɨm	*ɯm
—	*ɨn	*ɯn
—	—	*ɯŋ
—	*ɨp	*ɯp
—	*ɨt	*ɯt

(d) Closed rimes with high back rounded nuclei

Thurgood	*Ostapirat*	*PHl*
*u:j	*u:j	*u:j
*u:n (a)	*u:n	*u:n
—	—	*u:ɲ
*u:ŋ (a)	*u:ŋ	*u:ŋ
*u:t	*u:t	*u:t
*u:c	*u:c	*u:c
*uak (a)	*u:k	*u:k
*uj	*uj	*uj
*un	*un	*un

—	—	*uɲ
*oŋ	*uŋ	*uŋ
*ut	*ut	*ut
*uc	*uc	*uc

(e) Closed rimes with front mid nuclei

Thurgood	*Ostapirat*	*PHl*
—	—	*e:w
—	—	*e:m
—	—	*e:p
—	—	*e:n
—	—	*e:t
*i:ŋ	—	(*e:ŋ)
(*a:k)	—	(*e:k)

(f) Closed rimes with central mid nuclei

Thurgood	*Ostapirat*	*PHl*
*o:j	*ə:j	*ə:j
*uam (a)	*əm	*ə:m
*o:n	*ən	*ə:n
*uaŋ	*əŋ	*ə:ŋ
*uap (a)	*əp	*ə:p
*o:t	*ət	*ə:t
*o:k	*ək	*ə:k
*aj	*aj	*əj
*aw	*aw	*əw
*o	*əw	*əwh/ʔ
*am	*am	*əm
*an	*an	*ən
*aɲ	*aɲ	*əɲ
*aŋ	*aŋ	*əŋ
*ap	*ap	*əp
*at	*at	*ət
*ac	*ac	*əc
—	—	*ək

(g) Closed rimes with back mid nuclei

Thurgood	*Ostapirat*	*PHl*
*om	*um	*om
*oŋ	*uŋ	*oŋ
*op	—	*op
*ok	*uk	*ok

(h) Closed rimes with low nuclei

Thurgood	*Ostapirat*	*PHl*
*a:j	*a:j	*a:j
*a:w	*a:w	*a:w
*a:m	*a:m	*a:m
*a:n	*a:n	*a:n
—	—	*a:ɲ
(*i:ŋ)	*a:ŋ	*a:ŋ
*a:p	*a:p	*a:p
*uat	*a:t	*a:t
*uac	*a:c	*a:c
*a:k	*a:k	*a:k

3.6.2 *Thurgood's Reconstruction*

Thurgood's reconstructed rime inventory is shown below:

(171) **Open Rimes**

		*o
*a		

Final Glides

	Labiovelar	*Velar*	*Palatal*	
*i:w				*u:j
*iw				*uj
				*o:j
	*ow	*əɰ	*ej	
	*aw	*aɰ	*aj	
	*a:w		*a:j	

Final Stops (Oral and Nasal)

	Labials			*Alveolars*	
*i:m/*i:p			*i:n/*i:t		*u:n (a/b)/*u:t
*ip					*un/*ut
*uam (a/b)/*uap (a/b)					*uat
					*o:n/*o:t
		*om			
	*a:m/*a:p			*a:n	
	*am/*ap			*an/*at	
	Palatals			*Velars*	
		*u:c	*i:ŋ/*i:k		*u:ŋ (a/b)
*iɲ/*ic		*uc	*iŋ/*ik		
		*uac	*iaŋ		*uaŋ
					*uak (a/b)
					*o:k
					*oŋ/*ok
				*a:k	
	*aɲ/*ac			*aŋ	

Thurgood's reconstruction of an original vowel length distinction is in alignment with the present reconstruction. His open rime category is typologically marked due to the lack of high vowels, the reflexes of which he reconstructs as diphthongs. I consider the greatest weakness of this system to be the duplication of rimes in the categories he labels (a) and (b), without adequate explanation about why the second series should be considered to reflect loanwords (as noted above, this violates the principles of Commonality and Symmetry). There is also an inconsistency in the reconstruction of pure long high vowels versus diphthongs in final nasal versus final oral stop categories, when the evidence seems to militate for symmetry between the two. He does not reconstruct precursors to the Hlai tone categories, which leaves the alternations in Greater Hlai, Qi, and Cunhua (and the symmetry in the rimes which they disguise) unaccounted for.

3.6.3 *Ostapirat's Reconstruction*

Ostapirat's (2004) reconstruction is given below:

(172) **Open rimes**

*i:	*ɨ:	*u:
	*a:	

Final Glides

Labiovelar		*Palatal*	
*i:w		(*ɨ:j)	*u:j
*iw	*ɨw		*uj
		*ə:j	
	*əw		
	*a:w	*a:j	
	*aw	*aj	

Final Stops (Oral and Nasal)

	Labials			*Alveolars*	
*i:m/*i:p	*ɨ:m/*ɨ:p		*i:n/*i:t	*ɨ:n/ —	*u:n/*u:t
*im/*ip	*ɨm/*ɨp	*um/ —	*in/*it	*ɨn/*ɨt	*un/*ut
—/ —	*əm/*əp		—/ —	*ən/*ət	
	*am/*ap			*an/*al/*at	
	*a:m/*a:p			*a:n/*a:t	
	Palatals			*Velars*	
		—/*u:c	*i:ŋ/ *i:k	*ɨ:ŋ/*ɨ:k	*u:ŋ/*u:k
		—/*uc	*iŋ/*ik	—/ —	*uŋ/*uk
				*əŋ/*ək	
	*aɲ/*ac			*aŋ/ —	
	—/*a:c			*a:ŋ/ *a:k	

This reconstruction is parallel in many ways with the one suggested in this book. There is a full high vowel inventory (lacking the marginal *e:), a length distinction in the high vowels, and a general symmetry in the rime system as a whole, once co-occurrence constraints are taken into account. Weaknesses of this system include the lack of inclusion of some of the less well-represented rime categories which nevertheless show regular and expected patterns throughout the various Hlai languages; the reconstruction of a final lateral which is not justified by the overall evidence, despite the data in Wang & Qian (1951), and the reconstruction of only short mid central vowels, which does not explain the long reflexes in the majority of the Hlai daughter languages (a violation of both Directionality and Commonality). Finally, there is no examination of the precursors to the Hlai tone categories, which forces the reconstruction of *ɨw when there is actually no need for it, since this is in complimentary distribution with what is otherwise reconstructed as *aw.

In summary, this chapter has provided a comprehensive reconstruction of the PHl rime inventory. Besides cataloguing the major types of sound change which have occurred in the history of the Hlai languages, other major contributions include the evidence for and reconstruction of the segmental precursors of the PHl tone categories, outlining their subsequent development in the subgroups and daughter languages. A generally balanced system with typologically normal gaps has been reconstructed, which includes five vowels (plus a marginal sixth), two final glides, four places of articulation for final stops, and a vowel length distinction. Putting aside the set of changes which occurred quite early and distinguish Bouhin from Greater Hlai, it is almost invariably the NCHl languages which have undergone the most dramatic changes in the rime categories while the other branches remain more conservative.

It has also been shown that the four principles which apply to the reconstruction of initials apply equally well to the reconstruction of rimes. Directionality is important in constraining such processes as lengthening and diphthongization. Commonality is important in constraining the reconstruction to reflect the proto-language and limiting the amount of internal reconstruction which is not appropriate at this level. Economy is important in checking the features of vowel nuclei, using the reflexes of the daughter languages to triangulate the appropriate point in the vowel space to reconstruct. Finally, Symmetry is particularly important in the case of the rimes, as the overall system is readily constrained by this principle, and its few asymmetrical aspects highlighted appropriately.

The focus of the next chapter will be Pre-Hlai, the precursor to Proto-Hlai. This stage of Hlai is reconstructible using a combination of internal evidence as well as external evidence from other branches of Kra-Dai (in this case Tai). Unlike chapters two and three, chapter four will treat both the initial system and the rime system, with the goal of reconstructing the earliest possible stage of Pre-Hlai, and then showing the changes which occurred between that stage and Proto-Hlai.

CHAPTER 4

Pre-Hlai

The goal of this chapter is to develop a theory of the Pre-Hlai initial and rime inventories, and to trace the evolution of the Hlai initials and rimes from Pre-Hlai to Proto-Hlai.

To this end, cognates between Proto-Hlai and Proto-Tai and its immediate daughters Proto-Northern Tai and Proto-Southern Tai (Central + Southwestern Tai)[1] are compared in order to develop a hypothesis of the original Pre-Hlai inventory of initials. Although reconstructions of other branches of Kra-Dai exist (most notably Proto-Kam-Sui (Thurgood 1988), Proto-Kra (Ostapirat 1999), and Proto-Lakkja (L-Thongkum 1992)), I do not refer to them here so as to keep interphyletic comparisons manageable, limiting the comparanda to Western Kam-Tai.

Section 4.1 gives a brief overview of the prosodic word shape inherited from Proto-Western Kam-Tai (PWKT), and presents a comparison between the PHl initials and the Proto-Tai (PT) initials. Section 4.2 repeats this comparison for the rimes. Section 4.3 reviews and motivates the important changes which are hypothesized between Proto-Western Kam-Tai and Proto-Hlai.[2]

4.1 The Pre-Hlai Initials

As alluded to in chapter two, the PHl phonological word consisted of two types: either (a) monosyllabic or (b) disyllabic. Disyllabic words were certainly iambic, as this stress type is usually a necessary precondition in Southeast Asia for an eventual transition to a strictly monosyllabic inventory:

(1) (a) φ (b) φ

| / |

$\acute{\sigma}_{\mu\mu}$ ς $\acute{\sigma}_{\mu\mu}$

1 This is the original classification of Tai given in Li (1977). Pittayaporn (2009) suggests that SWT may actually be a subgroup of C Tai.

2 As in chapters two and three, the four principles of language change and reconstruction given in chapter one are used in this chapter as well.

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This first syllable in a disyllabic form (1b) is sometimes known as a *semisyllable, presyllable*, or *minor syllable* (in contrast with the second *main syllable*; the term *presyllable* will be adopted here), and the disyllabic foot was what is sometimes called *sesquisyllabic* ('syllable-and-a-half'), a term coined by James Matisoff in Matisoff (1973) (see also Svantesson (1983), Shaw (1993), Cho & King (1996)).

The first hypothesis adopted here is that moraic weight became assigned exclusively to the main (rightmost) syllable, and that the first syllable in a disyllabic form lost the ability to host a mora. The presyllable could carry segmental features (the inventory of which would become gradually restricted over time), but was not associated with moraic content.[3] I hypothesize that this loss of and subsequent lack of a mora was correlated with the steady erosion of presyllables until their eventual extinction in the Hlai daughter languages. This kind of iambic system stands in contrast to other iambic systems which have remained more stable (such as those of the Semitic languages) and not been reduced to monosyllables. The progression from full presyllable to moraless presyllable to monosyllable is shown below:[4]

(2)	φ	>	φ	>	φ
	/ |		/ |		|
	$\sigma_{\mu}\acute{\sigma}_{\mu\mu}$		$\varsigma\ \acute{\sigma}_{\mu\mu}$		$\acute{\sigma}_{\mu\mu}$
Example:	Cihrá:w	>	C-hrjá:w	>	hrjá:w

The existence of a length distinction in rimes suggests that codas were optionally moraic, bearing a mora in short rimes but not in long rimes.[5] PHl examples of each type are given below for monosyllabic words (3a) and sesquisyllabic words (3b), with the bimoraic domain of each word in brackets (remembering that the initial *C in the forms in (3b) represents an initial consonant with unspecified features):

(3)	(a)	dog	*hm[a:]	(b)	waist	*Ciɦ[a:]ɦ
		break	*p^{h}[ə:]nʔ		rough	*Cuɾ[a:]w
		spine	*$tç^{h}$[uɲ]ʔ		sore	*Cuʔ[əw]

3 I adopt Cho & King's (2003) convention of showing a moraless sesquisyllable (or semisyllable) with an ς.

4 A form such as C-hrjá:w in (3) may have been produced as [Cə̆hrjá:w], with the intervening schwa existing solely as an artifact of phonetic implementation, but not represented in underlying representations.

5 The laryngeal components of rimes in categories B and C do not appear to affect weight in any way, and are not considered to be potential mora-bearing units.

The second hypothesis adopted here is that the lowest unit of prosodic timing was the foot, a fact which would affect the organization of the segmental material associated to it. While this model predicts that the rime in both monosyllables and sesquisyllables should be identical, it also predicts three different types of initial consonants depending on their position within the foot. Under this model, the initial in a monosyllabic form lies at the edge of both the foot and the main syllable. On the other hand, there is an asymmetry in sesquisyllabic forms between the foot-initial consonant, which marks the edge of a prosodic timing category, and the initial consonant of the main syllable which does not (and now plays the ambiguous role of a syllable onset but a prosodicaly medial segment):

(4) The two types of feet in Pre-Hlai

(a) Monosyllable

Initial in main syllable domain
|--↓—-|
[(CV́:)]
|--↑—-|
Initial in foot domain

(b) Sesquisyllable

Initial in foot domain   Medial in foot domain
↘ |↓—|
[(Cv̆)(CV́:)]
|——-↑—--|
Initial in main syllable domain

It is shown below that each of these three kinds of initials has evolved along a different trajectory, each set eventually becoming disjunct with the other two.

The initials below are organized according to their Proto-Western Kam-Tai categories. Proto-Western Kam-Tai (PWKT) reconstructions are presented first, followed by Proto-Hlai (PHl), Proto-Tai (PTai), and finally the Proto-Northern Tai (PNT) and Proto-Southern Tai (PST) reconstructions upon which the Proto-Tai reconstructions are based.

4.1.1 *Initial Stops*

The correspondences for the simple (non-cluster) PWKT stops are given below. Expected phonemes with no supporting examples are placed in parentheses (there is no evidence in either PHl or PTai for initial *ɖ):

		PWKT	*PHl*	*PTai*	PNT	PST
(5)	(a)	*p	*p^{h}	*p	*p	*p
		*t	*t^{h}	*t	*t	*t
		*ʈ	*ʈʂ^{h}	*tr	*hr	*t^{h}r
		(*c	*tɕ^{h}	*c	*c	*c)
		*k	*k^{h}	*k	*k	*k
		*q	*k^{h}	*q	*k	*x
		*ʔ	*ʔ	*ʔ	*ʔ	*ʔ
	(b)	(*b	*p^{h}	*b	*b	*b)
		*d	*t^{h}	*d	*d	*d
		*ɟ	*tɕ^{h}	*ɟ	*ɟ	*ɟ
		(*g	*k^{h}	*g	*g	*g)
		*ɢ	*k^{h}	*ɢ	*ɣ	*g

The first series (5a) is reconstructed in PWKT as an original series of plain stops, the second series as original voiced stops. When the aspirated initial stops reconstructed for Proto-Hlai are compared with their Proto-Tai cognates, there are two patterns which emerge. The first is that there is no voicing distinction in Proto-Hlai stops, and the second is that the uvular series has merged with the velar series. Under this hypothesis, Proto-Tai is the more conservative of the two and the PHl inventory is the result of the merger of two Pre-Hlai categories: the uvular series with the velar series followed by that of the voiced obstruents with the voiceless obstruents, initiating a constraint on initial voiced obstruents in Hlai which has continued until the present day. Finally, the entire series of PHl obstruents underwent what Ostapirat (2004) recognizes as redundant aspiration (what will be referred to below as *main-syllable aspiration*), resulting from a general rule which affected all eligible initials in Pre-Hlai (see section 4.3). This series of changes is shown below:

		PWKT		*Pre-Hlai*		Proto-Hlai
(6)	(a)	*p	>	*p	>	*p^{h}
		*t	>	*t	>	*t^{h}
		*ʈ	>	*ʈ	>	*ʈʂ^{h}
		*c	>	*c	>	*tɕ^{h}
		*k	>	*k	>	*k^{h}
		*q	>	*k	>	*k^{h}
		*ʔ	>	*ʔ	>	*ʔ

	PWKT		*Pre-Hlai*		*Proto-Hlai*
(b)	*b	>	*p	>	*pʰ
	*d	>	*t	>	*tʰ
	*ɟ	>	*c	>	*tçʰ
	*g	>	*k	>	*kʰ
	*ɢ	>	*k	>	*kʰ

Examples of forms with original voiceless stops are given below. PTai forms are based on Pittayaporn (2009) with some modifications:

(7) PWKT plain voiceless stops

	Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	wing	*pi:k	*pʰi:k	—	—	*pi:k
	pat. grandfather	*pɰəw[ʔ/h]	*pʰu:ʔ	*pɰawh	*paw^{B}	*pu:^{B}
(b)	shallow	*tɯ:nʔ	*tʰɯ[:]nʔ	—	—	*tɯ:n^{C}
	tree (clsfr)	*to[:]nʔ	*tʰu:nʔ	—	—	*ton^{C}
	fall, drop	*tok	*tʰok	*tok	*tok	*tok
	turtle	*tu:ɦ	*tʰu:ɦ	*tawh	*taw^{B}	*taw^{B}
	piece, lump	*to[:]n[ɦ]	*tʰun	—	—	*to:n^{B}
	fart	*k-to[:]c	*tʰu:[t/c]	*k-toc	*hroc	*toc
	below	*tɯ:ʔ	*tʰɯ:ʔ	*taɰʔ	*taɰ^{C}	*taɰ^{C}
	wasp	*mite[:]l	*tʰin	*m-tje:l	*di:l	*p-te:n
(c)	fruit ~ testicles	*ʈə[:]m	*ʈʂʰə:m	*tram	*hram	*tʰram
	carry (shoulder)	*ʈa:p	*ʈʂʰa:p	*tra:p	*hra:p	*tʰra:p
	stone	*ʈi:l	*tçʰi:n[6]	*tri:l	*hri:l	*tʰri:n
	take, carry	*ʈi:wʔ	*ʈʂʰi:wʔ	*tri:wʔ	*hri:w^{C}	*tʰri:w^{C}
	weave ~ loom	*Cuʈɤ:k	*Cuʈʂʰɯ:k	*trwə:k	*hro:k	*tʰru:k
	headlouse	*Cuʈu:	*Cuʈʂʰu:	*traw	*hraw	*tʰraw
	eye	*p-ʈa:	*ʈʂʰa:	*p-tra:	*p-ta:	*p-tʰra:
(d)	in cupped hands	*ko[:]p	*kʰop	—	—	*ko:p
	eat	*kəɲ	*kʰən	*kɯɲ	*kɯn	*kin
	old	*kəwɦ	*kʰəwɦ	*kawh	*kaw^{B}	*kaw^{B}

6 The NWCHl and Jiamao reflexes indicate PHl *tçʰ. It is tentatively assumed that this indicates an irregular development in Pre-Hlai of *ʈ > *c before the high vowel *i.

(e)	arm	*qe:n	*kʰi:n	*qe:n	*ke:n	*xe:n
(f)	saddle	*ʔa:n	*ʔa:n	*ʔa:n	*ʔa:n	*ʔa:n
	basin	*ʔa:ŋɦ	*ʔa:ŋɦ	*ʔa:ŋh	*ʔa:ŋᴮ	*ʔa:ŋᴮ
	bathe	*ʔa:p	*ʔa:p	*ʔa:p	*ʔa:p	*ʔa:p
	marrow	*ʔwə:k	*ʔu:k	*ʔwə:k	*ʔu:k	*ʔo:k
	cradle	*ʔu:[ɦ]	*ʔu:	*ʔu:h	*ʔu:ᴮ	*ʔu:ᴮ
	carry in arms	*ʔ[o/u]mʔ	*ʔomʔ	*ʔumʔ	*ʔumʔ	*ʔumʔ
	open (mouth)	*Cuʔa:[ɦ/ʔ]	*Cuʔa:ɦ	*ʔa:ʔ	*ʔa:ᶜ	*ʔa:ᶜ

PHl correspondences with PTai voiced stops are far less common than the voiceless stops, and there are only a few straightforward examples:

(8) PWKT plain voiced stops

	Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	land leech	*N-ta:k	*tʰa:k	*N-ta:k	*[t/d]a:k	*da:k
	louse (body)	*m-d[əʎ]	*tʰən	*mlel	*mlel	*mlen
(b)	taste	*ɟim	*tɕʰim	*ɟim	*ɟim	*ɟim
	hole ~ crack	*ɟo:ŋ[ʔ/ɦ]	*tɕʰu:ŋʔ	*ɟo:ŋh	*ɟo:ŋᴮ	*ɟo:ŋᴮ
	bruised	*ɟəmʔ	*tɕʰəmʔ	*ɟamʔ	*ɟamᶜ	*ɟamᶜ
(c)	person	*ɢwɯn	*kʰun	*ɢwɯn	*ɣwɯn	*gwən

The evidence for the status of voicing in the initial in *land leech* is conflicting in PNT. The solution that I propose to this paradox is the existence of an original initial nasal, which was lost early in most branches, but lasted long enough in Tai to lead to homorganic voicing of the initial in all but the Northern Tai languages Yay and Wuming.

The best account for *body louse* may be that it was an original root beginning with *d which underwent regular development in PHl, but which lenited in PTai under the influence of the preceding *m-.

There are three examples of voiced stop-liquid clusters. The tendency in Hlai appears to have been for the medial liquid to be deleted:

(9)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	deceive ~ cheat	*bra:ŋ	*pʰə:ŋ	*bra:ŋ	*bra:ŋ	*bra:ŋ
	dirty sweat	*ɢlɰi:	*kʰi:	*ɢlɰi:	*ɣi:	*ɢlaj
	fishy	*ɢra:w	*kʰa:w	*ɢra:w	*ɣa:w	*ɢra:w

4.1.2 *Medial Stops*

Medial voiceless stops did not generally remain such by the time of Proto-Hlai. Presyllables, if they existed, were lost and left former medial stops to develop along the same path as original initial stops. The one exception was medial voiceless uvular stops, which underwent lenition via the following path: *C-q- > *C-ʁ- > *C-ɦ-:

(10)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	body hair	*puqwɯl	*Cuɦun	*p-qwɯl	*pwɯl	*xon
	horn	*r-qəw	*ɦəw	*r-qaw	*kaw	*r-xaw
	leg	*f-qa:	*ɦa:	*f-qa:	*f-ka:	*xa:
	excrement	*N-qɰəjʔ	*ɦa:jʔ	*N-qɰajʔ	*ɣajʔ	*N-qi:ʔ
	bitter	*N-qɰəm	*ɦə:m	*N-qɰam	*ɣam	*N-qom

Two series of intervocalic stop correspondences exist between PHl and PTai, depending on whether the preceding vowel was schwa (11b) or some other vowel (11a):

(11)		*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	*C-b	*ʋ	*C-b	*C-b	*ʔb
		*C-d	*ɾ	*C-d	*C-d	*ʔd
		*C-ɖ	*ɾ	*C-ɖ	*C-ɖ	*C-ɖ
		*C-ɟ	*hj	*ʔj	*ʔj	*ʔj
		*C-g	*ɦ	*ɣ	*ɣ	*ɣ
		*C-ɢ	*ɦ	*ɢ	*ɣ	*g
	(b)	*Cəʔb	*ɓ	*ʔb	*ʔb	*ʔb
		*Cəʔd	*ɗ	*ʔd	*ʔd	*ʔd
		*Cəʔɖ	*ɾ	*ʔɖ	*ʔɖ	*ʔd
		*Cəʔɟ	*tç	*ʔj	*ʔj	*ʔj
		*Cəʔg	*k	*x	*x	*x

This post-schwa development in (11b) is typologically similar to the development between Proto-Malayo-Polynesian and Proto-North Sarawak (PNS) (Blust 1995a, 1997a, 1997b, 1998, 2000, 2001, 2002, 2006, 2007), where voiced stops geminated after schwa and followed various paths of change in the PNS daughter languages. In some cases, such as Bintulu and Long San Kenyah, this resulted in a partial or complete implosive series similar to the series in Proto-Hlai:

(12)

PNS					*Bintulu*	*Kenyah* (*Long San*)
*Cəb:	>	*Cəʔb	>	ɓ		ɓ
*Cəd:	>	*Cəʔd	>	ɗ		ɗ
*Cəɟ:	>	*Cəʔɟ	>	ɟ		ʄ
*Cəg:	>	*Cəʔg	>	g		ɠ

Pre-Hlai intervocalic voiced stops generally lenited to approximants unless they followed schwa, in which case they geminated, after which the geminate became preglottalized; the one exception to this was the retroflex voiced stop, which lenited in both environments. The developments posited between PWKT and PHl are shown below:

(13)

	PWKT		*Pre-Hlai*		*Proto-Hlai*
(a)	*C-b	>	*C-ʋ	>	*ʋ
	*C-d	>	*C-ɾ	>	*ɾ
	*C-ɖ	>	*C-ɾ	>	*ɾ
	*C-ɟ	>	*C-j	>	*hj
	*C-g	>	*C-ɦ	>	*ɦ
	*C-ɢ	>	*C-ɦ	>	*ɦ
(b)	*Cəʔb	>	*Cəʔb	>	*ɓ
	*Cəʔd	>	*Cəʔd	>	*ɗ
	*Cəʔɖ	>	*Cəɾ	>	*ɾ
	*Cəʔɟ	>	*Cəɟ	>	*tç
	*Cəʔg	>	*Cəg	>	*k

Examples of medial voiced stops after non-schwa vowels are given below:

(14)

	Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	shoulder	*C-ba:ɦ	*ʋa:ɦ	*C-ba:h	*C-ba:ᴮ	*ʔba:ᴮ
(b)	bone	*Cudə:k	*Cuɾɯ:k	*C-dwə:k	*C-do:k	*ʔdu:k
	raw	*Cudi[:]p	*Cuɾi:p	*C-dip	*C-dip	*ʔdip
(c)	boat	*Cuɖa:	*Cuɾa:	*C-ɖuə	*C-ɖuə	*C-ɖɯə
(d)	medicine	*C-ɟa:	*hja:	*ʔja:	*ʔjɯə	*ʔja:
	granary	*C-ɟa:wʔ	*hja:wʔ	*ʔja:wʔ	*ʔjiəwʔ	*ʔja:wʔ
	stay, live at	*C-ɟu:[ɦ]	*hjəw	*ʔju:h	*ʔju:h	*ʔju:h
	pull ~ stretch	*C-ɟiət	*hji:t	*ʔ[j]iət	*ʔiət	*ʔjiət

(e)	thatch grass	*Ciga:	*Ciɦa:	*ɣa:	*ɣa:	*ɣa:
	field dike	*Cigə[:]l	*Ciɦə:n	*ɣal	*ɣal	*ɣan
	handspan	*Cugɯ[:]p	*Cuɦɯp	*ɣɯ:p	*ɣɯ:p	*ɣɯ:p
	to dig	*Cigut	*Ciɦut	—	*ɣut	—
(f)	chin	*Caɢa:ŋ	*ɦa:ŋ	*ɢa:ŋ	*ɣa:ŋ	*ga:ŋ
	smoke	*Cuɢə[:]n	*Cuɦə:n	*ɢwan	*ɣwan	*ɢwan

Examples of the medial stops following schwa are given below:

(15)		*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	(a)	fly	*Cəʔbil	*ɓin	*ʔbil	*ʔbil	*ʔbin
		leaf	*Cəʔbɯ:	*ɓɯ:	*ʔbaɰ	*ʔbaɰ	*ʔbaɰ
		overflow	*Cəʔba:ɦ	*ɓa:ɦ	—	—	*ʔba:^{B}
		carry (shoulder)	*Cəʔbe:k	*ɓi:k	—	—	*ʔbe:k
		bamboo basket	*Cəʔbuŋ	*ɓuŋ	—	—	*ʔbuŋ
	(b)	face ~ nose	*Cəʔdəŋ	*ɗəŋ	*ʔdaŋ	*ʔdaŋ	*ʔdaŋ
		winnow basket	*Cəʔdoŋʔ	*ɗoŋʔ	*ʔdoŋʔ	*ʔdoŋ^{C}	*ʔdoŋ^{C}
	(c)	star	*Cəʔɖa:w	*ɾa:w	*ʔɖa:w	*ʔɖa:w	*ʔda:w
		which	*Cəʔɖ[a:]	*ɾa:	—	—	*ʔdaɰ
	(d)	stand	*Cəʔɟu:n	*tɕu:n	*[ʔj]ɯ:n	(*ʔdɯn)	*ʔjɯ:n
	(e)	turbid	*Cəʔgunɦ	*kunɦ	—	—	*xun^{B}
		thing	*Cəʔgo[:]ŋ	*koŋ	*xo:ŋ	*xo:ŋ	*xo:ŋ

There are a few groups of irregular correspondences. The first is a set of examples in which the Proto-Hlai evidence indicates a preceding schwa, but the Proto-Tai evidence indicates a non-schwa vowel. Note that the PHl and PTai tone categories also fail to correlate:

(16)	*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	orange ~ red	*C[əʔ]dje:ŋ[ʔ]	*ɗe:ŋʔ	*C-dje:ŋ	*C-di:ŋ	*ʔde:ŋ
	black	*C[əʔ]dəm[ʔ]	*ɗəmʔ	*C-dam	*C-dam	*ʔdam
	thread	*C[əʔ]da:j[ʔ]	*ɗə:j	*C-da:jʔ	*C-da:j^{C}	*ʔda:j^{C}

In the next example, the PHl form indicates a medial stop but the PTai form indicates an initial stop which devoiced:

(17)

	Gloss	*PWKT*	*PHl*	*PT*	*PNT*	*PST*
	1st person	*[a]gu:	*ɦu:	*ku:	*ku:	*ku:

The following examples show variation in place: palatal in PHl and alveolar in PTai:

(18)

Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
extinguish	*Cəʔ[d/ɟ]əp	*tçəp	*ʔdap	*ʔdap	*ʔdap
dive	*Cəʔ[d/ɟ][o/ə]m	*tçom	—	—	*ʔdam

The following two examples have PTai forms which can be tentatively reconstructed as labial-coronal sequences:

(19)

Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
gall bladder	*Cəʔbəʔdi:	*ɗəj	*ʔbli:	*ʔbli:	*ʔbli:
navel	*Cəʔbuɖɯ:	*Cuɾɯ:	*ʔblɯ:	*ʔblɯ:	*ʔblɯ:

The following forms have medial stops reconstructible in Pre-Hlai but voiceless initial stops in PTai. There are several possible Middle Chinese loans in the examples below, indicating that a major (perhaps exclusive) source of forms with in this correspondence set may be loanwords. MC forms are adapted from Baxter & Sagart (2014):

(20)

	Gloss	*MC*	*PHl*	*PTai*	*PNT*	*PST*
(a)	board	板 *pænʔ	*ɓe:nɦ	*pe:nʔ	*pe:nᶜ	*pe:nᶜ
	duck	—	*ɓit	*pjət	*pit	*pet
	crab	—	*ɓu:ɦ	*p[aw]	*paw	*pu:
(b)	castrate	—	*ɗɯ:n	*to:n	*to:n	*to:n
	to ladle	杓 *dʝak	*ɗok	*tak	*tak	*tak
(c)	cross over	過 *kwah	*kuaʔ	*kwa:h	*kwa:ᴮ	*kwa:ᴮ
	sword	劍 *kjæmh	*kɯ:mɦ	—	—	*kiəmh
	hoe	—	*kwa:k	—	*[k]wa:k	*kuək

Finally, the following examples show correspondences between PHl medial voiced stops and PTai initial voiced stops. These are also probably explainable as loans:

(21)	*Gloss*	*MC*	*PHl*	*PTai*	*PNT*	*PST*
	raft	簰 *bɛ:	*ɓəj	*be:	*be:	*be:
	goose	—	*ɓunɦ	—	—	*bɯn^{B}
	bag	袋 *dojh	*ɗa:jʔ	—	—	*daj^{B}
	copper	銅 *dəwŋ	*ɗu:ŋ	*do:ŋ	*do:ŋ	*do:ŋ
	money	錢 *dʝen	*tɕi:n	*ɟe:n	*ɟe:n	*ɟe:n

4.1.3 *Fricatives*

While PWKT *f and *s were maintained as *f^{h} and *s^{h} in Proto-Hlai, the PWKT palatal and velar fricatives *ç and *x narrowed in stricture and merged with the aspirated reflexes of *c and *k by the time of PHl. All originally voiced fricatives devoiced; the voiced velar fricative *ɣ devoiced to *x, eventually merging with *k^{h}. A medial uvular fricative *χ is reconstructed which developed into PHl *ɦ (like the intervocalic uvular stops in (10) and (14) above) and PTai *x. The following are the correspondences for the PWKT fricatives:

(22)		*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	*f	*f^{h}	*f	*f	*f
		*s	*s^{h}	*s	*s	*s
		*ç	*tɕ^{h}	*s	*s	*s
		*x	*k^{h}	*x	*h	*x
		*C-χ	*ɦ	*x	*h	*x
	(b)	*v	*f^{h}	*v	*v	*v
		*z	*s^{h}	*z	*z	*z
		*ɣ	*k^{h}	*ɣ	*ɣ	*ɣ

The evolution of the PWKT fricatives into Proto-Hlai is shown below:

(23)		*PWKT*		*Pre-Hlai*		*Proto-Hlai*
	(a)	*f	>	*f^{h}	>	*f^{h}
		*s	>	*s^{h}	>	*s^{h}
		*ç	>	*ç^{h}	>	*tɕ^{h}
		*x	>	*x^{h}	>	*k^{h}
		*C-χ	>	*C-ɣ	>	*ɦ

(b)	*v	>	$*f^h$	>	$*f^h$
	*z	>	$*s^h$	>	$*s^h$
	*ɣ	>	$*x^h$	>	$*k^h$

Examples of the PWKT voiceless fricatives are given in (24) and voiced fricatives in (25):

(24)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	rain	*C-fwɯn	*fʰun	*C-fwɯn	*C-fwɯn	*fwən
		millet	*ɧa:ŋʔ	*fʰa:ŋʔ	*ɧa:ŋʔ	*fɯəŋᶜ	*fa:ŋᶜ
		cloud	*ɧa:ʔ	*fʰa:ʔ	*ɧa:ʔ	*fɯəᶜ	*fa:ᶜ
		dream	*fən	*fʰən	—	—	*fan
	(b)	you (pl)	*su:	*sʰəw	*su:	*su:	*su:
		teach	*so[:]l	*sʰun	*so:l	*so:l	*so:n
		wart	*so:[c/t]	*sʰu:c	—	—	*so:t
	(c)	pestle ~ pound	*ça:k	*tçʰa:k	*sa:k	*sa:k	*sa:k
		snail	*çi:	*tçʰi:	—	*saj	—
	(d)	white	*xa:w	*kʰa:w	*xa:w	*ha:w	*xa:w
		green	*xe:w	*kʰi:w	*xe:w	*he:w	*xe:w
		dry	*xɰɯ:ɦ	*kʰɯ:ɦ	*xɰɯ:h	*hɯ:ᴮ	*xaɰᴮ
	(e)	step across	*C-χa:m[ɦ/ʔ]	*ɦa:mɦ	*xa:mʔ	*ha:mᶜ	*xa:mᶜ
		cry, crow	*Ciχə[:]l	*Ciɦə:n	*xal	*hal	*xan
		lie face down	*Nuχə[:]m	*Cuɦə:m	*N-xwamʔ	*hŋwamʔ	xwamʔ

(25)		*Gloss*	*PWKT*	*PHl*	*PT*	*PNT*	*PST*
	(a)	cloud	*va:ʔ	*fʰa:ʔ	—	—	*va:ᶜ
		fire	*vɰi:	*fʰi:	*vɰi:	*vi:	*vaj
		tooth	*vjən	*fʰjən	*van	*van	*van
		foam ~ bubble	*vo:ŋ[ʔ]	*fʰu:ŋʔ	—	—	*vo:ŋ
	(b)	wash clothes	*zə[:]k	*sʰə:k	*zak	*zak	*zak
	(c)	itch	*ɣwəm	*kʰom	*ɣwəm	*ɣum	*ɣom

There is one potential example of prenasalized *f:

(26)

Gloss	PWKT	PHl	PTai	PNT	PST
seed	*N-fən	*fʰən	*N-fan	*fan	*van

The following items are most likely Chinese loanwords:

(27)

Gloss	MC	PHl	PTai	PNT	PST
pick up, gather	拾 *dʝip	*sip	*kjep	*kip	*kep
ginger	薑 *kjaŋ	*kʰɯːŋ	*xiːŋ	*hiːŋ	*xiŋ

4.1.4 *Nasals and Laterals*

Since PWKT nasals and laterals developed in a similar way, they will be treated together. There are a total of four correspondence sets between PHl and PTai nasals/laterals. Examples are presented from a Hlai perspective, and solutions are suggested in order to explain the mixed correspondences.

4.1.4.1 Preaspirated Nasals and Laterals

Two sets of correspondences exist for PHl aspirated nasals and laterals: one set with PTai plain sonorants and another with PTai voiceless sonorants. The first correspondence set is reconstructed as a series of plain sonorants which became preaspirated in initial position in PHl. The second set is reconstructed as a series of voiceless (and probably slightly aspirated) sonorants:

(28)

	PWKT	Proto-Hlai	PTai	PNT	PST
(a)	*m	*hm	*m	*m	*m
	*n	*hn	*n	*n	*n
	*ɲ	*hɲ	*ɲ	*ɲ	*ɲ
	*ŋ	*hŋ	*ŋ	*ŋ	*ŋ
	*ŋw	*hŋw	*ŋw	*ŋw	*ŋw
	*l	*hl	*l	*l	*l
(b)	*m̥	*hm	*m̥	*m̥	*m̥
	*n̥	*hn	*n̥	*n̥	*n̥
	*ŋ̊	*hŋ	*ŋ̊	*ŋ̊	*ŋ̊
	*l̥	*hl	*l̥	*l̥	*l̥

The development of both series from PWKT to PHl is shown below. In the case of the first series, preaspiration developed by the time of PHl. This precipitated the merger of the two categories, since voicelessness in the second series had been strengthened to full preaspiration by the time of Pre-Hlai:

(29)		PWKT		Pre-Hlai		Proto-Hlai
	(a)	*m	>	*m	>	*hm
		*n	>	*n	>	*hn
		*ɲ	>	*ɲ	>	*hɲ
		*ŋ	>	*ŋ	>	*hŋ
		*ŋw	>	*ŋw	>	*hŋw
		*l	>	*l	>	*hl
	(b)	*m̥	>	*hm	>	*hm
		*n̥	>	*hn	>	*hn
		*ŋ̊	>	*hŋ	>	*hŋ
		*l̥	>	*hl	>	*hl

Examples of plain sonorant initials are given below:

(30)	*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
(a)	return	*mɯə	*hmɯ:	—	—	*mɯə
	drunk	*mwi:	*hmuj	—	*mwi:	—
	beard	*mɯ[:]m[ʔ/ɦ]	*hmɯ:mʔ	*mumh	*mum^B	*mum^B
	mother	*me:[ʔ/ɦ]	*hmi:ʔ	*me:h	*me:^{B}	*me:^{B}
	ant	*moc	*hmuc	*moc	*moc	*moc
(b)	paddy	*na:[ɦ]	*hna:ɦ	*na:	*na:	*na:
	otter	*na:k	*hna:k	*na:k	*na:k	*na:k
	mos. yngr bro	*n[r]a:ʔ	*hnɯ:ʔ	*na:ʔ	*na:ʔ	*na:ʔ
(c)	to shoot	*ɲɯ:	*hɲɯ:	—	—	*ɲɯ:
	dye	*ɲwəmʔ	*hɲomʔ	*hɲwəmʔ	*ɲum^C	*ɲo:m^C
(d)	silver	*ŋjən	*hŋən	*ŋjan	*ŋjan	*ŋɤn
	sesame	*ŋra:	*hŋɯ:	*ŋra:	*ŋra:	*ŋa:
(e)	day	*ŋjwən	*hŋwən	*ŋjwan	*ŋjwan	*ŋwan

(f)	tongue	*li:nʔ	*hli:nʔ	*li:nʔ	*li:n^{C}	*li:n^{C}
	child	*lɯ:k	*hlɯ:k	*lɯ:k	*lɯk	*lu:k
	deep	*lɰək	*hlə:k	*lɰak	*lak	*lɯk
	blood	*la:c	*hla:c	*lɯət	*lɯət	*lɯət

Examples of voiceless sonorants are given below:[7]

(31)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	dog	*m̥a:	*hma:	*m̥a:	*m̥a:	*m̥a:
		flea	*m̥ə[:]t	*hmə:t	*m̥at	*m̥at	*m̥at
		pig	*m̥u:	*hməw	*m̥u:	*m̥u:	*m̥u:
		widow	*m̥a:j[h/ʔ]	*hmə:jʔ	*m̥a:j[h/ʔ]	*m̥a:j^{B}	*m̥a:j^{C}
	(b)	mouse	*n̥ju:	*hniw	*n̥u:	*n̥u:	*n̥u:
		above	*n̥ɯə	*hnɯ:	—	—	*n̥ɯə
	(c)	grey hair	*ŋ̊wə:k	*hŋu:k	*ŋ̊wə:k	*hu:k	*ŋ̊o:k
	(d)	many	*l̥a:j	*hlə:j	*l̥a:j	*l̥a:j	*l̥a:j

The items in (32) are examples of loose lateral clusters in which the first member was lost in Hlai:

(32)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	PST
	fish	*p-la:	*hla:	*pla:	*pla:	*pla:
	spittle	*m-la:j	*hlə:j	*m-la:j	*mla:j	*m-la:j

The autonym in (34) is in variation between PHl *hl and PTai *d; if these two forms are truly cognate, then an original lateral may be implied which hardened irregularly to *d in Tai.

(34)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	autonym	*[l]əj	*hləj	*daj	*daj	*daj

4.1.4.2 Medial Nasals and Laterals

PHl medial nasal and lateral correspondence sets also split into two series. When the correspondence is with a voiceless PTai sonorant, a voiceless presyllable initial is reconstructed. When it was with a plain PTai sonorant, a voiced

7 Many of these are animal names, and an animal prefix has been suggested to account for these (Ostapirat 1999, Thurgood 1988b).

presyllable initial is reconstructed. There appears to have been a constraint in PTai on the devoicing of a retroflex sonorant; items with these medials are listed in the voiceless series by default, with the caveat that the voicing status of the presyllable initial is ambiguous:

(35)		*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	*C-m	*C-m	*m̥	*m̥	*m̥
		*C-n	*C-n	*n̥	*n̥	*n̥
		*C-ɳ	*C-n	*ɳ	*ɳ	*n
		*C-ŋ	*C-ŋ	*ŋ̊	*ŋ̊	*ŋ̊
		*C-l	*C-l	*l̥	*l̥	*l̥
		*Cil	*hlj	*l̥	*l̥	*l̥
		*C-ɭ	*C-l	*ɭ	*ɭ	*l
		*Ciɭ	*hlj	*ɭ	*ɭ	*l
	(b)	*C^{V}-m[8]	*C-m	*m	*m	*m
		*C^{V}-n	*C-n	*n	*n	*n
		*C^{V}-ɲ	*C-ɲ	*ɲ	*ɲ	*ɲ
		*C^{V}-ŋ	*C-ŋ	*ŋ	*ŋ	*ŋ
		*C^{V}-l	*C-l	*l	*l	*l

The development of these two series in PHl is given below. Retroflex sonorants merged with alveolars in Pre-Hlai, while voiced presyllable initials devoiced:

(36)		*PWKT*		*Pre-Hlai*		*Proto-Hlai*
	(a)	*C-m	>	*C-m	>	*C-m
		*C-n	>	*C-n	>	*C-n
		*C-ɳ	>	*C-n	>	*C-n
		*C-ŋ	>	*C-ŋ	>	*C-ŋ
		*C-l	>	*C-l	>	*C-l
		*Cil	>	*lj	>	*hlj
		*C-ɭ	>	*C-l	>	*C-l
		*Ciɭ	>	*lj	>	*hlj
	(b)	*C^{V}-m	>	*C-m	>	*C-m
		*C^{V}-n	>	*C-n	>	*C-n
		*C^{V}-ɲ	>	*C-ɲ	>	*C-ɲ
		*C^{V}-ŋ	>	*C-ŋ	>	*C-ŋ
		*C^{V}-l	>	*C-l	>	*C-l

8 C^{V} here represents an originally voiced initial in a sesquisyllabic form.

The following are examples of medial nasals preceded by originally voiceless initials:

(37)		*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	(a)	(flesh of) fruit	*C-ma:k	*C-ma:k	*m̥a:k	*m̥a:k	*m̥a:k
		bear	*C-mwɯj	*C-muj	*m̥wɯj	*m̥ɯəj	*m̥i:
		grow up	*C-ma:[ʔ]	*C-ma:	*m̥a:ʔ	*m̥a:ᶜ	*m̥a:ᶜ
	(b)	thick	*C-na:	*C-na:	*n̥a:	*n̥a:	*n̥a:
		skin	*C-nə[:]ŋ	*C-nə:ŋ	*n̥aŋ	*n̥aŋ	*n̥aŋ
		this	*C-ni:[ɦ/ʔ]	*C-ni:ɦ	*n̥i:ʔ	*n̥i:ᶜ	*n̥i:ᶜ
	(c)	water	*C-ɳəmʔ	*C-nəmʔ	*ɳamʔ	*ɳamᶜ	namᶜ
		bamboo shoot	*C-ɳa:ŋ	*C-nɯ:ŋ	—	*ɳa:ŋ	—
	(d)	gill	*Ciŋa:k	*C-ŋa:k	*ŋ̊ɯək	*ŋ̊ɯək	*ŋ̊ɯək
		goose	*C-ŋa:nɦ	*C-ŋa:nɦ	*ha:nh	*ha:nᴮ	*ha:nᴮ
		cry	*t-ŋi:ʔ	*C-ŋi:ʔ	*t-hajʔ	*tajᶜ	*hajᶜ
	(e)	big	*C-luəŋ	*C-luŋ	—	—	*l̥uəŋ
		far	*k-ləj	*C-ləj	*klaj	*klaj	*klaj
		drum	*k-l-	*C-ləŋ	*klo:ŋ	*klo:ŋ	*klo:ŋ
	(f)	yellow	*Cila:ŋ	*hlja:ŋ	—	—	*l̥ɯəŋ
		remainder	*Cila:	*hlja:	*l̥ɯə	*l̥ɯə	*l̥ɯə
		gadfly	*Cila:k	*hlja:k	*l̥ɯək	*l̥ɯək	*l̥ɯək
		leech	*piliŋ	*hljiŋ	*pliŋ	*pliŋ	*pliŋ
	(g)	fingernail	*Ciɭe[:]p	*C-li:p	*ɭje:p	*ɭi:p	*lep
		firefly	*C-ɭip	*C-lip	—	*ɭip	—
	(h)	steal	*Ciɭək	*hljok	*ɭak	*ɭak	*lak

The following are examples of medial nasals preceded by originally voiced initials:

(38)		*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	(a)	yam	*Cⱽ-mən	*C-mən	*man	*man	*man
		you	*Cⱽ-mɯ:	*C-mɯ:	—	—	*maɰ
		hand	*Cⱽ-umɯ:	*C-mɯ:	*mwɯ:	*mwɯ:	*mɯ:
		cat	*Cⱽ-me:w[ɦ]	*C-mi:wɦ	*me:w	*me:w	*me:w

(b)	younger sib	*C^{V}-nuoŋ[ɦ/ʔ]	*C-n[o/u]ŋɦ	*nuoŋʔ	*nuəŋʔ	*no:ŋʔ
(c)	mosquito	*C^{V}-ɲu[:]ŋ	*C-ɲu:ŋ	*ɲuŋ	*ɲuŋ	*ɲuŋ
	sew	*C^{V}-ɲəp	*C-ɲəp	*ɲjep	*ɲip	*ɲep
(d)	branch (road)	*C^{V}-ŋa:[ʔ/ɦ]	*C-ŋa:ʔ	—	—	*ŋa:^{B}
	mute	*C^{V}-ŋwəm[ʔ]	*C-ŋom	*ŋwamʔ	*ŋwam^{C}	*ŋwam^{C}
(e)	forget	*C^{V}-lɯ:m[ɦ]	*C-lɯ:mɦ	*lɯ:m	*lum	*lɯ:m
	sickle	*C^{V}-liəm	*C-li:m	*liəm	*liəm	*liəm
	lightning	*mile[:]p	*hljip	—	—	*m-le:p

A few exceptions which may be cognate include the following:

(39)	*Gloss*	*PWKT*	*Proto-Hlai*	*PT*	*PNT*	*PST*
(a)	head hair	*p-[ɳ]om	*C-[ɳ]om	*prom	*prom	*p^{h}rom
(b)	stinger	*m-ləj	*C-nəj	*m-laj	*laj	*m-laj
(c)	moon	*Cəʔb-ʎa:n	*C-ɲa:n	*ʔblɯən	*ʔblɯən	*ʔblɯən
(d)	child	*C-[d/l]ek	*C-lik	—	—	*ʔdek

The reconstruction of the PHl form for *head hair* (39a) is very tentative. PHl *C-[ɳ] is reconstructed based on Bouhin and Ha Em forms which indicate *hn and Moyfaw and Baisha forms which indicate *ɾ—they may not be cognate. If this reconstruction is correct, however, the lenition of intervocalic *ɳ to *r in PT may be postulated. If cognate with the PTai form, the PHl word *stinger* (39b) represents a rare coalescence of a nasal and alveolar lateral. The case of *moon* (39c) is problematic, in that it must assume a shift in Pre-Hlai from *ʎ to *ɲ; the two forms may not be cognate. If the two words for *child* (39d) are cognate, either an irregular lenition must be assumed in Hlai or an irregular fortition in Tai.

Finally, there is one comparison which is probably irregular due to borrowing from Chinese occurring at different times (see OC *[N-kə.]rʕanʔ for the rhotic in PST):

(40)	*Gloss*	*MC*	*PHl*	*PTai*	*PNT*	*PST*
	lazy	懶 *lanʔ	*C-la:nʔ	—	—	*gra:n^{C}

4.1.4.3 *m-l Clusters

This series of PHl laterals participates in an extremely heterogeneous group of correspondences with PTai, and it appears that in at least some cases the PHl labial nasal may be secondary. The PWKT reconstructions below are extremely tentative:

(41)

		Gloss	PWKT	PHl	PTai	PNT	PST
	(a)	swim ~ float	*[m-]lwə:j	*m-li:	—	—	*lo:j
	(b)	termite	*m-lu[ə]k	*m-lu:k	*plu[ə]k	*pluk	*pluək
	(c)	near	*-lɯ:ʔ	*m-lɯ:ʔ	*klaɰʔ	*klaɰ^{C}	*klaɰ^{C}

In the (41a), the original nasal was not retained in PTai, if it indeed existed in PWKT. In the case of (41b), it appears that a tight cluster formed in Pre-Tai, giving rise to an excrescent stop which devoiced by the time of PTai (*ml > *mbl > *bl > *pl). Finally, in the case of (41c), it appears as though there is an original root *-lɯ:ʔ which was prefixed independently in each of the two branches of PWKT.

4.1.5 *Rhotics*

Comparison with Proto-Tai shows that Proto-Hlai retains evidence for two series of rhotics at the retroflex and uvular places of articulation, respectively. In some cases it can also be shown that the PWKT retroflex lateral *ɭ lenited to *r when part of a tight cluster. PWKT *ʀ appears to have merged with *hr by the time of Proto-Hlai unless the latter followed schwa, in which case it developed in the same way as *Cəʔg. This is the same thing that happened in the North Sarawak language Ida'an Begak, where Proto-Malayo-Polynesian *ʀ merged with reflexes of *ɢ following schwa (for the reinterpretation of traditional PAn *g as *ɢ see Norquest & Downey (2013)):

(42)

		Gloss	PMP	PNS	Ida'an Begak
	(a)	gong	*əɢuŋ	—	gkuŋ
		rattan sp.	*səɢa	—	səgko
		gulp, drink	*təɢuk	—	təgkuk
	(b)	heavy	*bəʀəqat	*bəʀat	bəgkat
		rustle, rustling	*dəʀəs	—	rəgkos
		core of tree	*təʀas	*təʀas	təgkas

The correspondences for PHl rhotics are given below:

(43)

		PWKT	PHl	PTai	PNT	PST
	(a)	*r	*hr	*r	*r	*r
		*k-ɭ	*hr	*kɭ	*kr	*kl
		*Cəʀ	*k	*[K-]ʀ	*hr	*[K-]ʀ

The development of the rhotic phonemes (including medial *ɭ) from PWKT to PHl is shown below

(44)	*PWKT*		*Pre-Hlai*		*Proto-Hlai*
	*r	>	*r	>	*hr
	*C-ɭ	>	*C-r	>	*C-r
	*ʀ	>	*r	>	*hr
	*Cəʀ	>	*Cəʔg	>	*k

Examples of rhotics are given in (45). Initial retroflex rhotics are shown in (45a), rhotics which are part of clusters in (45b), rhotics derived from retroflex laterals in (45c), and uvular rhotics in (45d):

(45)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	house	*rwa:n	*hrɯ:n	*rwa:n	*ra:n	*rɯən
		we (incl)	*ru:	*hru:	*raw	*raw	*raw
		banyan	*ri:	*hri:	*raj	*raj	*raj
		bran	*rəm	*hrom	*ram	*ram	*ram
		know	*Curə:[ʔ]	*Cuhrɯ:	*rwo:ʔ	*ro:^{C}	*ru:^{C}
	(b)	taro	*pira:k	*hra:k	*prɯək	*prɯək	*p^{h}rɯək
		spicy hot	*p-ret	*hrit	—	—	*p^{h}ret
		ask	*c-ra:m	*hra:m	*cra:m	*cra:m	*t^{h}a:m
	(c)	head/ hairknot	*kuɭəwʔ	*Cuhrəwʔ	*kɭawʔ	*kraw^{C}	*klaw^{C}
	(d)	laugh	*qiʀa:w	*hrja:w	*qʀ[ɯəw]	*hriəw	*q^{h}ʀuə

Examples of uvular rhotics preceded by schwa are given below:

(46)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	road	*Cəʀo[:]n	*ku:n	*ʀon	*hron	*hon
	yawn	*təʀa:w	*ka:w	*tʀa:w	*hra:w	*C-ʀa:w
	jar ~ steamer	*qəʀəj	*kəj	*qʀaj	*hraj	*q^{h}ʀaj
	machete	*ɟ-məʀa:ʔ	*ka:ʔ	*ɟmra:ʔ	*ɟra:ʔ	*bra:ʔ

There are two examples of PWKT clusters where the uvular liquid was lost in Hlai:

(47)

Gloss	PWKT	PHl	PTai	PNT	PST
dove	*k-ʀu:	*kʰu:	*kʀaw	*hraw	*kʰʀaw
ribs	*k-ʀa:ŋʔ	*kʰa:ŋʔ	—	—	*kʰʀa:ŋ^{C}

In several other cases, a high front vowel or glide appears to have conditioned an irregular shift in Pre-Hlai from retroflex and uvular liquids to various alveolar segments; not all of the following examples may be valid, and the PWKT forms are tentative, but there are enough examples to suggest a pattern:

(48)

Gloss	PWKT	PHl	PTai	PNT	PST
blighted grain	*k-ɭe:p	*hli:p	*k-ɭe:p	*ɭe[:]p	*kle:p
centipede	*k-re[:]p	*ɾi:p	—	—	*kʰrep
sieve	*kiʀəŋ	*hljoŋ	*kʀɰaŋ	*hraŋ	*kʰʀɯŋ
mushroom	*Cuʀet	*ɗit	*ʀwet	*hret	*hrwet

4.1.6 *Glides*

There is only one Proto-Hlai word with a glide that has a potential cognate in Proto-Tai, and the correspondence is irregular:

(49)

Gloss	PWKT	PHl	PTai	PNT	PST
village	*Cə[ʔb/w]a:n[ʔ]	*C-wa:n	*ʔba:nʔ	*ʔba:n^{C}	*ʔba:n^{C}

It is unclear whether this should be reconstructed to the level of PWKT—if so, it presupposes either an irregular lenition in PHl or an irregular fortition in PTai.

4.1.7 *Interim Summary*

Through the comparison of PHl with PTai, it is possible to reconstruct a general first approximation of the PWKT initials. There is evidence that the PWKT prosodic word inventory was essentially the same as that posited for Pre-Hlai and Proto-Hlai, consisting of both monosyllabic and sesquisyllabic words. The number of exceptional examples to otherwise general correspondence sets indicates that the evolution of initials in the various branches of PWKT has not always been similar, nor has it been without variation both between and within the daughter languages. The system of PWKT initials which has been reconstructed in this section is shown below (expected but unattested phonemes are placed in brackets):

(50) *PWKT Initial Consonants*

*p	*t	*ʈ	[*c]	*k	*q	*ʔ
*b	*d		*ɟ	[*g]	*ɢ	
*f	*s		*ç	*x		
*v	*z			*ɣ		
*m	*n		*ɲ	*ŋ(w)		
	*l	*r			*ʀ	
[*w]			[*j]			
*m̥	*n̥		[*ɲ̊]	*ŋ̊(w)		
	*l̥					
[*w̥]			[*j̊]			

PWKT Medial Consonants

		*C-ʈ			*C-q	*C-ʔ
*C-b	*C-d	*C-ɖ	*C-ɟ	*C-g	*C-ɢ	
*C-f					*C-χ	
*C-m	*C-n	*C-ɲ	*C-ɲ	*C-ŋ		
	*C-l	*C-ɭ				
		*C-r			*C-ʀ	
[*C-w]						
*C^{V}-m	*C^{V}-n	[*C^{V}-ɲ]	*C^{V}-ɲ	*C^{V}-ŋ		
		*C^{V}-l	[*C^{V}-ɭ]			
[*C^{V}-w]						

It is evident that the position of a consonant in a prosodic word has determined its evolution from PWKT to PHl. This is most glaring in the case of obstruents, but the same is also true of sonorants, the latter being particularly permeable to vocalic transfer within sesquisyllabic words. The specific Pre-Hlai changes which have been shown in the initials in this section will be discussed in section 4.3.

The PWKT initial inventory itself is on balance more typologically normative than Hlai, primarily because it has plain obstruents and sonorants in word-initial position where PHl has aspirated obstruents and preaspirated sonorants. It has one more place feature (uvular), but nothing that is typologically irregular.

The gaps which exist in word-initial position are not unusual. There is no evidence for retroflex voiced oral or nasal stops, a retroflex or uvular fricative series or a voiced palatal fricative; these are less common places of articulation where gaps are more likely to occur. Glides are also missing, but this may be an artifact of the comparative data since initial glides have a fairly low frequency in both Proto-Hlai and Proto-Tai. The gaps in medial position include most voiceless stops and fricatives, and glides are conspicuously absent here as well.

4.2 The Pre-Hlai Rimes

This section is divided into three subsections. The first compares and discusses the PWKT tone categories. The second section is devoted to the open rimes, and the final section focuses on the closed rimes.

4.2.1 *Tone Categories*

The correspondences between PHl and PTai tone categories are generally straightforward:

(51)

PHl	*PT*
A	A
B	B
C	C
D	D

Pending more in-depth tonal reconstruction, the PTai tone categories B and C are reconstructed here merely as *-h and *-ʔ respectively. Based on the PHl evidence presented in chapter 3, the PWKT tone categories can tentatively be reconstructed as the following:

(52)

Tone	*PWKT*	*PHl*	*PTai*
A	*∅	*∅	*∅
B	*-ɦ	*-ɦ	*-h
C	*-ʔ	*-ʔ	*-ʔ
D	*-ʔ͡C	*-ʔ͡C	*-C

This tentative reconstruction must await full validation until the reconstruction of the Proto-Tai tone system. Tone category letters will continue to be used with PNT and PST forms.

Although correspondences are largely regular, there are some exceptions. There are some cases in which PHl tone A corresponds with PTai tone B or C and vice versa, possibly implying that the glottal feature was lost in one branch before it could participate in tonogenesis, while it was retained in the other branch:

(53)

	Gloss	PWKT	PHl	PTai	PNT	PST
(a)	cradle	*ʔu:[ɦ]	*ʔu:	*ʔu:h	*ʔu:^{B}	*ʔu:^{B}
	piece, lump	*to[:]n[ɦ]	*t^{h}un	—	—	*to:n^{B}
	stay, live at	*C-ɟu:[ɦ]	*hjəw	*ʔju:h	*ʔju:^{B}	*ʔju:^{B}
(b)	paddy	*na:[ɦ]	*hna:ɦ	*na:	*na:	*na:
	cat	*C^{V}-me:w[ɦ]	*C-mi:wɦ	*me:w	*me:w	*me:w
	forget	*C^{V}-lɯ:m[ɦ]	*C-lɯ:mɦ	*lɯ:m	*lum	*lɯ:m
(c)	know	*Curə:[ʔ]	*Cuhrɯ:	*rwo:ʔ	*ro:^{C}	*ru:^{C}
	grow up	*C-ma:[ʔ]	*C-ma:	*m̥a:ʔ	*m̥a:^{C}	*m̥a:^{C}
	thread	*C[əʔ]da:j[ʔ]	*ɗə:j	*C-da:jʔ	*C-da:j^{C}	*ʔda:j^{C}
	mute	*C^{V}-ŋwəm[ʔ]	*C-ŋom	*ŋwamʔ	*ŋwam^{C}	*ŋwam^{C}
	village	*Cə[ʔb/w]a:n[ʔ]	*C-wa:n	*ʔba:nʔ	*ʔba:n^{C}	*ʔba:n^{C}
(d)	foam ~ bubble	*vo:ŋ[ʔ]	*f^{h}u:ŋʔ	—	—	*vo:ŋ
	orange ~ red	*C[əʔ]dje:ŋ[ʔ]	*ɗe:ŋʔ	*C-dje:ŋ	*C-di:ŋ	*ʔde:ŋ
	black	*C[əʔ]dəm[ʔ]	*ɗəmʔ	*C-dam	*C-dam	*ʔdam

In other cases, PHl has tone B while PTai has tone C and vice versa. These cases are more difficult to explain, and at least some of them may indicate cases of parallel borrowing from another language family. Another possibility is that they are chance look-alikes which are not ultimately cognate:

(54)

	Gloss	PWKT	PHl	PT	PNT	PST
(a)	stove	*su:[ʔ/ɦ]	*s^{h}u:ʔ	—	*sawh	—
	pat. grandfather	*pɰəw[ʔ/h]	*p^{h}u:ʔ	*pɰawh	*paw^{B}	*pu:^{B}
	mother	*me:[ʔ/ɦ]	*hmi:ʔ	*me:h	*me:^{B}	*me:^{B}
	fork (road)	*C^{V}-ŋa:[ʔ/ɦ]	*C-ŋa:ʔ	—	—	*ŋa:^{B}
	beard	*mɯ[:]m[ʔ/ɦ]	*hmɯ:mʔ	*mumh	*mum^{B}	*mum^{B}
	hole ~ crack	*ɟo:ŋ[ʔ/ɦ]	*tɕ^{h}u:ŋʔ	*ɟo:ŋh	*ɟo:ŋ^{B}	*ɟo:ŋ^{B}
	widow	*m̥a:j[ʔ/ɦ]	*hmə:jʔ	*m̥a:j[h/ʔ]	*m̥a:j^{B}	*m̥a:j^{C}
(b)	this	*C-ni:[ɦ/ʔ]	*C-ni:ɦ	*n̥i:ʔ	*n̥i:^{C}	*n̥i:^{C}
	open (mouth)	*Cuʔa:[ɦ/ʔ]	*Cuʔa:ɦ	*ʔa:ʔ	*ʔa:^{C}	*ʔa:^{C}
	younger sib	*C^{V}-nuoŋ[ɦ/ʔ]	*C-n[o/u]ŋɦ	*nuoŋʔ	*nuəŋʔ	*no:ŋʔ
	step across	*C-χa:m[ɦ/ʔ]	*ɦa:mɦ	*xa:mʔ	*ha:m^{C}	*xa:m^{C}

4.2.2 *Open Rimes*

Although correspondences between PHl and PTai low open rimes *a: are relatively straightforward, there is a high degree of variation in the high open rimes between pure vowels and diphthongs. These two categories will therefore be treated separately.

4.2.2.1 High Open Rimes

There are three sets of correspondences which occur between PHl high open rimes and PTai:

(55)		*PWKT*	*PHl*	PTai	*PNT*	*PST*
	(a)	*i:	*i:	*aj	*aj	*aj
		*ɯ:	*ɯ:	*aɰ	*aɰ	*aɰ
		*u:	*u:	*aw	*aw	*aw
	(b)	*i:	*i:	*i:	*i:	*i:
		*ɯ:	*ɯ:	*ɯ:	*ɯ:	*ɯ:
		*u:	*u:	*u:	*u:	*u:
	(c)	*ɰi:	*i:	*ɰi:	*i:	*aj
		*ɰɯ:	*ɯ:	*ɰɯ:	*ɯ:	*aɰ
		*ɰəw	*u:	*ɰəw	*aw	*u:

(55a) appears to be the most common and regular correspondence set, in which the high open vowels diphthongized at the level of Proto-Tai. (55b) is more restricted, and includes examples of PT forms in which high vowels did not undergo this regular diphthongization; this category includes two function words (*this* and *1st person*) which actually show variation in the Tai daughter languages between pure and diphthongized forms. (55c) is also a restricted category in which diphthongization occurred in one branch of Tai but not the other; coarticulations are tentatively reconstructed on the preceding initial to account for this variation. Examples are given below in (56–58):

(56)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	snail	*çi:	*tç^{h}i:	—	*saj	—
		cry	*t-ŋi:ʔ	*C-ŋi:ʔ	*t-hajʔ	*taj^{C}	*haj^{C}
		banyan	*ri:	*hri:	*raj	*raj	*raj
	(b)	below	*tɯ:ʔ	*t^{h}ɯ:ʔ	*taɰʔ	*taɰ^{C}	*taɰ^{C}
		leaf	*Cəʔbɯ:	*ɓɯ:	*ʔbaɰ	*ʔbaɰ	*ʔbaɰ
		you	*C^{V}-mɯ:	*C-mɯ:	—	—	*maɰ
		near	*-lɯ:ʔ	*m-lɯ:ʔ	*klaɰʔ	*klaɰ^{C}	*klaɰ^{C}

(c)	turtle	*tu:ɦ	*tʰu:ɦ	*tawh	*tawh	*tawh
	headlouse	*Cuʈu:	*Cuʈʂʰu:	*traw	*hraw	*tʰraw
	stove	*su:[ʔ/ɦ]	*sʰu:ʔ	—	*sawh	—
	we (incl)	*ru:	*hru:	*raw	*raw	*raw
	dove	*k-ʀu:	*kʰu:	*kʀaw	*hraw	*kʰʀaw

(57)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	this	*C-ni:[ɦ/ʔ]	*C-ni:ɦ	*n̥i:ʔ	*n̥i:^{C}	*n̥i:^{C}
(b)	navel	*Cəʔbuɖɯ:	*Cuɾɯ:	*ʔblɯ:	*ʔblɯ:	*ʔblɯ:
	hand	*C^{V}umɯ:	*C-mɯ:	*mwɯ:	*mwɯ:	*mɯ:
	to shoot	*ɲɯ:	*hɲɯ:	—	—	*ɲɯ:
(c)	1st person	*[a]gu:	*ɦu:	*ku:	*ku:	*ku:
	cradle	*ʔu:[ɦ]	*ʔu:	*ʔu:h	*ʔu:^{B}	*ʔu:^{B}

(58)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	dirty sweat	*ɢlɰi:	*kʰi:	*ɢlɰi:	*ɣi:	*ɢlaj
	fire	*vɰi:	*fʰi:	*vɰi:	*vi:	*vaj
(b)	dry	*xɰɯ:ɦ	*kʰɯ:ɦ	*xɰɯ:h	*hɯ:^{B}	*xaɰ^{B}
(c)	pat. grandfather	*pɰə[ʔ/h]	*pʰu:ʔ	*pɰawh	*paw^{B}	*pu:^{B}

There are two examples in which it appears an original PWKT sequence of glide-vowel was reinterpreted in PHl as a diphthong:

(59) *Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
drunk	*mwi:	*hmuj	—	*mwi:	—
mouse	*n̥ju:	*hniw	*n̥u:	*n̥u:	*n̥u:

Finally, there are a handful of more complex comparisons shown below in (60):

(60)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	mother	*me:[ʔ/ɦ]	*hmi:ʔ	*me:h	*me:^{B}	*me:^{B}
(b)	swim ~ float	*[m-]lwə:j	*m-li:	—	—	*lo:j
(c)	know	*Curə:[ʔ]	*Cuhrɯ:	*rwo:ʔ	*ro:^{C}	*ru:^{C}

(d)	return	*mɯə	*hmɯ:	—	—	*mɯə
	above	*n̥ɯə	*hnɯ:	—	—	*n̥ɯə
(e)	mos. yngr bro	*n[r]a:ʔ	*hnɯ:ʔ	*na:ʔ	*na:ʔ	*na:ʔ
	sesame	*ŋra:	*hŋɯ:	*ŋra:	*ŋra:	*ŋa:

With the exception of (60b), these all appear to be regular based on other comparisons with closed rimes. PWKT mid vowels were normally raised to high vowels by the time of Proto-Hlai, the PWKT dipthongs *iə, *ɯə and *uə monophthongized in PHl to *i:, *ɯ:, and *u: respectively, and *ə: and *a: backed to *ɤ: when following *r and then raised again along with the other peripheral mid vowels. These developments are shown below:

(60)	*PWKT*		*Pre-Hlai*		*Proto-Hlai*
	*e:	>	*e:	>	*i:
	*wə:j	>	*we:	>	*i:
	*ɯə	>	*ɯə	>	*ɯ:
	*rə:	>	*ɤ:	>	*ɯ:
	*ra:	>	*ɤ:	>	*ɯ:

4.2.2.2 Low Open Rimes

Correspondences between PHl and PTai low open rimes are generally straightforward:

(61)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	eye	*p-ʈa:	*ʈʂha:	*p-tra:	*p-ta:	*p-tʰra:
		open (mouth)	*Cuʔa:[ɦ/ʔ]	*Cuʔa:ɦ	*ʔa:ʔ	*ʔa:^{C}	*ʔa:^{C}
		leg	*f-qa:	*ɦa:	*f-qa:	*f-ka:	*xa:
		shoulder	*C-ba:ɦ	*ʋa:ɦ	*C-ba:h	*C-ba:^{B}	*ʔba:^{B}
		thatch grass	*Ciga:	*Ciɦa:	*ɣa:	*ɣa:	*ɣa:
		overflow	*Cəʔba:ɦ	*ɓa:ɦ	—	—	*ʔba:^{B}
		cloud	*va:ʔ	*fʰa:ʔ	—	—	*va:^{C}
		paddy	*na:[ɦ]	*hna:ɦ	*na:	*na:	*na:
		dog	*m̥a:	*hma:	*m̥a:	*m̥a:	*m̥a:
		fish	*p-la:	*hla:	*pla:	*pla:	*pla:
		grow up	*C-ma:[ʔ]	*C-ma:	*m̥a:ʔ	*m̥a:^{C}	*m̥a:^{C}
		thick	*C-na:	*C-na:	*n̥a:	*n̥a:	*n̥a:
		fork (road)	*C^{V}-ŋa:[ʔ/ɦ]	*C-ŋa:ʔ	—	—	*ŋa:^{B}
		machete	*ɟ-məʀa:ʔ	*ka:ʔ	*ɟmra:ʔ	*ɟra:ʔ	*bra:ʔ

Complications only occurred when the PTai rime was preceded by a high glide (normally resulting from a presyllable vowel leading to vocalic transfer across the medial consonant). In these cases, the glide and low vowel coalesced into a high-mid dipththong in either PNT (62a) or at the level of PTai (62 b–c):

(62)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	cloud	*fja:ʔ	*f^{h}a:ʔ	*fja:ʔ	*fɯə^{C}	*fa:^{C}
		medicine	*C-ɟa:	*hja:	*ʔja:	*ʔjɯə	*ʔja:
	(b)	remainder	*Cila:	*hlja:	*l̥ɯə	*l̥ɯə	*l̥ɯə
	(c)	boat	*Cuɖa:	*Cuɾa:	*C-ɖuə	*C-ɖuə	*C-ɖɯə

There is one more irregular form in which the Tai rime is presumed to be irregular:

(63)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	which	*Cəʔɖ[a:]	*ɾa:	—	—	*ʔdaɰ

4.2.3 *Closed Rimes*

In the case of the closed rimes, the one overarching question which can be asked is: what is the origin of the length distinction in rimes? When the PHl data is compared with PT, there is a general tendency (albeit with several exceptions) for vowel length to correlate. One possibility is that there may have been an inherited feature which existed in, and was inherited from, PWKT, that led to, but which was not itself, a length distinction. The most obvious candidate is stress, the presence of which is often typologically and phonetically associated with long rimes (see for example Hayes (1995)), and the absence of which is associated with short rimes. Since it has been argued in the first half of this chapter that Pre-Hlai (and by inference its predecessor) possessed an inventory which included at the very least bisyllabic words, a stress distinction would have been possible (but would have necessarily preceded the shift to strict iambic rhythm). The other possibility is that the length distinction was already present in Proto-Western Kam-Tai, was inherited in the daughter languages, and discrepancies which exist in length are due to secondary changes which occurred after the break-up of Western Kam-Tai into its daughter branches.

Given the available data, the first solution is the more economical one. Taking the item *raw* (67a below) as an example, the difference in vowel length between PHl and PTai can be projected as variation in stress between *Cudíp (> PHl *Cuɾi:p) and *Cúdip (> PTai *C-dip). However, since this solution is rather tentative at present, the length discrepancies between PHl and PTai will merely be noted for now.

Comparisons in this section are not subdivided according to the rime coda as was done in chapter three, as there are not enough examples to justify this approach. The rime categories are instead grouped together by nucleus only.

4.2.3.1 High Front Rimes

The correspondences for this category are given below:

(64)

PWKT	*PHl*	*PTai*	*PNT*	*PST*
*i:C	*i:C	*i:C	*i:C	*i:C
*iəC	*i:C	*iəC	*iəC	*iəC
*e:C	*i:C	*e:C	*e:C	*e:C
*iC	*iC	*iC	*iC	*iC
*eC	*iC	*eC	*eC	*eC

The first major change which has occurred in this rime category has been the merger in Hlai of the PWKT high and mid rimes, due to the raising of the latter category. The second is the monophthongization of the diphthong *iə:

(65)

PWKT		*Pre-Hlai*		*Proto-Hlai*
*i:C	>	*i:C	>	*i:C
*iəC	>	*iəC	>	*i:C
*e:C	>	*i:C	>	*i:C
*iC	>	*iC	>	*iC
*eC	>	*iC	>	*iC

This raises the question of why there still exist *e:C rimes in PHl (no short *eC rimes are reconstructed). This question will be treated in section 4.2.6.

Examples of PWKT long high and mid front rimes and diphthongs are given below:

(66)

	Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	take, carry	*ʈi:wʔ	*ʈʂʰi:wʔ	*tri:wʔ	*hri:w^{C}	*tʰri:w^{C}
	tongue	*li:nʔ	*hli:nʔ	*li:nʔ	*li:n^{C}	*li:n^{C}
	stone	*ʈi:l	*tçʰi:n	*tri:l	*hri:l	*tʰri:n
	wing	*pi:k	*pʰi:k	—	—	*pi:k

(b)	green	*xe:w	*kʰi:w	*xe:w	*he:w	*xe:w
	cat	*C^{V}-me:w[ɦ]	*C-mi:wɦ	*me:w	*me:w	*me:w
	arm	*qe:n	*kʰi:n	*qe:n	*ke:n	*xe:n
	blighted grain	*k-ɭe:p	*hli:p	*k-ɭe:p	*ɭe[:]p	*kle:p
	carry (shoulder)	*Cəʔbe:k	*ɓi:k	—	—	*ʔbe:k
(c)	sickle	*C^{V}-liəm	*C-li:m	*liəm	*liəm	*liəm
	pull ~ stretch	*C-ɟiət	*hji:t	*ʔ[j]iət	*ʔiət	*ʔjiət

The following forms do not correspond in vowel length in one or more branches. The PST forms in (67b) also indicate a mid vowel; note however that in both cases retroflex initials are involved which may have conditioned vowel lowering:

(67)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	raw	*Cudi[:]p	*Cuɾi:p	*C-dip	*C-dip	*ʔdip
	(b)	fingernail	*Ciɭe[:]p	*C-li:p	*ɭje:p	*ɭi:p	*lep
		centipede	*k-re[:]p	*ɾi:p	—	—	*kʰrep

Examples of PWKT short high and mid front rimes are given below:

(68)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	taste	*ɟim	*tçʰim	*ɟim	*ɟim	*ɟim
		fly	*Cəʔbil	*ɓin	*ʔbil	*ʔbil	*ʔbin
		leech	*piliŋ	*hljiŋ	*pliŋ	*pliŋ	*pliŋ
		firefly	*C-ɭip	*C-lip	—	*ɭip	—
	(b)	spicy hot	*p-ret	*hrit	—	—	*pʰret
		mushroom	*C[u]ʀet	*ɗit	*ʀwet	*hret	*hrwet
		child	*C-[d/l]ek	*C-lik	—	—	*ʔdek

The following forms are problematic in both vowel length and height, and the reconstruction of the PWKT reconstruction must therefore remain tentative:

(69)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	wasp	*mite[:]l	*tʰin	*m-tje:l	*di:l	*p-te:n
	lightning	*mile[:]p	*hljip	—	—	*m-le:p

4.2.3.2 High Back Unrounded Rimes

There are no good examples of short rimes in this category. Correspondences are given below (note that the only two examples of *ə:C in PTai have been colored by a preceding *u):

(70)

PWKT	*PHl*	*PTai*	*PNT*	*PST*
*ɯ:C	*ɯ:C	*ɯ:C	*ɯ:C	*ɯ:C
*ɯəC	*ɯ:C	*ɯəC	*ɯəC	*ɯəC
*uCə:C	*ɯ:C	*wə:C	*o:C	*u:C

The changes which occurred between PWKT and PHl are the following:

(71)

PWKT		*Pre-Hlai*		*Proto-Hlai*
*ɯ:C	>	*ɯ:C	>	*ɯ:C
*ɯəC	>	*ɯəC	>	*ɯ:C
*ə:C	>	*ɤ:C	>	*ɯ:C

Examples are given below:

(72)

	Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	forget	*C^{V}-lɯ:m[ɦ]	*C-lɯ:mɦ	*lɯ:m	*lum	*lɯ:m
	shallow	*tɯ:nʔ	*tʰɯ[:]nʔ	—	—	*tɯ:n^{C}
	child	*lɯ:k	*hlɯ:k	*lɯ:k	*lɯk	*lu:k
(b)	weave ~ loom	*Cuʈə:k	*Cuʈʂʰɯ:k	*trwə:k	*hro:k	*tʰru:k
	bone	*Cudə:k	*Cuɾɯ:k	*C-dwə:k	*C-do:k	*ʔdu:k

There are two cases in which the length between PHl and PTai rimes disagrees:

(73)

Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
beard	*mɯ[:]m[ʔ/ɦ]	*hmɯ:mʔ	*mumh	*mum^{B}	*mum^{B}
handspan	*Cugɯ[:]p	*Cuɦɯp	*ɣɯ:p	*ɣɯ:p	*ɣɯ:p

There are two instances in which centralization of PWKT low rimes has been conditioned by a retroflex initial (*a:C > *ɤ:C), after which the Hlai nuclei underwent regular raising:

(74)

Gloss	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
house	*rwa:n	*hrɯ:n	*rwa:n	*ra:n	*rɯən
bamboo shoot	*C-ɳa:ŋ	*C-nɯ:ŋ	—	*ɳa:ŋ	—

Incidentally, some Middle Chinese loans in PHl imply that the rime *ɯ:C is derived in at least some cases from a form with an original sequence *jaC. Compare the below PHl forms with the Middle Chinese forms (Baxter & Sagart 2014) from which they are probably borrowed:

(75)	*Gloss*	*PHl*	*MC*
	sword	*kɯ:mɦ	*kjæmh
	release	*pʰɯ:ŋʔ	*pjaŋh
	ginger	*kʰɯ:ŋ	*kjaŋ
	two (a pair)	*C-lɯ:ŋɦ	*ljaŋʔ
	measure (rice)	*C-lɯ:ŋʔ	*ljaŋh

This presumes a similar situation with *ja: sequences in PT, where the original sequence *jaC first coalesced to *ɯəC in Pre-Hlai, and then underwent the regular shift to *ɯ:C by the time of Proto-Hlai (note a similar development in the Sino-Vietnamese words gươm [ɣɰɤm A1] 'sword', gừng [ɣɯŋ A2] 'ginger', and lường [lɰɤŋ A2] 'measure').

4.2.3.3 High Back Rounded Rimes

In general, the correspondences in this rime category mirror those of the high front rimes:

(76)	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	*u:C	*u:C	*u:C	*u:C	*u:C
	*uəC	*u:C	*uəC	*uəC	*uəC
	*o:C	*u:C	*o:C	*o:C	*o:C
	*uC	*uC	*uC	*uC	*uC
	*wɯC	*uC	*wɯC	*wɯC	*wəC
	*oC	*uC	*oC	*oC	*oC

As with the high front rimes, there was a merger of the PWKT mid back rimes with the high back rimes in Hlai, due to the raising of the mid back vowels to high back vowels; the diphthongs *uəC and *wɯC also monophthongized to *u:C and *uC respectively:

(77)	*PWKT*		*Pre-Hlai*		*Proto-Hlai*
	*u:C	>	*u:C	>	*u:C
	*uəC	>	*uəC	>	*u:C
	*o:C	>	*u:C	>	*u:C
	*uC	>	*uC	>	*uC
	*wɯC	>	*wɯC	>	*uC
	*oC	>	*uC	>	*uC

Examples of PWKT long high and mid back rounded rimes and diphthongs are given below. In (78a) it is assumed that unrounding in PT was conditioned by the palatal initial:

(78)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	stand	*Cəʔɟu:n	*tçu:n	*[ʔj]ɯ:n	(*ʔdɯn)	*ʔjɯ:n
	(b)	hole ~ crack	*ɟo:ŋ[ʔ/ɦ]	*tçʰu:ŋʔ	*ɟo:ŋh	*ɟo:ŋ^{B}	*ɟo:ŋ^{B}
		wart	*so:[c/t]	*sʰu:c	—	—	*so:t
		foam ~ bubble	*vo:ŋ[ʔ]	*fʰu:ŋʔ	—	—	*vo:ŋ
	(c)	termite	*m-lu[ə]k	*m-lu:k	*plu[ə]k	*pluk	*pluək

The following forms do not correspond in vowel length:

(79)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	mosquito	*C^{V}-ɲu[:]ŋ	*C-ɲu:ŋ	*ɲuŋ	*ɲuŋ	*ɲuŋ
	(b)	tree (clsfr)	*to[:]nʔ	*tʰu:nʔ	—	—	*ton^{C}
		fart	*k-to[:]c	*tʰu:[t/c]	*k-toc	*hroc	*toc
		road	*CəʀO[:]n	*ku:n	*ʀon	*hron	*hon

The PNT and PST rimes in the following two examples do not correspond in height, and the PWKT reconstruction must remain tentative:

(80)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	grey hair	*ŋ̊wə:k	*hŋu:k	*ŋ̊wə:k	*hu:k	*ŋ̊o:k
	marrow	*ʔwə:k	*ʔu:k	*ʔwə:k	*ʔu:k	*ʔo:k

Examples of PWKT short high and mid back rounded rimes and the diphthong *wɯC are given below:

(81)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	to dig	*Cigut	*Ciɦut	—	*ɣut	—
		turbid	*Cəʔgunɦ	*kunɦ	—	—	*xun^{B}
		bamboo basket	*Cəʔbuŋ	*ɓuŋ	—	—	*ʔbuŋ
	(b)	ant	*moc	*hmuc	*moc	*moc	*moc

(c)	bear	*C-mwɯj	*C-muj	*m̥wɯj	*m̥ɯəj	*m̥i:
	person	*ɢwɯn	*kʰun	*ɢwɯn	*ɣwɯn	*gwən
	rain	*C-fwɯn	*fʱun	*C-fwɯn	*C-fwɯn	*fwən
	body hair	*puqwɯl	*Cuɦun	*p-qwɯl	*pwɯl	*xon

There are three cases in which the length between PHl and PTai disagree; in (82b) it is the PHl form which is irregular:

(82)		*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	(a)	piece, lump	*to[:]n[ɦ]	*tʰun	—	—	*to:n^{B}
		teach	*so[:]l	*sʰun	*so:l	*so:l	*so:n
	(b)	big	*C^{V}-luəŋ	*C-luŋ	—	—	*l̥uəŋ

4.2.3.4 Front Mid Rimes

PHl *e:C rimes are exceptions to the rule that all front mid vowels raised to front high vowels in Pre-Hlai, which presents a conundrum. There are in fact only eight robust examples of PHl long front mid rimes, only one of them having a PT cognate:

(83)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
	orange ~ red	*C[əʔ]dje:ŋ[ʔ]	*ɗe:ŋʔ	*C-dje:ŋ	*C-di:ŋ	*ʔde:ŋ

Some of these may ultimately be loans from Chinese, which entered Pre-Hlai after peripheral vowel raising and main-syllable aspiration:

(84)	*Gloss*	*PHl*	*MC*		*OC*
	flat	*ɓe:nɦ	*penʔ	<	扁 *pˤe[r]ʔ
	board	*ɓe:nɦ	*pænʔ	<	板 *C.pˤranʔ
	press under arm	*ɦe:p	*kɛp	<	夾 *kˤ[r]ep
	pile (clfr)	*C-le:p	*dep	<	疊 *lˤ[i]p
	bed	*tʰ[e]:ŋɦ	*ɖʐjaŋ	<	床 *k.dzraŋ

One other item which may be a loan from Proto-Vietic:

(85)	*Gloss*	*PHl*	*Proto-Vietic*
	elder brother	*ʔ[e]:ŋʔ	*ʔɛ:ŋʔ

These likely originated in a small group of *ɛ:C rimes in Pre-Hlai, which were raised to *e:C after the original *e:C rimes were raised to *i:C. This hypothesis is not incompatible with the hypothesis of these words being of foreign origin, and is therefore adopted here.

4.2.3.5 Mid Central Rimes

The reflexes of the mid central rimes are for the most part straightforward. In general, the long and short rimes have merged completely in PTai due to the shortening of the former.

Examples of the long mid central rimes are as follows:

(86)

	Gloss	PWKT	PHl	PTai	PNT	PST
(a)	fruit ~ testicles	*ʈə:m	*ʈʂʰə:m	*tram	*hram	*tʰram
	lie face down	*Nuχə:m	*Cuɦə:m	*N-xwamʔ	*hŋwamʔ	*xwamʔ
	smoke	*Cuɢə:n	*Cuɦə:n	*ɢwan	*ɣwan	*ɢwan
	field dike	*Cigə:l	*Ciɦə:n	*ɣal	*ɣal	*ɣan
	cry, to crow	*Ciχə:l	*Ciɦə:n	*xal	*hal	*xan
	skin	*C-nə:ŋ	*C-nə:ŋ	*n̥aŋ	*n̥aŋ	*n̥aŋ
	flea	*m̥ə:t	*hmə:t	*m̥at	*m̥at	*m̥at
	wash clothes	*zə:k	*sʰə:k	*zak	*zak	*zak
(b)	bitter	*N-qɰəm	*ɦə:m	*N-qɰam	*ɣam	*N-qom
	deep	*lɰək	*hlə:k	*lɰak	*lak	*lɯk

Instead of the expected *a:j, it is actually PHl *ə:j which corresponds with PTai *a:j and suggests that the nucleus of PWKT *a:j raised in Hlai, particularly in tone category A (with the exception of apparent loanwords); this seems plausible in light of the fact that there is no long PHl *ə:w reconstructed for PHl:

(87)

Gloss	PWKT	PHl	PTai	PNT	PST
widow	*m̥a:j[h/ʔ]	*hmə:jʔ	*m̥a:j[h/ʔ]	*m̥a:jᴮ	*m̥a:jᶜ
many	*l̥a:j	*hlə:j	*l̥a:j	*l̥a:j	*l̥a:j
spittle	*m-la:j	*hlə:j	*m-la:j	*mla:j	*m-la:j
thread	*C[əʔ]da:j[ʔ]	*ɗə:j	*C-da:jʔ	*C-da:jᶜ	*ʔda:jᶜ

There is only one other potential PTai cognate with a PHl form in *ə:j. The expected PHl correspondence of PTai *e: would be *i:, but it's possible the preceding uvular rhotic influenced it's development. It is also possible that this is an early loan from Old Chinese, borrowed independently in each branch.

(88)

Gloss	OC	PHl	PTai	PNT	PST
cast-net	羅 *rˤaj	*hrə:jʔ	*qʀe:	*hre:	*qʰʀe:

There is one other example of a PHl mid vowel rime corresponding to a PTai low vowel rime. If cognate, it can be postulated that the original low vowel was raised in Pre-Hlai under the influence of the preceding rhotic, but to *əː instead of *ɤː:

(89)

Gloss	PWKT	*PHl*	*PTai*	PNT	PST
deceive ~ cheat	*braːŋ	*pʰəːŋ	*braːŋ	*braːŋ	*braːŋ

Examples of the short mid central rimes are given below:

(90)

Gloss	PWKT	*PHl*	*PTai*	PNT	PST
autonym	*[l]əj	*hləj	*daj	*daj	*daj
far	*k-ləj	*C-ləj	*klaj	*klaj	*klaj
stinger	*m-ləj	*C-nəj	*m-laj	*laj	*m-laj
jar ~ steamer	*qəʀəj	*kəj	*qʀaj	*hraj	*qʰʀaj
horn	*r-qəw	*ɦəw	*r-qaw	*kaw	*r-xaw
head/hairknot	*kuɭəwʔ	*Cuhrəwʔ	*kɭawʔ	*kraw^C	*klaw^C
old	*kəwɦ	*kʰəwɦ	*kawh	*kaw^B	*kaw^B
bruised	*ɟəmʔ	*tçʰəmʔ	*ɟamʔ	*ɟam^C	*ɟam^C
black	*C[ə]dəm[ʔ]	*ɗəmʔ	*C-dam	*C-dam	*ʔdam
water	*C-ɳəmʔ	*C-nəmʔ	*ɳamʔ	*ɳam^C	nam^C
dream	*fən	*fʰən	—	—	*fan
tooth	*vjən	*fʰjən	*van	*van	*van
seed	*N-fən	*fʰən	*N-fan	*fan	*van
silver	*ŋjən	*hŋən	*ŋjan	*ŋjan	*ŋɤn
day	*ŋjwən	*hŋwən	*ŋjwan	*ŋjwan	*ŋwan
yam	*C^V-mən	*C-mən	*man	*man	*man
face ~ nose	*Cəʔdəŋ	*ɗəŋ	*ʔdaŋ	*ʔdaŋ	*ʔdaŋ
extinguish	*Cəʔ[d/ɟ]əp	*tçəp	*ʔdap	*ʔdap	*ʔdap

There are two sets of exceptions in this class as well. The first (91a) are probably original pure high vowels which have diphthongized irregularly in Hlai. The second (91b) have irregular high or front vowels in PTai or its daughters, all of which can tentatively be explained by postulating a preceding or final palatal consonant.

(91)		*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	(a)	gall bladder	*Cəʔbəʔdi:	*ɗəj	*ʔbli:	*ʔbli:	*ʔbli:
		stay, live at	*C-ɟu:[ɦ]	*hjəw	*ʔju:h	*ʔju:h	*ʔju:h
		you (pl)	*su:	*sʰəw	*su:	*su:	*su:
		pig	*m̥u:	*hməw	*m̥u:	*m̥u:	*m̥u:
	(b)	sew	*C^{V}-ɲəp	*C-ɲəp	*ɲjep	*ɲip	*ɲep
		eat ~ feed (n.)	*kəɲ	*kʰən	*kɯɲ	*kɯn	*kin
		louse (body)	*m-d[əʎ]	*tʰən	*mlel	*mlel	*mlen

In the case of *drum*, the rime can't be reconstructed, possibly because both PHl and PTai have borrowed this item independently from Mon-Khmer:

(92)	*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	drum	*k-l-	*C-ləŋ	*klo:ŋ	*klo:ŋ	*klo:ŋ

4.2.3.6 Mid Back Rimes

PHl *oC generally corresponds with PTai *o[:]C and *wə[:]C. Examples are given below:

(93)		*Gloss*	PWKT	*PHl*	*PTai*	PNT	PST
	(a)	head hair	*p-[ɻ]om	*C-[ɻ]om	*prom	*prom	*pʰrom
		winnow basket	*Cəʔdoŋʔ	*ɗoŋʔ	*ʔdoŋʔ	*ʔdoŋ^{C}	*ʔdoŋ^{C}
		fall, drop	*tok	*tʰok	*tok	*tok	*tok
	(b)	thing	*Cəʔgo[:]ŋ	*koŋ	*xo:ŋ	*xo:ŋ	*xo:ŋ
		in cupped hands	*ko[:]p	*kʰop	—	—	*ko:p
	(c)	itch	*ɣwəm	*kʰom	*ɣwəm	*ɣum	*ɣom
	(d)	dye	*ɲwə[:]mʔ	*hɲomʔ	*hɲwə:mʔ	*ɲum^{C}	*ɲo:m^{C}

The next most common correspondence with PHl *oC is PTai *aC. In some cases, the the PHl vowel may have been colored by a preceding retroflex or uvular consonant:

(94)

	Gloss	PWKT	PHl	PTai	PNT	PST
(a)	dive	*Cəʔ[d/ɟ][ə]m	*tçom	—	—	*ʔdam
	mute	*C^V-ŋwəm[ʔ]	*C-ŋom	*ŋwamʔ	*ŋwam^C	*ŋwam^C
	bran	*rəm	*hrom	*ram	*ram	*ram
	steal	*Ciɭək	*hljok	*ɭak	*ɭak	*lak
(b)	sieve	*kiʀəŋ	*hljoŋ	*kʀɰaŋ	*hraŋ	*kʰʀɯŋ

There are two exceptions to the correspondence sets above:

(95)

	Gloss	PWKT	PHl	PTai	PNT	PST
(a)	younger sib	*C^V-nuoŋ[ɦ/ʔ]	*C-n[o/u]ŋɦ	*nuoŋʔ	*nuəŋʔ	*no:ŋʔ
(b)	carry in arms	*ʔ[u]mʔ	*ʔomʔ	*ʔumʔ	*ʔumʔ	*ʔumʔ

4.2.3.7 Low Rimes

There are two primary kinds of correspondences between PHl *a:C and PTai rimes: those with and without the complications of vocalic transfer from preceding high front vowels (or in a couple of cases influence from a palatal initial or final consonant). These series are given below:

(96)

PWKT	PHl	PTai	PNT	PST
*a:C	*a:C	*a:C	*a:C	*a:C
*a:C	*a:C	*ɯəC	*ɯəC	*ɯəC

The first series is by far the most numerous, and is uncomplicated. The second series can be reconstructed as sesquisyllabic forms which had an initial high vowel that conditioned vocalic transfer and ultimate raising of the final vowel in PTai. Examples are given below:

(97)

	Gloss	PWKT	PHl	PTai	PNT	PST
(a)	fishy	*ɢra:w	*kʰa:w	*ɢra:w	*ɣa:w	*ɢra:w
	granary	*C-ɟa:wʔ	*hja:wʔ	*ʔja:wʔ	*ʔjiəwʔ	*ʔja:wʔ
	star	*Cəʔɗa:w	*ɾa:w	*ʔɗa:w	*ʔɗa:w	*ʔda:w
	white	*xa:w	*kʰa:w	*xa:w	*ha:w	*xa:w
	yawn	*təʀa:w	*ka:w	*tʀa:w	*hra:w	*C-ʀa:w
	step across	*C-χa:m[ɦ/ʔ]	*ɦa:mɦ	*xa:mʔ	*ha:m^C	*xa:m^C
	ask	*c-ra:m	*hra:m	*cra:m	*cra:m	*tʰa:m
	saddle	*ʔa:n	*ʔa:n	*ʔa:n	*ʔa:n	*ʔa:n
	goose	*C-ŋa:nɦ	*C-ŋa:nɦ	*ha:nh	*ha:n^B	*ha:n^B
	village	*Cə[ʔb/w]a:n[ʔ]	*C-wa:n	*ʔba:nʔ	*ʔba:n^C	*ʔba:n^C

	basin	*ʔa:ŋɦ	*ʔa:ŋɦ	*ʔa:ŋh	*ʔa:ŋ^{B}	*ʔa:ŋ^{B}
	chin	*C-ɢa:ŋ	*ɦa:ŋ	*ɢa:ŋ	*ɣa:ŋ	*ga:ŋ
	ribs	*k-ʀa:ŋʔ	*kʰa:ŋʔ	—	—	*kʰʀa:ŋ^{C}
	carry (shoulder)	*ʈa:p	*ʈʂʰa:p	*tra:p	*hra:p	*tʰra:p
	bathe	*ʔa:p	*ʔa:p	*ʔa:p	*ʔa:p	*ʔa:p
	land leech	*N-ta:k	*tʰa:k	*N-ta:k	*[t/d]a:k	*da:k
	pestle ~ pound	*ça:k	*tçʰa:k	*sa:k	*sa:k	*sa:k
	otter	*na:k	*hna:k	*na:k	*na:k	*na:k
	flesh (fruit)	*C-ma:k	*C-ma:k	*m̥a:k	*m̥a:k	*m̥a:k
(b)	laugh	*qiʀa:w	*hrja:w	*qʀ[ɯəw]	*hriəw	*qʰʀuə
	moon	*Cəʔb-ʎa:n	*C-ɲa:n	*ʔblɯən	*ʔblɯən	*ʔblɯən
	yellow	*Cila:ŋ	*hlja:ŋ	—	—	*l̥ɯəŋ
	blood	*la:c	*hla:c	*lɯət	*lɯət	*lɯət
	gill	*Ciŋa:k	*C-ŋa:k	*ŋ̊ɯək	*ŋ̊ɯək	*ŋ̊ɯək
	gadfly	*Cila:k	*hlja:k	*l̥ɯək	*l̥ɯək	*l̥ɯək
	taro	*pira:k	*hra:k	*prɯək	*prɯək	*pʰrɯək

The centralization of the PTai nucleus in the items *moon* and *blood* may not be due to vocalic transfer, but rather to influence from an initial palatal (*moon*) or final palatal (*blood*).

There are two exceptional forms:

(98)	*Gloss*	*PWKT*	*PHl*	*PTai*	*PNT*	*PST*
(a)	millet	*ɧa:ŋʔ	*fʱa:ŋʔ	*ɧa:ŋʔ	*fɯəŋ^{C}	*fa:ŋ^{C}
(b)	excrement	*N-qɰəjʔ	*ɦa:jʔ	*N-qɰajʔ	*ɣajʔ	*N-qi:ʔ

In the case of *millet*, the palatal coarticulation of the initial has led to centralization only in PNT. In *excrement*, the expected PHl reflex is *ə:j, but this may have lowered under the influence of the preceding uvular initial.

4.2.3.8 Interim Summary

The comparison of PHl rimes with those of PTai, as in the case of the initials, uncovers a core group of regular correspondences as well as a smaller but significant group of exceptions. This includes the tone categories, which generally match up regularly, but occasionally include mismatches between branches.

The tentative inventory of PWKT rimes, reconstructed here, which developed into the PHl rimes is the following:

(99) *Open rimes*

*iː	*ɯː	*uː
(*eː)	*əː	
	*aː	
	*ɯə	

Closed rimes

*iːC	*ɯːC	*uːC
*iC	*ɯC	*uC
*eːC	*əːC	*oːC
*eC	*əC	*oC
*ɛːC	*aːC	
*iəC	*ɯəC	*uəC

The most significant finding in this section is that the PWKT mid vowels underwent raising in Pre-Hlai, merging with their high counterparts by the time of Proto-Hlai. It has also been hypothesized that some PHl peripheral mid vowels reflect original low vowels which raised to mid vowels, filling the gap left by the original mid vowels.

The reconstruction of the PWKT rime inventory ultimately reveals an eight-vowel system, with three levels of height and backness, the diphthongs *iə, *ɯə, and *uə, and a length distinction. The *ɛːC category is still marginal, and if ignored leaves a more balanced seven-vowel system.

4.3 Changes between Pre-Hlai and Proto-Hlai

The goal of this section is to move through the various changes which occurred after PWKT in Pre-Hlai, leading ultimately to the inventory of initials and rimes reconstructible for Proto-Hlai. For every different change, the motivation for and mechanisms by which the change may have taken place are described if possible; consequences of the change are stated; and typologically relevant example from other languages are also provided.

4.3.1 *Elimation of Uvulars*

At some point in Pre-Hlai, uvular became defunct as a place of articulation. Evidence was presented above, based on the PTai evidence, for the presence of the following categories in PWKT: *q, *C-q, *ɢ, *C-ɢ, *C-χ, and *Cəʀ. The members of this category all initially merged with the velar series (systemic realignment), with the intervocalic velars later undergoing the normal change to glottal fricatives:

(100)

PWKT						*Proto-Hlai*
q	>	q	>	k	>	kʰ
ɢ	>	q	>	k	>	kʰ
C-q	>	C-ɢ	>	C-ɣ	>	ɦ
C-ɢ	>	C-ɢ	>	C-ɣ	>	ɦ
C-χ	>	C-ʁ	>	C-ɣ	>	ɦ
Cəʀ	>	Cəg	>	Cəʔg	>	k

Examples are given below:

(101)

		PWKT		*Pre-Hlai*		*Proto-Hlai*
(a)	arm	*qe:n	>	*ki:n	>	*kʰi:n
(b)	person	*ɢwɯn	>	*kwɯn	>	*kʰun
(c)	thigh	*f-qa:	>	*C-ɣa:	>	*ɦa:
(d)	chin	*C-ɢa:ŋ	>	*C-ɣa:ŋ	>	*ɦa:ŋ
(e)	to cry, crow	*Ciχə:l	>	*Ciɣə:l	>	*Ciɦə:l
(f)	yawn	*təʀa:w	>	*Cəʔga:w	>	*ka:w

4.3.2 *Intervocalic Lenition*

It was shown in section 4.1 that Pre-Hlai medial voiced stops underwent a process of intervocalic lenition following non-schwa vowels, distinguishing them further from the preglottalized voiced stops which had already developed after schwa in PWKT. This intervocalic lenition can be seen as a reduction in the magnitude and/or increase in the sonority of intervocalic gestures, so that voiced stops became approximants:[9]

(102)

CVbV	>	CVʋV
CVdV	>	CVɾV
CVɖV	>	CVɾV
CVɟV	>	CVjV
CVgV	>	CVɦV

9 This lenition was originally suggested in Ostapirat (2004).

This is an archetypical example of temporal compression, resulting in a diminuition of duration of intervocalic consonants:

(103)
```
       φ
      / |
    [ς  σ́μμ]
    /| /\
   [CvCV]
      ↑
Site of temporal compression
```

Lavoie (1999) argues that this kind of lenition can be seen primarily as a reduction in timing, where a shorter voiceless stop may be perceived as a voiced stop, and a shorter voiced stop may be perceived as an approximant. The consonants most vulnerable to lenition are those which occupy the onset position of the second syllable of a bisyllabic foot. It is important to note that her findings do not predict there to be a lenition from voiced stop to approximant through the intermediate stage of a fricative, but rather directly from one to the other.

Another typological parallel of this change is provided in Ferlus (1982), which describes intervocalic lenition in Vietnamese similar to that posited here for Pre-Hlai. In Vietnamese, intervocalic stops (both voiced and voiceless) were lenited to fricatives and approximants, some of which went on to merge with other phonemes. The schema which Ferlus outlines is the following (which I have modified by reversing the order he suggests for intervocalic voicing and lenition, avoiding spirantization of intervocalic voiceless stops):

(104)

Proto-VN		*Voicing*		*Lenition*		*Modern VN*[10]
-p/b-	>	-b-	>	-β-	>	v
-t/d-	>	-d-	>	-ð-	>	z <d>
-s/ç-	>	-z-	>	-r-	>	z <r>
-tʃ/dʒ-	>	-dʒ-	>	-ʝ-	>	z <gi>
-c/ɟ-	>	-ɟ-	>	-ʝ-	>	z <gi>
-k/g-	>	-g-	>	-ɣ-	>	ɣ <g(h)>

The Pre-Hlai lenition erased the class of plain intervocalic voiced obstruents, and added a new series of approximants into the Hlai phoneme inventory which was allophonic (at this point) in word-medial position. At the same

10 The convention is followed here of placing orthography within angled brackets.

time, anterior preglottalized voiced stops became implosives while the posterior ones deglottalized and devoiced. Examples are given below:

(105)			*Pre-Hlai*				*Proto-Hlai*
	(a)	shoulder	*C-ba:ɦ	>	*C-ʋa:ɦ	>	*ʋa:ɦ
		hang	*C-di:ŋʔ	>	*C-ɾi:ŋʔ	>	*ɾi:ŋʔ
		boat	*Cuɖa:	>	*Cuɾa:	>	*Cuɾa:
		medicine	*C-ɟa:	>	*C-ja:	>	*hja:
		thatch grass	*Ciga:	>	*Ciɣa:	>	*Ciɦa:
	(b)	fly	*Cəʔbil	>	*ʔbin	>	*ɓin
		face	*Cəʔdəŋ	>	*ʔdəŋ	>	*ɗəŋ
		stand	*Cəʔɟu:n	>	*ɟu:n	>	*tɕu:n
		slant	*Cəʔge:ŋ	>	*gi:ŋ	>	*ki:ŋ

4.3.3 *Vocalic Transfer*

As discussed in chapter two and section 4.2 above, another byproduct of temporal compression was the reinterpretation of the features of the high vowels *i* and *u*, if they were in the first syllable of a sesquisyllabic word, as coarticulations of the certain onsets of the second syllable (see also Ostapirat (2004)). In chapter 2, it was shown that this occurred following the breakup of PHl in the Central Hlai retroflex affricate (*ʈʂʰ) velar nasal (*ŋ), coronal approximants (*ɾ, *hr), and glottals (*ɦ, *ʔ). There were also a group of initials reconstructed in PHl which already hosted palatal coarticulations:

(108)	*fʰj	*ɾj
	*hlj	*hrj

As discussed above, these are also cases of vocalic transfer. It appears as though vocalic transfer was first favored in the case of *i preceding the coronal liquids *l, *ɾ, and *r, and therefore occurred early. There is only one secure instance of *fʰj (from Pre-Hlai *vj), so it seems that this was an exceptional case, probably due to the fact that *v was an obstruent (more sonorous consonants are generally weaker barriers to vocalic transfer than less sonorous consonants):

(109)	Civ	>	Cĭvj	Ciɾ	>	Cĭɾj
	Cil	>	Cĭlj	Cir	>	Cĭrj

The asymmetry between the lengths of the two syllables in sesquisyllabic forms may have played a role in this change as well. In the examples below, the boundary between the two vowels of a word is shown in (110a), a full bisyllabic word where the medial consonant acts as a clearly defined boundary, and in (110b), the sesquisyllabic equivalent, where there is bleedthrough as the vowel space remains roughly proportionate in overall timing, despite the imbalance in syllable length:

(110)	(a)	Cilaŋ	>	(b)	Cĭljá:ŋ
		[V | V]			[V | V]

There are two typological parallels which can be cited as examples of intersyllabic vocalic transfer. The first is Proto-Paman, the roots of which were normally bisyllabic trochees, with contrastive vowel length in the first syllable (Smith (1997)). In several North Paman languages, including Awŋt̪im, stress shift occurred and the final syllable became stressed. In words with a short initial syllable, the initial consonant was lost and features of the vowel were transferred into the remaining syllable (111a). In words with a long initial syllable, the same phenomenon occurred, but a vestigial schwa remained at the beginning of the word (111b).

(111)	(a)	*Gloss*	*Proto-Paman*	>	*Awŋt̪im*
		mother's mother	*kámi		máj
		skin	*Cákur		káwɣ
		arm	*pínta		nɖjá:
		3sg obl.	*ɲíŋu		ŋjú:
		sun	*púŋa		ŋwá:
		tooth	*múlir		lwíð
	(b)	*Gloss*	*Proto-Paman*	>	*Awŋt̪im*[11]
		what	*ŋá:ni		ənáj
		armpit	*ŋá:mur		əmáwɣ
		south	*jí:par		əβét (< əβját)
		smoke	*Cí:puj		əβør (< əβjúr)
		father's father	*pú:la		əlwá:
		two	*kú:ʈi-		əðwít̪

The second example is of the Oceanic languages Rotuman and Kwara'ae (see Blevins & Garrett 1998, Heinz 2005, Norquest 2001, 2003), both of which have a register[12] distinction where in the conservative (citation) register, syllables are

11 Notice the lenition of Awŋt̪im intervocalic stops, similar to that posited for Hlai.

12 Register here is used in the sociolinguistic sense, not the phonological sense discussed in other parts of this book.

of the shape CV, but in the innovative (discourse) register, there is a metathesis of C_2 and V_2 within the foot. This is essentially the mirror-image of the vocalic transfer which is postulated for Hlai and shown in Awŋt̪im above, and is correlated with stress: trochaic in the case of Rotuman and Kwara'ae, as opposed to iambic in Hlai and Awŋt̪im. Note also that this case involves a shift from the syllable (separated by periods in the examples below) to the foot as the primary domain of timing and stress:

(112)

	Rotuman			*Kwara'ae*	
Gloss	*Citation*	*Discourse*	*Gloss*	*Citation*	*Discourse*
floor	pu.pú.i	pu.púi	to climb	a.bú.i	a.búi
erroneous	se.sé.va	se.séav	to bail	da.lú.ma	da.lúəm
people	fa.mo.ri	fa.mør	seaweed	a.lá.ge	a.lǽ:ŋg
zealous	fe.ʔé.ni	fe.ʔén	their name	sa.tá.da	sa.tá:nd

It is significant that in the data of both Blevins & Garrett (1998) and Heinz (2005), words in the Kwara'ae discourse register show optional voiceless vowels following certain consonants in their corresponding position in the citation register:

(113) *Kwara'ae* (Blevins & Garrett 1998: 530; Heinz 2004: 29)

	Citation	*Discourse*		*Citation*	*Discourse*
cat	fúsi	húisi̥	fear	máʔu	máŭʔu̥
thin	kádo	káodo̥	wife	ʔáfe	ʔáĕhe̥
name	sáta	sá:tḁ	to burst	búsu	bú:su̥

This indicates the historical process by which this metathesis occurred involved an original articulation of V_2 on both sides of C_2, with later devoicing and loss of the latter half of V_2 altogether. The corresponding situation in Hlai may have been similar, occurring on the opposite edge of the word:

(114)

	Pre-Hlai				Proto-Hlai
tooth	*CiC	>	*Ci̥Cj	>	*Cj

The consequences of this change are that high vowel information from the presyllable became associated with the main syllable initial and was therefore preserved within the domain of the main syllable. This complicated the medial consonant inventory by creating a new class of palatalized medial consonants. Examples are given below:

(115)

		Pre-Hlai				*Proto-Hlai*
(a)	tooth	*Civən	>	*Ci̥vjən	>	*fʰjən
(b)	lift	*Cidɯnɦ	>	*Ci̥ɾjɯnɦ	>	*ɾjɯnɦ
(c)	yellow	*Cila:ŋ	>	*Ci̥lja:ŋ	>	*hlja:ŋ
(d)	permeate	*Cirəp	>	*Ci̥rjəp	>	*hrjəp

4.3.4 *Initial Obstruent Devoicing*

The first instance of devoicing occurred in Pre-Hlai, affecting initial obstruents in both monosyllabic (106a–b) and sesquisyllabic words (106c-d—*H- represents an initial fricative in a sesquisyllabic form). The cumulative list of devoiced initials from section 4.2 is given below. There is no direct evidence for (106d) as mergers in PHl and PTai would have obscured it as an independent category, but it is listed below as a logical possibility:

(106)

(a)	*b	>	*p	(b)	*v	>	*f
	*d	>	*t		*z	>	*s
	*ɟ	>	*c				
	*g	>	*k		*ɣ	>	*x
(c)	*C$^{\mathrm{V}}$-C	>	*C-C	(d)	*H$^{\mathrm{V}}$-C	>	*H-C

There is little evidence in PTai for voiced stops in Pre-Hlai. Some of the few examples which exist are given below:

(107)

		Pre-Hlai				*Proto-Hlai*
(a)	cheat	*bra:ŋ	>	*pɚ:ŋ	>	*pʰə:ŋ
	land leech	*da:k	>	*ta:k	>	*tʰa:k
	hole	*ɟo:ŋʔ	>	*cu:ŋʔ	>	*tɕʰu:ŋʔ
(b)	sky	*va:ʔ	>	*fa:ʔ	>	*fʰa:ʔ
	wash clothes	*zə:k	>	*sə:k	>	*sʰə:k
	itch	*ɣom	>	*xom	>	*kʰom
(c)	yam	*C$^{\mathrm{V}}$-mən	>	*C-mən	>	*C-mən
	sew	*C$^{\mathrm{V}}$-ɲəp	>	*C-ɲəp	>	*C-ɲəp
	sickle	*C$^{\mathrm{V}}$-liəm	>	*C-li:m	>	*C-li:m

4.3.5 *Main-Syllable Aspiration*

The hypothesis presented above in section 4.2 is that the more exotic aspects of the PHl consonant inventory were shaped by an increasing differentiation between the series of initial and medial consonants. More specifically, this differentiation occurred via a form of fortition of consonants which involved increased airflow at the left edge of the main syllable, leading to the aspiration of all initial consonants that were not phonetically exempt. In monosyllabic words, this included all initials except the glottal stop. In sesquisyllabic words, this included all main-syllable initials which were not voiced (i.e., all preglottalized voiced stops and sonorants were excluded except for *hr, which may have been redundantly aspirated), again with the exception of the glottal stop.

There is no evidence that this change affected presyllable initials. It can therefore be stated that aspiration occurred only at the left edge of the main syllable (and was therefore correlated with stress, if this had become fixed at the right edge of the prosodic word by this stage of Pre-Hlai). The general rule for main-syllable aspiration in monosyllabic words is given in (116a); that for sesquisyllabic words is given in (116b):

(116)	(a)	[(CV́:)] ↑ Target	(b)	[(Cv̆)(CV́:)] ↑ ↑ Exempt Target (if voiceless and not glottal stop)

The Pre-Hlai initial consonants which were affected by this change are listed below:

(117)	(a)	Obstruents			(b)	Sonorants		
		p	>	p^h		m	>	hm
		t	>	t^h		n	>	hn
		ʈ	>	ʈ^h		ɲ	>	hɲ
		c	>	c^h		ŋ	>	hŋ
		k	>	k^h		ŋw	>	hŋw
		f	>	f^h		l	>	hl
		s	>	s^h		lj	>	hlj
		ç	>	ç^h		r	>	hr
		x	>	x^h		rj	>	hrj
						j	>	hj
						w	>	hw

In light of the above discussion, the following description of Loloish (a branch of Tibeto-Burman) languages from Bradley (1978) is relevant:

> One interesting phenomenon in Maru and several other Burmish languages is the existence of aspirated, glottalized, and voiced stops in all positions of articulation. *The glottalized stops are the reflexes of certain *prefixed Proto-BL forms, while the aspirated stops are the reflexes of*

*unprefixed *voiceless stops*. This contrast is not found in Burmese dialects, which have merged the two manners of articulation to voiceless aspirated, as in 'standard' Burmese. [emphasis added]

Here, then, is an example in the Loloish family where there is a contrast between 'plain' initials which exhibit allophonic aspiration, and a glottalized set of initials, which is the result of original presyllables.

The most important change this effected was to modify the initial inventory of monosyllabic words. Examples are given below:

(118)

		Pre-Hlai		*Proto-Hlai*
(a)	wing	*pi:k	>	*p^{h}i:k
	fall	*tok	>	*t^{h}ok
	headlouse	*Cuʈu:	>	*Cuʈʂ^{h}u:
	(to) wedge	*ci:m	>	*tç^{h}i:m
	chicken	*kəj	>	*k^{h}əj
	millet	*fa:ŋʔ	>	*f^{h}a:ŋʔ
	lips	*sunʔ	>	*s^{h}unʔ
	snail	*çi:	>	*tç^{h}i:
	white	*xe:w	>	*k^{h}i:w
(b)	return/come	*mɯə	>	*hmɯ:
	field	*na:ɦ	>	*hna:ɦ
	shoot~bow	*ɲɯ:	>	*hɲɯ:
	silver	*ŋən	>	*hŋən
	day	*ŋwən	>	*hŋwən
	tongue	*li:nʔ	>	*hli:nʔ
	lightning	*ljip	>	*hljip
	head	*Curəwʔ	>	*Cuhrəwʔ
	sweep	*rjik	>	*hrjik
	sheep	*ja:ŋ	>	*hja:ŋ
	bail water	*wi:t	>	*hwi:t

4.3.6 *Monosyllabification and Voiced Obstruent Devoicing*

Monosyllabification seems to have occurred in stages, with the loss of presyllables occurring early before the least sonorant medials, and later before more sonorant medials; with the exception of the initials which became implosives (119a), the remaining voiced medial obstruents deglottalized and devoiced upon becoming initial (119b):

(119)	(a)	Cəʔb	>	ɓ	(b)	Cəʔɟ	>	ɟ	>	c
		Cəʔd	>	ɗ		Cəʔg	>	g	>	k

Examples are given below:

(120)	*Pre-Hlai*				*Proto-Hlai*
overflow	*Cəʔba:ɦ	>	*ɓa:ɦ	>	*ɓa:ɦ
gall bladder	*Cəʔdəj	>	*ɗəj	>	*ɗəj
tread	*Cəʔɟə:mɦ	>	*ɟə:mɦ	>	*tçə:mɦ
turbid	*Cəʔgunɦ	>	*gunɦ	>	*kunɦ

The medial nasals and laterals still retained an unambiguous initial voiceless segment at the time of PHl, as indicated by their inclusion in the class of high register initials described in chapter two:[13]

(121)			
	C-m	>	C-m
	C-n	>	C-n
	C-ɲ	>	C-ɲ
	C-ŋ	>	C-ŋ
	Cuŋ	>	Cuŋ
	C-l	>	C-l
	C-w	>	C-w

Although there are only a subset of approximants and glottals which can be directly reconstructed with initial presyllables at the stage of Proto-Hlai (see chapter two), the systemic evidence and the development of Pre-Hlai posited here imply that all sonorants must have been able to support presyllables at the stage of PHl, even though direct evidence for them is not available in the reflexes of the modern languages. Those for which direct evidence for presyllables exists are the following:

(122)			
	Cuɾ	>	Cuɾ
	Cuhr	>	Cuhr
	Ciɦ	>	Ciɦ
	Cuɦ	>	Cuɦ
	Ciʔ	>	Ciʔ
	Cuʔ	>	Cuʔ

13 Where phonotactically possible, sonorants may have preserved an initial glottal stop as a vestige of the original presyllable initial, so that what is reconstructed in PHl as *C-m may have actually been *ʔm; I see no way to distinguish one possibility from another, so the former reconstruction is used.

The initials for which evidence of a former presyllable is structural and ultimately indirect are the following:

(123)	*Pre-Hlai*		*Proto-Hlai*
	C-ʋ	>	ʋ
	C-ɾ	>	ɾ
	Ciɾj	>	ɾj
	Cirj	>	rj
	C-j	>	hj
	C-ɦ	>	ɦ

Since there is no direct evidence from the Hlai daughter languages supporting the reconstruction of the presyllable in words with these initials, these are reconstructed without presyllables in Proto-Hlai.

The motivation for this change involved the continuous phonetic weakening of the presyllable in sesquisyllabic forms, due to temporal compression acting on the foot and the ensuing gestural overlap. A likely path of change is the devoicing of all minor syllable nuclei concomitant with extreme shortening. When the first and second consonants of the foot came into contact, place information from the first consonant could easily become unrecoverable through lack of a sufficient burst, leading to complete loss in pre-obstruent position (124a) and possibly to debuccalization in pre-sonorant position (124b):

(124)	(a)	Cə̆ʔgá:	>	gá:
	(b)	Cə̆lá:	>	ʔlá:

Two typological examples, in which monosyllabification occurred in a way similar to that posited here for Hlai, are shown below. As mentioned previously, Proto-Chamic stress was iambic, and roots were typically bisyllabic (Thurgood 1999). When speakers of what became the language Tsat moved from mainland Southeast Asia to Hainan, there was pressure from language contact to reduce the bisyllabic lexicon to monosyllabic forms. When it was possible phonotactically for the first and second consonant of a word to form a cluster (a stop plus a liquid, the latter then leniting to a palatal glide), then the initial consonant was preserved (125a). If no cluster was phonotactically possible, then the initial consonant was lost entirely (125b). The first of the two vowels was lost in every instance. (Tsat also developed tone, in conformity with the language area into which it became integrated):

(125) Reduction of bisyllabic forms to monosyllabic forms in Tsat

	Gloss	*P-Chamic*	>	*Tsat*
(a)	shoulder	*bará:		p^{h}ja:^{1}
	moon	*bulá:n		p^{h}ja:n^{1}
	blood	*daráh		sja:^{5}
	village	*palə́j		pjaj^{3}

	Gloss	*P-Chamic*	>	*Tsat*
(b)	wet; damp	*basáh		sa:^{5}
	flower	*buŋá:		ŋa:^{1}
	thick	*kapá:l		pa:n^{1}
	bamboo shoot	*rabúŋ		p^{h}uŋ^{1}

A Mon-Khmer example is the language Nhaheun, which descends from sesquisyllabic West Bahnaric (Sidwell 2000), but has undergone monosyllabification, with intervocalic lenition also occurring in some environments:

(126)	*Gloss*	*P-W. Bahnaric*	>	*Nhaheun*
	termite	*kəntiár		tían
	skirt	*kədá:ŋ		tá:ŋ
	son-in-law	*pəsá:w		sá:w
	mortar	*təʔpál		dwáw
	crab	*kəʔtá:m		grá:m
	onion	*kəʔdiám		gríam
	stone	*təmɔ́:		nwɔ́:
	right side	*cəmá:		^{m}má:

4.3.7 *Stop and Fricative Affrication*

Toward the end of the Pre-Hlai period, but before Proto-Hlai, the retroflex and palatal obstruents underwent affrication:

(127)			
	ʈ^{h}	>	ʈʂ^{h}
	c^{h}	>	tç^{h}
	c	>	tç

At some point after initial obstruent devoicing, the dorsal fricatives underwent affrication and merged with their affricate or stop counterparts:

(128)	çʰ	>	tçʰ
	xʰ	>	kʰ

Examples are given below:

(129)			*Pre-Hlai*				*Proto-Hlai*
	(a)	head louse	*Cuʈu:	>	*Cuʈʰu:	>	*Cuʈʂʰu:
		taste	*ɟim	>	*cʰim	>	*tçʰim
		stand	*CəʔɟuːN	>	*ɟu:n	>	*tçu:n
	(b)	pestle	*ça:k	>	*çʰa:k	>	*tçʰa:k
		white	*xa:w	>	*xʰa:w	>	*kʰa:w

4.3.8 *Peripheral Vowel Raising*

The most sweeping change in the Pre-Hlai rime inventory was that of the raising of the mid vowels, allowing their merger with the high vowels (130a). This stands in opposition to the central vowel series. If the hypothesis presented in section 4.2 is correct, this was part of a chain shift which allowed the low peripheral vowel to raise in turn and fill the gaps left by the original mid vowels (130b):

(130)	(a)	e(:C) > i(:C)	ɤ(:C) > ɯ(:C)	o(:C) > u(:C)
	(b)	ɛ:(C) > e:(C)		

Note that as mentioned in section 3.5.3 above, short *oC rimes with grave codas were exempted from raising.

Examples are given below:

(131)			*Pre-Hlai*		*Proto-Hlai*
	(a)	wrinkle	*C-ɲe:wʔ	>	*C-ɲi:wʔ
		small	*Cᵛ-lek	>	*C-lik
		before	*ko:nɦ	>	*kʰu:nɦ
		needle	*ŋoc	>	*hŋuc
	(b)	pile (clsfr)	*C-lɛ:p	>	*C-le:p

As noted above, this shift also included secondarily derived *ɤ: in the examples below:

		Gloss	PWKT				PHl
(132)	(a)	know	*Curə:	>	*Cuhrɤ:	>	*Cuhrɯ:
		loom	*Cuʈə:k	>	*Cuʈɤ:k	>	*Cuʈʂʰɯ:k
		bone	*Cudə:k	>	*Cudɤ:k	>	*Cuɾɯ:k
	(b)	mos. yngr bro	*n[r]a:ʔ	>	*nɤ:ʔ	>	*hnɯ:ʔ
		sesame	*ŋra:	>	*ŋɤ:	>	*hŋɯ:
		house	*rwa:n	>	*hrɤ:n	>	*hrɯ:n
		bamboo shoot	*C-ɳa:ŋ	>	*C-nɤ:ŋ	>	*C-nɯ:ŋ

4.3.9 *Monophthongization*

If the PWKT reconstructions in section 4.2 are correct, then the following mergers took place in the rime inventory via monophthongization:

(133)	*iə(C)	>	*i:(C)
	*ɯə(C)	>	*ɯ:(C)
	*uə(C)	>	*u:(C)

Examples are given below:

	Gloss	Pre-Hlai		Proto-Hlai
(134)	pull	*C-ɟiət	>	*hji:t
	above	*hnɯə	>	*hnɯ:
	termite	*m-luək	>	*m-lu:k

4.3.10 *Summary*

The goal of this section was to take the postulated PWKT initial and rime inventories as a starting point and illustrate the changes which have occurred throughout Pre-Hlai which led to the Proto-Hlai inventory. It has been shown that nine important changes occurred in Pre-Hlai. Those changes which affected the initials were the elimination of uvulars, intervocalic lenition, initial devoicing, vocalic transfer, main-syllable aspiration, monosyllabification, and fricative affrication. Those changes which affected the rimes were peripheral vowel raising and monophthongization. The collective history of these changes is one in which category deletion and creation has led to alternating contractions and expansions in the initial inventory, and a reduction in the inventory of rimes.

The first contraction of the Pre-Hlai initial inventory occurred with the elimination of uvular as a place of articulation. The medial consonant inventory was then modified through intervocalic lenition, which eliminated intervocalic voiced stops which didn't follow schwa, but added a new series of intervocalic approximants. The initial consonant inventory was reduced via the ongoing process of obstruent devoicing, where all voiced initial obstruents devoiced and merged with their voiceless counterparts. Vocalic transfer then expanded the medial consonant inventory by creating a set of consonants with secondary articulations. Stress-correlated main-syllable aspiration increased the gap between the set of initial consonants and the medial consonants. The now very asymmetrical sets of initial and medial obstruents were merged as the latter lost their presyllables in the first wave of monosyllabification, while dorsal fricative affrication removed the posterior fricatives from the fricative series, merging them with the aspirated palatal affricate and velar stop, respectively.

The set of Pre-Hlai rimes underwent a dramatic reduction as a result of peripheral vowel raising, where original peripheral mid nuclei merged with their high counterparts, and original peripheral low nuclei rose to fill their vacated positions in the vowel space. Individual monophthongizations led to the merger of *iə, *ɯə, and *uə with *iː, *ɯː and *uː respectively.

The set of changes described above explains most of the asymmetries in the PHl phoneme inventory. The skewing of the PHl fricative inventory is explained by dorsal fricative affrication, which led to the elimination of fricatives at anterior places of articulation. The presence of the palatalized labiodental fricative, lateral, tap and rhotic are the result of palatal vocalic transfer, which primarily targeted the latter three phonemes. Finally, the number of aspirated and preaspirated initials in proportion to plain initials is the result of main-syllable aspiration, which aspirated all possible word-initial consonants but had no effect on medial consonants.

There are two asymmetries which exist in the PHl rime inventory: long *eːC rimes without short *eC rimes, and short *oC rimes without long *oːC rimes. The first has not been completely explained; however, it was shown above that there is evidence suggestive of the fact that these rimes are ultimately of secondary origin.

4.4 Conclusion

The main focus of this chapter has been to compare Proto-Hlai with Proto-Tai, in view of performing a preliminary reconstruction of Proto-Western Kam-Tai.

Taking a bird's-eye view of the changes described in section 4.3, it can be generalized that there have been four main structural changes which have occurred between PWKT and PHl. Intervocalic lenition and subsequent vocalic transfer were position-dependent and served to create important asymmetries between the inventory of initial and medial consonants. Main-syllable aspiration was also position-dependent, and served to sharpen the asymmetry between the initial and medial consonants. Monosyllabification was dependent on the sonority of the medial consonant in sesquisyllabic forms, and adjusted the ratio of monosyllabic words to sesquisyllabic words sharply in favor of the former. Finally, peripheral vowel raising led to a sharp reduction in the rime inventory, the final effect of which was to decrease the number of peripheral mid vowel rimes and eliminate the inventory of peripheral low vowel rimes.

The reconstructed PWKT inventory of initials in (135) can be compared with that of PHl (136) below. There are some noticeable gaps in the inventory which are not reconstructible with the amount of evidence examined in this chapter (placed in brackets); some of these may be filled in the future with more work on Tai:

(135) *PWKT Initial Consonants*

*p	*t	*ʈ	[*c]	*k	*q	*ʔ
*b	*d		*ɟ	[*g]	*ɢ	
*f	*s		*ç	*x		
*v	*z			*ɣ		
*m	*n		*ɲ	*ŋ(w)		
	*l	*r			*ʀ	
[*w]			[*j]			
*m̥	*n̥		[*ɲ̊]	*ŋ̊(w)		
	*l̥					
[*w̥]			[*j̊]			

PWKT Medial Consonants

		*C-ʈ			*C-q	*C-ʔ
*C-b	*C-d	*C-ɖ	*C-ɟ	*C-g	*C-ɢ	
*C-f					*C-χ	
*C-m	*C-n	*C-ɲ	*C-ɲ	*C-ŋ		
	*C-l	*C-ɭ				
		*C-r			*C-ʀ	
[*C-w]						
*C^{V}-m	*C^{V}-n	[*C^{V}-ɲ]	*C^{V}-ɲ	*C^{V}-ŋ		
	*C^{V}-l	[*C^{V}-ɭ]				
[*C^{V}-w]						

(136) *PHl Initial Consonants*

*pʰ	*tʰ	*ʈʂʰ	*tɕʰ	*kʰ	
*ɓ	*ɗ		*tɕ	*k	*ʔ
*fʰ(j)	*sʰ				
					*ɦ
*hm	*hn		*hɲ	*hŋ(w)	
	*hl(j)				
*ʋ	*ɾ(j)	*hr(j)			
*hw			*hj		

PHl Medial Consonants

		*Cuʈʂʰ			*Ciʔ, *Cuʔ
					*Ciɦ, *Cuɦ
*C-m	*C-n		*C-ɲ	*C(u)ŋ	
	*C-l				
	*Cuɾ	*Cuhr			
*C-w					

The differences between the PWKT (137) and the PHl (138) rime inventories are shown below:

(137) *PWKT Open rimes*

*iː	*ɯː	*uː
(*eː)	*əː	
	*aː	
	*ɯə	

PWKT Closed rimes

*iːC	*ɯːC	*uːC
*iC	*ɯC	*uC
*eːC	*əːC	*oːC
*eC	*əC	*oC
*ɛːC	*aːC	
*iəC	*ɯəC	*uəC

(138) *PHl Open Rimes*

*iː	*ɯː	*uː
*eː		
	*aː	

PHl Closed Rimes

*iːC	*ɯːC	*uːC
*iC	*ɯC	*uC
*eːC	*əːC	
	*əC	*oC
	*aːC	

The next section will be devoted to the treatment of Jiamao, its relationship with Hlai having been a continuing challenge in Hlai comparative work. It will be shown that Jiamao has borrowed from Hlai in the Pre-Hlai, Proto-Hlai and post-Proto-Hlai periods, and data from Jiamao is therefore important in supporting the reconstructions of all periods.

CHAPTER 5

Jiamao

The Jiamao language has been recognized since the publication of Ouyang & Zheng (1983) as being somehow related to but very different from the other Hlai languages. There are at least three reasons for this. The first is that Jiamao shares less than half of its lexicon with the other Hlai languages; excluding more recent Chinese loans, this leaves a significant part of the lexicon (including some very basic vocabulary) with an unknown origin. The second is that Jiamao shows no robust pitch distinction between tone categories A, B, and C, a distinction otherwise maintained robustly by all other Hlai languages (although this distinction is reflected secondarily in Jiamao vowel length). Finally, there is a one-to-many correspondence between Proto-Hlai initials and rimes on the one hand, and Jiamao initials and rimes on the other; some of these correspondences can be shown to correlate with Pre-Hlai reflexes which pre-date PHl.

The hypothesis that Jiamao is not originally a Hlai language at all was first advanced in Thurgood (1992); it is suggested here that it is a (as of yet) language isolate which has been in long-term contact with Hlai; this hypothesis has the advantage of explaining the three facts listed above in the following way. First, the non-Hlai part of the Jiamao vocabulary which has not been borrowed from Chinese or other neighboring languages can be postulated as the oldest lexical stratum in Jiamao. Second, the distinction between the tone categories in vowel length as opposed to pitch can be understood to reflect a distinction that was salient to Hlai speakers in one way, but salient to speakers of Jiamao in another, and this is reflected as such in the Jiamao reflexes; the inconsistency in tone category representation can be related to either misperception at the time of borrowing or to changes in representation of tone category at different points in time in the Hlai donor language. Finally, the one-to-many correspondences in both initials and rimes can be explained if the assumption is made that they represent different strata of loanwords into Jiamao from two or more distinct periods of contact.

This chapter is structured in the following way. The Jiamao initials will be treated in section 5.1, with an emphasis on multiple correspondences with Proto-Hlai; these multiple correspondences will be argued to reflect a distinction between borrowing from Pre-Hlai[1] and borrowing from Proto-Hlai

1 Citing Pre-Hlai forms is problematic from the perspective of the rime, because original Pre-Hlai peripheral mid vowels can only be separated from their high counterparts using external

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or one of its immediate daughters, primarily Ha Em, Lauhut, Baoting and Zandui. The Jiamao rimes will be treated in section 5.2, beginning with a discussion of the tone categories, and then moving to the segmental component of the rimes, again showing that multiple correspondences can be explained according to the period during which the borrowing occurred. Finally, non-Hlai core lexical items will be given and discussed.

5.1 Initials

This section begins with a discussion of register, which when understood, will help to clarify the discussion of segmental initials which follows. Jiamao probably underwent registrogenesis through participation in the same language area that it shares with the Qi languages. There is a register division in all tone categories, as well as a length distinction in category D in both registers, something which only exists otherwise in Baoting (and there only in high register).

5.1.1 *Register*

The values of the tones in both high and low register as listed in Ouyang & Zheng (1983) are given below (the tone numbers which are assigned therein to designate each tone category are given in parentheses):

(1) Jiamao tone reflexes

Tone Category	*High*	*Tone*	*Low*	*Tone*
A	55	(1)	11	(4)
X	51	(5)	31	(2)
DLong	53	(9)	31	(8)
DShort	55	(7)	22	(10)

The unmarked tone category is designated as A, and the marked tone category as X. The same pitch depression associated with low register which is apparent in the registrogenetic Hlai languages is very marked in Jiamao, where all low register tones are clearly lowered versions of their high register counterparts. Jiamao register is valuable in reconstruction for the same reasons it is in the

Kra-Dai evidence; the same is true in differentiating original *iə, *ɯə and *uə. Proto-Hlai peripheral mid vowel rimes therefore can't be used in the Pre-Hlai reconstructions.

other Hlai languages, as it indicates the voicing status of initials at the time of registrogenesis, regardless of the status of their voicing in modern Jiamao.

With an understanding of Jiamao register in place, it is now possible to proceed to the Jiamao initials. These will be grouped by manner in the same way as the initials in chapters 2 and 4. Since it is argued that the influx of loans into Jiamao began at a stage before PHl, both Pre-Hlai and PHl reconstructions will be used as appropriate.

5.1.2 *Stops*

The Hlai stop correspondences with Jiamao are the following:

(2)	*Pre-Hlai*	*PHl*	*Jiamao*
	*p	*pʰ	ɓ, pʰ
	*t	*tʰ	ɗ, tʰ
	*k	*kʰ	h, kʰ

There is evidence above for two distinct layers of loans. The hypothesis presented here is that Pre-Hlai plain stops were borrowed before main-syllable aspiration occurred, possibly while some were still members of sesquisyllabic forms, and afterwards followed two distinct paths of development. The bilabial and alveolar stops underwent implosion, in keeping with the general island-wide diffusion of this sound change. The velar stop, on the other hand, underwent lenition to a fricative, and eventually debuccalized. A second round of borrowing occurred after the aspiration of the Hlai initials, and occurred at the stage of PHl or after. These were all borrowed as aspirated initials, and remained unchanged. These two layers of Hlai loanwords into Jiamao and their subsequent developments are shown below:

(3)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*p	→	p > ɓ	*t	→	t > ɗ
		↓			↓		
	PHl	*pʰ	→	pʰ	*tʰ	→	tʰ

		Hlai		*Jiamao*
	Pre-Hlai	*k	→	k > x
		↓		
	PHl	*kʰ	→	kʰ

Examples are given below. Presyllables are not shown in the Pre-Hlai forms due to lack of direct corroboratory evidence from the Hlai languages, but their presence may be hypothesized:

(4)

(a)	*Pre-Hlai*	*Jiamao*	(b)	*PHl*	*Jiamao*
slap	*piːk	ɓia^{5}	flee	*pʰiw	pʰiw^{1}
break	*pəːnʔ	ɓɯan^{1}	stick to	*pʰək	pʰak^{7}
fork (road)	*paː	ɓow^{1}	high	*pʰaːk	pʰɯː^{5}

(c)	*Pre-Hlai*	*Jiamao*	(d)	*PHl*	*Jiamao*
exit	*tɯːn	ɗaŋ^{1}	rotten	*tʰuj	tʰɯj^{5}
pot	*təw	ɗaw^{1}	solid	*tʰəːmɦ	tʰɔːm^{5}
seven	*tuː	ɗaw^{1}	to breed	*tʰaːŋ	tʰeːŋ^{1}

(e)	*Pre-Hlai*	*Jiamao*	(f)	*PHl*	*Jiamao*
old	*kəwɦ	hiːw^{1}	full	*kʰɯːm	kʰɔm^{1}
nose	*kət	hɔːt^{9}	chicken	*kʰəj	kʰaj^{1}
leg	*kok	hɔːk^{9}	ascend	*kʰaːn	kʰuən^{1}

There is one group of exceptions in the category of alveolar stops, in which palatalization occurred before an original high front vowel:

(5)

Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
sound	*tʰiːw	tsʰew^{1}	*tɕʰiw
chopsticks	*tʰiːp	tsʰep^{7}	*tɕʰip
full	*tʰiːk	tsʰia^{5}	*tɕʰiəʔ

One other exceptional correspondence occurs in this category:

(6)

Gloss	*Pre-Hlai*	*Jiamao*	*Pre-Jiamao*
louse	*tən	ten^{1}	*din

The expected Jiamao initial for this word is *ɗ*, but the actual initial and register for this word indicates *d. As shown in the last chapter, the Pre-Hlai form is descended from an original *m-d; whether or not this somehow explains the unexpected Jiamao initial is unclear.

5.1.3 *Affricates*

The reflexes of the Hlai affricates are the following:

(7)	*Pre-Hlai*	*PHl*	*Jiamao*
	*ʈ	*(Cu)ʈʂʰ	t
	*c	*tçʰ	ts, tsʰ

Jiamao, like Bouhin and Ha Em, preserves no evidence for the presyllable in *Cuʈʂʰ. There is only one extant reflex of these initials, indicating that they were either borrowed in the same way from both Pre-Hlai as well as PHl, or that what were originally two reflexes merged into a single reflex. I make the tentative assumption that Pre-Hlai *ʈ underwent affrication and aspiration after early instances of borrowing, merging later with PHl *ʈʂʰ; this affricate then shifted to a fricative *ʂ* and participated in a chain shift with *s (see below), so that *ʂ* shifted to *s*, which then participated in the regional shift of *s* to *t*. The palatal affricate, if the one example below in (9) is indicative, was borrowed as a plain affricate from Pre-Hlai; after aspiration in PHl, the aspirated affricate was borrowed as such. Both remained unchanged until the shift of palatals to alveolars:

(8)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*ʈ	→	ʈʂʰ > s > t	*c	→	c > tç > ts
		↓			↓		
	PHl	*ʈʂʰ	→	ʈʂʰ > s > t	*tçʰ	→	tçʰ > tsʰ

Examples are given below:

(9)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	repay	*ʈʂʰə:mʔ	tiam^{1}	weave (fabric)	*Cuʈʂʰɯ:k	ta:k^{9}
	sick	*ʈʂʰok	ta:k^{9}	head louse	*Cuʈʂʰu:	taw^{1}
	eye	*ʈʂʰa:	tow^{1}	below	*Cuʈʂʰəw	ta:w^{1}

	(c)	*Pre-Hlai*	*Jiamao*	(d)	*PHl*	*Jiamao*
	light (a fire)	*cujʔ	tsej^{1}	snail	*tçʰi:	tsʰaj^{1}
				hole	*tçʰu:ŋʔ	tsʰua^{1}
				wear	*tçʰət	tsʰɔ:t^{9}

There is one exceptional correspondence in this category:

(10)	*Gloss*	*PHl*	*Jiamao*	*Baoting*
	tree	*ʈʂ^{h}əj	ts^{h}aj^{1}	ts^{h}aj^{1}

This irregular initial probably indicates a relatively late date of borrowing, most likely from either Baoting or Zandui.

5.1.4 *Fricatives*

The relexes of the Hlai fricatives in Jiamao are given below:

(11)	*Pre-Hlai*	*Proto-Hlai*	*Jiamao*
	*f	*f^{h}	p
	*vj	*f^{h}j	ts^{h}
	*s	*s^{h}	ts^{h}

The most straightforward assumption in the case of the fricatives is that they were borrowed into Jiamao without modification, only later undergoing changes internal to Jiamao:

(12)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*f	→	f > p	*vj	→	vj > fç^{h} > ts^{h}
		↓			↓		
	PHl	*f^{h}	→	f > p	*f^{h}j	→	fj > fç^{h} > ts^{h}

		Hlai		*Jiamao*
	Pre-Hlai	*s	→	s^{h} > ts^{h}
		↓		
	PHl	*s^{h}	→	s^{h} > ts^{h}

The fricatives appear to have been stable throughout the first two waves of borrowing, with only one reflex apiece in Jiamao. PHl *f^{h} participated in a rather late change in Jiamao in which fricatives were hardened to stops, and the Jiamao reflex is therefore *p*. This gap was then available to be filled, so like Bouhin and Yuanmen, the only case in which Jiamao has a reflex *f* is as a reflex of *C-w. There is more than one way that it can be conjectured that *f^{h}j led to *ts^{h}* in Jiamao, but I hypothesize an intermediate stage of *fç^{h}* (with the aperture of the glide assimilating to that of the preceding fricative). This is parallel to the development of *ʈʂ^{h}w to *f* in NCHl and Lauhut discussed in chapter two, and is similar to a change called High Vowel Frication in Bantu, an example of which is given in Shona (Mathangwane 1999: 88):

(13) Examples of High Vowel Frication in Shona

Proto-Bantu		*Shona*	*Example*	*Proto-Bantu*		*Shona*
*pį	>	s^{w}	stick	*-pį́mbo	>	s^{w}imbo
*tų	>	pf	forge	*-tų́d-a	>	pfura

Unlike all other fricatives which hardened to plain stops, *s seems to have undergone an earlier change to an affricate (an identical shift with Run). This cleared the way for the sibilant chain shift mentioned above:

(14)

Pre-Hlai		*PHl*		*Jiamao*				
*s	>	*s^{h}	→	s^{h}	>	ts^{h}		
*ʈ	>	*ʈʂ^{h}	→	ʂ	>	s	>	t

Examples are given below. Note that only three examples of *f^{h}j exist, and of these, there is only corroboration for this reflex in *tooth* in the NWCHl and Meifu branches:

(15)

(a)	*PHl*	*Jiamao*	(b)	*Pre-Hlai*	*Jiamao*
go	*f^{h}i:	paj^{1}	scrub	*v[j]ɯ:p	ts^{h}uəp^{9}
hairbun	*f^{h}unʔ	pɔŋ^{1}	seed	*v[j]ən	ts^{h}an^{1}
dream	*f^{h}ən	pɔ:n^{1}	tooth	*vjən	ts^{h}aŋ^{1}

(c)	*PHl*	*Jiamao*
poke a hole	*s^{h}ɯ:ŋʔ	ts^{h}a:ŋ^{5}
you (pl)	*s^{h}əw	ts^{h}aw^{1}
thread needle	*s^{h}ok	ts^{h}ɔ:k^{9}

There is one exceptional correspondence in this category:

(16)

Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
return	*s^{h}ut	tsɔk^{7}	*[ʔɟ]ʌk

In the case of this word, the expected Jiamao initial would be aspirated ts^{h}, and if related, it is unclear why it is unaspirated.

5.1.5 *Medial Preglottalized Stops*

The reflexes of the Pre-Hlai medial preglottalized stops are the following. There are three reflexes each of *ɓ and *ɗ, and two each of *tç and *k (as in chapter two, a reflex in bold font indicates that it is correlated with low register):

(17)	*Pre-Hlai*	*PHl*	*Jiamao*
	*Cəʔb	*ɓ	p, ɓ, **f**
	*Cəʔd	*ɗ	t, ɗ, **ɬ**
	*Cəʔɟ	*tç	ts, ts^h
	*Cəʔg	*k	k, h

Reflexes of words borrowed at the time of PHl or subsequently are straightforward. Those borrowed during the Pre-Hlai period, however, show two sets of correspondences. In one case, the presyllable seems to have merely dropped off, leaving plain voiced stops which later devoiced. In the other, additional intervocalic lenition occurred (possibly due to the loss of the glottal stop), in which the stops shifted to voiced fricatives or, in the case of the alveolar, to a lateral. The palatal and velar fricatives devoiced before registrogenesis, whereas the bilabial fricative didn't do so until afterward:

(18)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*Cəʔb	→	ʔb > b > p	*Cəʔd	→	ʔd > d > t
			↘			↘	
		↓		β > **v** > **f**	↓		l > **ɮ** > **ɬ**
	PHl	*ɓ	→	ɓ	*ɗ	→	ɗ
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*Cəʔɟ	→	ʔɟ > ɟ > ts	*Cəʔg	→	ʔg > g> k
			↘			↘	
		↓		z > s > ts^h	↓		ɣ > x > h
	PHl	*tç	→	tç > ts	*k	→	k > k

Examples are given below:

(19)	(a)	*Pre-Hlai*	*Jiamao*	(b)	*PHl*	*Jiamao*
	leaf	*Cəʔbɯ:	pi:^{1}	decorate	*ɓi:nɦ	ɓiən^{5}
	overflow	*Cəʔba:ɦ	pɔ:^{1}	duck	*ɓit	ɓet^{7}
	end	*Cəʔbə:jʔ	pɯj^{5}	to hoe	*ɓəwɦ	ɓɔ:w^{5}

(c)	*Pre-Hlai*	*Jiamao*
fly	*Cəʔbin	ɓin^{4}
thief	*Cəʔbuj	ɓuj^{4}
feed	*Cəʔbu:ɦ	ɓo:^{4}

(d)	*Pre-Hlai*	*Jiamao*
porcupine	*Cəʔdəj	ti:^{1}
bamboo	*Cəʔdɔm	təm^{1}
dregs	*Cəʔda:k	tɯ:^{5}

(e)	*PHl*	*Jiamao*
bright	*ɗinʔ	ɗin^{1}
bamboo	*ɗom	ɗum^{5}
ladle	*ɗok	ɗɔ:k^{9}

(f)	*Pre-Hlai*	*Jiamao*
castrate	*Cəʔdɯ:n	ɬɯŋ^{4}
fear	*Cəʔda:ʔ	ɬɔ:^{4}

(g)	*Pre-Hlai*	*Jiamao*
elder bros	*Cəʔɟu:	tsʰu:^{1}
wife		
stand	*Cəʔɟu:n	tsʰu:n^{1}

(h)	*PHl*	*Jiamao*
bear fruit	*tçi:ŋ	tseŋ^{1}
jump	*tçu:nʔ	tsuən^{1}
extinguish	*tçəp	tsep^{7}

(i)	*Pre-Hlai*	*Jiamao*
yawn	*Cəʔga:w	hɔ:^{5}

(j)	*PHl*	*Jiamao*
able	*ki:w	kiw^{1}
jar	*kə:ŋʔ	kɔ:ŋ^{1}
grind (rice)	*ka:nɦ	ka:n^{5}

Note the timing of the devoicing of voiced stops which entered Jiamao in the first wave of borrowing compared with the changes which occurred in the plain voiceless stops which entered at the same time:

(20)						
	p	>	ɓ	ʔb	>	p
	t	>	ɗ	ʔd	>	t
	k	>	x	ʔg	>	k

Exceptional correspondences are given below:

(21)		*Gloss*	*Pre-Hlai*	*Jiamao*	*Pre-Jiamao*
	(a)	castrate	*Cəʔdɯ:n	tʰɯŋ^{4}	*[l]ɯ:ŋ
		front	*Cəʔdəŋ	tʰiəŋ^{4}	*[l]eŋ

(b)	soak	*Cəʔdə:mʔ	tsiəm⁴	*[ɾj]em
	light, insipid	*Cəʔdəc	tsia²	*[ɾj]iəʔ
(c)	sink	*Cəʔɟə:n	tsen⁴	*[ɾj]in
	grandmother	*Cəʔɟɯ:ʔ	tsə:²	*[ɾj]ɐ:ʔ

5.1.6 *Initial Nasals*

There are two correspondences for each of the Hlai initial nasals, with the exception of *hŋw, which has followed the development of most other Hlai languages in merging with *hw. The reflexes of Pre-Hlai *ɲ vary between *ɲ* and *n*, apparently conditioned by the following vowel—*n* before low vowels and *ɲ* elsewhere.

(22)	*Pre-Hlai*	*PHl*	*Jiamao*
	*m	*hm	**m**, **p**
	*n	*hn	**n**, **t**
	*ɲ	*hɲ	**ɲ**/**n**, **ts**
	*ŋ	*hŋ	**ŋ**, **k**
	*ŋw	*hŋw	v

The development of the initial nasals is shown below. The reflexes in the second wave of borrowing indicate that this wave was not borrowed precisely at the time of PHl, but shortly thereafter from one of the daughter languages, almost certainly Ha Em (which was not only present in the same vicinity, but had evolved in a way that best explains the form of the Jiamao borrowings):

(23)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*m	→	m > **m**	*n	→	n > **n**
		↓			↓		
	PHl	*hm	→	mb > b > **p**	*hn	→	nd > d > **t**
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*ɲ	→	ɲ > **ɲ**/**n**	*ŋ	→	ŋ > **ŋ**
		↓			↓		
	PHl	*hɲ	→	ɲɟ > ɟ > **ts**	*hŋ	→	ŋg > g > **k**
		Hlai		*Jiamao*			
	Pre-Hlai	(*ŋw	→	w > hw > v)			
		↓					
	PHl	*hŋw	→	hw > v			

Examples are given below:

(24)

(a)	*Pre-Hlai*	*Jiamao*	(b)	*PHl*	*Jiamao*
beard	*mɯ:mʔ	mum^{2}	ant	*hmuc	puət^{8}
come	*mɯ:n	mɯŋ^{4}	wet	*hmənʔ	pə:n^{4}
mouth	*məmʔ	muəŋ^{4}	dog	*hma:	pow^{4}

(c)	*Pre-Hlai*	*Jiamao*	(d)	*PHl*	*Jiamao*
mos y. brother	*nɯ:ʔ	ni:^{4}	long	*hna:wʔ	tow^{4}
six	*nom	nəm^{4}	dragon	*hnəŋ	tə:ŋ^{4}
otter	*na:k	nɯ:^{2}	wetfield	*hna:ɦ	tow^{4}

(e)	*Pre-Hlai*	*Jiamao*	(f)	*PHl*	*Jiamao*
shoot	*ɲɯ:	ni:^{4}	unhusked rice	*hɲ[e]:ŋ	tsi:ŋ^{2}
card (cotton)	*ɲɯ:	ni:^{4}			
surround	*ɲa:wʔ	nə:w^{2}			

(g)	*Pre-Hlai*	*Jiamao*	(h)	*PHl*	*Jiamao*
aunt	*ŋi:n	ŋiən^{2}	necklace	*hŋi:w	kew^{4}
lay down	*ŋu:ɦ	ŋɔ:^{4}	needle	*hŋuc	kuət^{8}
lid	*ŋə:t	ŋɯt^{8}	fog	*hŋa:wʔ	kɔ:w^{4}

(i)	*PHl*	*Jiamao*
wind	*hŋwə:t	vɯat^{7}
day	*hŋwən	vɔ:n^{1}

There are several exceptional correspondences in this category as well:

(25)

	Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
(a)	hemp	hmi:n	mian^{1}	*[hm]e:n
	mother	hmi:ʔ	ma:j^{5}	*[hm]ə:jʔ
	glutinous rice	hŋa:ʔ	ŋow^{1}	*[hŋ]a:
	frog (inedible)	hŋɯ:ɦ	ŋaj^{1}	*[hŋ]əj
(b)	mouse	hniw	kew^{4}	*hŋiw
(c)	yawn	hŋa:p	hɔ:p^{8}	*ɦʌ:p

The forms in (25a) are all in high register; the best explanation for this is that they were borrowed after main-syllable aspiration, so that preaspirated nasals conditioned high register (and therefore before the shift to poststopped nasals in Greater Hlai). The word *mouse* (25b) irregularly reflects an original initial *hŋ. The word *yawn* in (25c) indicates an irregular original glottal fricative, which may have formed under the presence of the preceding word in the compound *hɔː*[5] *hɔːp*[8].

5.1.7 *Medial Nasals*

The correspondences of the Hlai medial nasals in Jiamao all occur in high register, indicating that they were still either medial or preglottalized at the time of registrogenesis. The same variation in the palatal series that occurred initially also occurs medially:

(26)

Proto-Hlai	*Jiamao*
*C-m	m
*C-n	n
*C-ɲ	ɲ/n
*C-ŋ	ŋ
*Cuŋ	ŋ

There was no change between the stages of Pre-Hlai and PHl, and there is only one set of reflexes for each initial:

(27)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*C-m	→	C-m > m	*C-n	→	C-n > n
	↓			↓		
PHl	*C-m	→	C-m > m	*C-n	→	C-n > n

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*C-ɲ	→	C-ɲ > ɲ/n	*C-ŋ	→	C-ŋ > ŋ
	↓			↓		
PHl	*C-ɲ	→	C-ɲ > ɲ/n	*C-ŋ	→	C-ŋ > ŋ

	Hlai		*Jiamao*
Pre-Hlai	*Cuŋ	→	C-ŋ > ŋ
	↓		
PHl	*Cuŋ	→	C-ŋ > ŋ

Examples are given below:

(28)

(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
poison	*C-mi:n	mi:n⁵	bamboo shoot	*C-nɯ:ŋ	na:ŋ¹
hand	*C-mɯ:	ma:¹	water	*C-nəmʔ	na:m¹
foreigner	*C-mə:j	muəj¹	thick	*C-na:	now¹

(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
year before last	*C-ɲɯ:	na:¹	tattoo face	*C-ŋu:	ŋaw⁵
cow	*C-ɲiw	naw¹	cry	*C-ŋi:ʔ	ŋa:j¹
moon	*C-ɲa:n	nuən¹	liver	*C-ŋa:n	ŋuən¹

(e)	*PHl*	*Jiamao*
wild potato	*Cuŋa:	ŋow¹
rest head	*Cuŋa:n	ŋuən¹

There are three kinds of exceptional correspondences in this category:

(29)

	Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
(a)	shake	*C-ɲoŋɦ	ɲuəŋ⁴	*ɲoŋ
	salt	*C-ɲa:wʔ	nɔ:w⁴	*nʌ:w
	alcohol	*C-ŋa:wɦ	ŋə:w²	*ŋɐ:wʔ
	branch (tree)	*C-ŋa:mɦ	ŋəm²	*ŋɐmʔ
(b)	wear (hat)	*Cuŋəwʔ	ɲiaw¹	*ʔɲe:w

	Gloss	*PHl*	*Jiamao*	*Baoting*
(c)	bear	*C-muj	muj⁴	muj¹

In (29a), the low register of these forms indicates that the nasals were initial, not medial; they may have been borrowed as such. The originally velar nasal in (29b) appears to have palatalized under the influence of the following rime. Finally, the word bear (29c) appears to be a recent borrowing from Baoting.

5.1.8 *Laterals*

The Jiamao correspondences for initial Hlai laterals are given below. In all cases, there is a one-to-one correspondence:

(30)	*Pre-Hlai*	*PHl*	*Jiamao*
	*l	*hl	**ɬ**
	*Cilj	*hlj	**ts**
	*C-l	*C-l	l
	*m-l	*m-l	l

Amongst the four categories of laterals, the only one which underwent a significant change between Pre-Hlai and PHl is the plain lateral, which became aspirated prior to PHl. Although Jiamao has a modern aspirated reflex for this initial, the fact that it occurs in low register indicates that it must have been borrowed as a voiced segment, most probably a plain lateral. It could have later become aspirated in one of two ways: either (1) by first developing into the voiced lateral fricative *ɮ* (the hypothesis advocated here), probably under the influence of Baoting and the other Qi languages which had inherited this initial as a reflex of *hlj, or (2) by undergoing unconditioned spontaneous aspiration.

(31)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*l	→	l > ɮ > **ɬ**	*Cilj	→	lj > dʝ > **ts**
		↓			↓		
	PHl	*hl	→	l > ɮ > **ɬ**	*hlj	→	lj > dʝ > **ts**
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*C-l	→	C-l > l	*m-l	→	m-l > p-l > l
		↓			↓		
	PHl	*C-l	→	C-l > l	*m-l	→	m-l > p-l > l

Examples are given below:

(32)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	tongue	*hli:nʔ	ɬi:n⁴	leech	*hljiŋ	tsi:ŋ⁴
	brain	*hlu:k	ɬu:ʔ⁸	neck	*hljoŋʔ	tsaŋ²
	fish	*hla:	ɬow⁴	steal	*hljok	tsa:k⁸
	(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
	fingernail	*C-li:p	lep⁷	bamboo	*m-lɯ:jɦ	luəj⁵
	change clothes	*C-ləw	law¹	termite	*m-lu:k	lua⁵
	uncover	*C-la:k	lɯa⁵	near	*m-lɯ:ʔ	la:¹

The exceptional correspondences in this categoryare given below. At least three of these appear to be more recent borrowings:

(33)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	heart	*hla:wʔ	tsʰia:w¹	*[s]iə:w
	(b)	choose	*hləɲ	tsɔn⁴	*[ɾj]ʌn
	(c)	measure (rice)	*C-lɯ:ŋʔ	ɬɔ:ŋ⁴	*lʌ:ŋ
		Gloss	*PHl*	*Jiamao*	*Ha Em*
	(d)	spade	*hlja:wɦ	za:w⁴	za:w²
		Gloss	*PHl*	*Jiamao*	*Zandui*
	(e)	warm	*hlunɦ	tʰu:n⁵	ɬun⁵
		not know	*hlumʔ	tʰum⁴	ɬum³

5.1.9 *Approximants*

The Jiamao reflexes of the Hlai approximants are given below. Single reflexes in Jiamao indicate stability of these intitials between Pre-Hlai and PHl.

(34)	*Pre-Hlai*	*PHl*	*Jiamao*
	*C-ʋ	*ʋ	**v**
	*C-ɾ	*ɾ	**l**
	*Ciɾj	*ɾj	**ts**
	*Cuɾ	*Cuɾ	**l**
	*r	*hr	k
	*Cirj	*hrj	**ts**
	*Cur	*Cuhr	k

The development of these initials is on balance similar to those in other Hlai languages. Jiamao patterns with Bouhin and Ha Em in not undergoing vocalic transfer in the *Cuɾ and *Cuhr initials. The reflex of *hr must have velarized very early to *ɣ, hardened to a voiced stop and ultimately devoiced:

(35)		*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*ʋ	→	ʋ > **v**	*ɾ	→	ɾ > **l**
		↓			↓		
	PHl	*ʋ	→	ʋ > **v**	*ɾ	→	ɾ > **l**

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*Ciɾj	→	ɾj > dʝ > **ts**	*Cuɾ	→	ɾ > **l**
	↓			↓		
PHl	*ɾj	→	ɾj > dʝ > **ts**	*Cuɾ	→	ɾ > **l**

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*r	→	ɣ > g > k	*Cirj	→	ɾj > dʝ > **ts**
	↓			↓		
PHl	*hr	→	ɣ > g > k	*hrj	→	ɾj > dʝ > **ts**

Hlai		*Jiamao*
*Cur	→	ɣ > g > k
↓		
*Cuhr	→	ɣ > g > k

Note that Jiamao *l* in low register is always the reflex of PHl *ɾ, whereas Jiamao *l* in high register is the reflex of PHl *C-l.

Examples are given below:

(36)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	length clsfr	*ʋənʔ	viən^{4}	skirt	*ɾi:nʔ	liən^{2}
	master	*ʋa:ŋ	vɯ:^{4}	mortar	*ɾəw	lu:^{4}
	clothes	*ʋa:ŋʔ	vo:^{4}	intestine	*ɾa:jʔ	lɯj^{4}
	(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
	kiss[2]	*ɾju:c	tsuət^{9}	bone	*Cuɾɯ:k	liək^{10}
	sieve	*[ɾj]əw	tsi:w^{4}	earth	*Cuɾən	len^{4}
	bamboo inst.	*ɾjəj	tsaj^{2}	boat	*Cuɾa:	lɔ:^{4}
	(e)	*PHl*	*Jiamao*	(f)	*PHl*	*Jiamao*
	sell	*hri:wʔ	ki:w^{1}	calf (of leg)	*hrjinʔ	tsin^{4}
	cicada	*hrə:j	kuj^{1}	laugh	*hrja:w	tsu^{4}
	taro	*hra:k	kɯ:^{5}	sweep	*hrjit	tset^{10}
	(g)	*PHl*	*Jiamao*			
	pus	*Cuhriwʔ	ku:^{1}			
	head	*Cuhrəwʔ	ki:w^{1}			
	100	*Cuhra:n	kɯ:n^{1}			

2 The high register in this Jiamao form is irregular.

Exceptional correspondences in this category are given below. At least two of these (37f) are probably recent loans from Baoting:

(37)		Gloss	PHl	Jiamao	Pre-Jiamao
	(a)	poor	*ʋa:t	fɯ:t⁸	*vɯət
	(b)	day bfr last	*ɾu:ʔ	tsa:w⁴	*ɾjə:w
	(c)	to lead	*hrujʔ	luəj²	*ɾojʔ
		red	*hra:nʔ	ɬɯ:n⁴	*lɯən
	(d)	lizard	*hrjɯ:ŋ	liəŋ⁴	*ɾeŋ
		magpie	*hrju:t	luət⁸	*ɾot
		Gloss	*PHl*	*Jiamao*	*Baoting*
	(e)	cricket	*Cuɾu:ŋʔ	fuəŋ⁴	fu:ŋ⁶
		not	*Cuhri:ɦ	vaj¹	hwaj²

Many of these exceptional reflexes remain mysterious; based on the examples above, there was apparently some confusion between plain *ɾ, palatalized *ɾj, and *hr.

5.1.10 *Glottals*

The Jiamao reflexes of Hlai glottal fricatives and stops are given below:

(38)	Pre-Hlai	PHl	Jiamao
	*ɣ	*ɦ	**h**
	*Ciɣ	*Ciɦ	**h/z**
	*Cuɣ	*Cuɦ	**h**
	*ʔ	*ʔ	ʔ
	*Ciʔ	*Ciʔ	ʔ
	*Cuʔ	*Cuʔ	ʔ

Jiamao again patterns with Bouhin and Ha Em in not undergoing vocalic transfer in forms with medial glottal segments and preceding high vowels. There are two exceptions to this. One is *Ciɦ, where the Jiamao reflex is often *z* in low register before low vowels; z is also occasionally the reflex of *ɦ if followed by a high front vowel in the rime. The other exception is *Ciʔ, for which there is only one Jiamao example. This example (*steam*) shows evidence for vocalic transfer, but it is also possible based on the rime that this is a relatively recent borrowing from Baoting. The Jiamao reflex of *Ciʔ must therefore be considered very tentative.

(39)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*ɣ	→	ɦ > **h/z**	*ʔ	→	ʔ
	↓			↓		
PHl	*ɦ	→	ɦ > **h/z**	*ʔ	→	ʔ

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*Ciɣ	→	ɦ(j) > **h/z**	*Ciʔ	→	—
	↓			↓		
PHl	*Ciɦ	→	ɦ(j) > **h/z**	*Ciʔ	→	(ʔj > ts)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*Cuɣ	→	ɦ > **h**	*Cuʔ	→	ʔ
	↓			↓		
PHl	*Cuɦ	→	ɦ > **h**	*Cuʔ	→	ʔ

Examples are given below:

(40)

(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
horn	*ɦəw	haw^{4}	field dike	*Ciɦəːn	hɯan^{4}
excrement	*ɦaːjʔ	hɯaj^{2}	leak	*Ciɦəp	hɔːp^{9}
step	*ɦaːmɦ	hɔːm^{2}	crippled	*Ciɦaːɲɦ	heːŋ^{2}

(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
spirit	*Cuɦɯː	haː^{4}	thatch grass	*Ciɦaː	zow^{4}
gourd	*Cuɦɯːp	huəp^{8}	step	*Ciɦaːmɦ	zaːm^{5}
bite	*Cuɦəːt	hɯət^{10}	bitter	*ɦəːm	ziam^{4}

(e)	*PHl*	*Jiamao*	(f)	*PHl*	*Jiamao*
wash	*ʔuːt	ʔuət^{9}	steam	*Ciʔunɦ	tsun^{1}
dense	*ʔəːt	ʔɯət^{7}			
bathe	*ʔaːp	ʔɯp^{9}			

(g)	*PHl*	*Jiamao*
get up	*Cuʔɯːɦ	ʔaː^{1}
open	*Cuʔaːɦ	ʔow^{1}

Exceptional correspondences are given below:

(41)		Gloss	Pre-Hlai	Jiamao	Pre-Jiamao
	(a)	I[3]	*ɣu:	kaw¹	*gəw
		pluck/scratch	*ɣɯ:t	kɯat⁷	*gɤ:t
		hunchback	*ɣomɦ	kɔ:m¹	*gʌ:m
		Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
	(b)	go	*ɦi:	haj¹	*həj
	(c)	pond	*Ciɦu:ŋɦ	ʔjɔŋ⁵	*ʔjʌŋʔ
		tree heart	*Cuɦəc	ʔiət⁷	*ʔet
	(d)	swollen	*ʔun	fun⁴	*ʋu:n
		Gloss	*PHl*	*Jiamao*	*Baoting*
	(e)	earthworm (lg)	*Cuɦən	van¹	van¹

In general, the forms in (41a) appear to have been borrowed with an original velar fricative *ɣ, merging with loans from PHl forms with initial *hr. The word in (41d) seems to have developed an excrescent fricative *ʋ* in initial position, which later devoiced. The word in (41e) is a late loan from Baoting.

5.1.11 *Glides*

The Jiamao reflexes of the Hlai glides are the following:

(42) Pre-Hlai	PHl	Jiamao
*j	*hj	ts
*w	*hw	v
*C-w	*C-w	f

The only difference between the Pre-Hlai and PHl initial glides is that the latter became preaspirated. The Jiamao reflexes of the glides occur in high register, indicating that they were preaspirated at the time of registrogenesis. Any glides originally borrowed as unaspirated must have therefore later become preaspirated, merging with the glides borrowed later.

3 Thurgood (p.c.) suggests that the first person pronoun in (41a) may be a loan from Utsat.

(43)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Pre-Hlai	*j	→	hj > ɟ > ts	*w	→	hw > v
	↓			↓		
PHl	*hj	→	hj > ɟ > ts	*hw	→	hw > v

Hlai		*Jiamao*
*C-w	→	β > ɸ > f
↓		
*C-w	→	β > ɸ > f

Examples are given below:

(43)

(a)	*PHl*	*Jiamao*
egg	*hjɯːm	tsum^{1}
elder male inlaw	*hjəwʔ	tsiːw^{1}
old	*hjaː	tsoː^{1}

(b)	*PHl*	*Jiamao*
a bundle of rice	*hwiw	vew^{1}
ghost	*hwəːt	vɯat^{9}
plantain	*hwaːk	vɯa^{5}

(c)	*PHl*	*Jiamao*
cooked	*C-wuj	fuəj^{1}
village	*C-waːn	fuən^{1}
nine	*C-wɯːʔ	fəː^{1}

There are two exceptional correspondences in this category, both of which may be recent loans:

(45)

Gloss	*PHl*	*Jiamao*	*Baoting*
corner	*hjuːŋ	ts^{h}uəŋ^{1}	*zuːŋ^{4}
extend	*hjaːʔ	tsɔː^{4}	*zɔː^{3}

5.1.12 *Summary*

In examining the initial consonants of PHl and Jiamao, the largest complications in correspondences between the two can be explained in terms of a model in which there were (at least) two periods of borrowing from Hlai into Jiamao. The first period was in the latter part of the Pre-Hlai period, but before main-syllable aspiration. The second period was around the time of reconstructed Proto-Hlai, and extending into the early period of Proto-Hlai disintegration. When there are at least two Jiamao reflexes, the additional witness of Jiamao as external evidence for the various stages of Hlai can be quite valuable. Despite the fact that regular correspondences between Jiamao and Hlai can be identified once the nature of the borrowing relationship has been explicated, there remains a residue of Jiamao forms which seem related to Hlai but have unexpected correspondences; when they do not seem to be recent loans, these forms are explainable in at least some cases as due to errors in transmission during borrowing, and reinforce the hypothesis that Jiamao is a non-Hlai language which has been in intense contact with Hlai for quite some time.

5.2 Rimes

In comparison with the Jiamao initial correspondences, the Jiamao rime correspondences are much more complicated, and often seem to reflect more than two layers of loanwords. These layers can be sorted out to a certain degree using a combination of reference directly to various stages of Hlai, as well as relying on the Jiamao initials to provide constraints on linearization of borrowing, provided that there are two distinct layers in the class of initials in question.

There are still numerous exceptions to the generalizations which apply to different strata of vocabulary; it is my opinion that these can only be accounted for by both transmission errors at the time of the loans themselves as well as occasional idiosyncratic changes which occurred later, after the loans entered the language. Although in some rime categories it is possible to suggest a general progression of loanword strata, it is not presently possible to do this in all cases; where this stratification is evident, it is presented in as much detail as possible.

Based upon comparison with the timeline of the Jiamao initials, the following general principles of Jiamao sound change chronology are relatively secure:

(i) There were two different changes involving schwa, one earlier, one later.
(ii) Diphthongs in closed rimes originate in formerly pure vowels.

In the case of (i), the two changes are in keeping with similar changes which affected the Hlai languages, as well as the Be languages to the north east. These changes were the following, with (a) preceding (b):

(46) (a) ə > ɔ
     (b) ə > a

In the majority of cases, it is probably safe to assume that a Jiamao word with the first reflex is an earlier loan; the one exception to this is the Proto-Hlai rime category *oC, which, given the phonetic similarity, may be suspected of being of more recent origin if it corresponds to a Jiamao rime ɔ[ː]*C*, either long or short. On the other hand, a Jiamao word with the latter reflex can not automatically be assumed to be a later loan, since it is only known that its individual path of development had led to a schwa nucleus by the time at which the change *ə* > *a* occurred.

In the case of (ii), the generalization can be made that low-centered diphthongs of the type *VaC* (where V is some high vowel) originated in long low vowels, and that mid-centered diphthongs of the type *VəC* (where V is some high vowel) originated in mid vowels (short in the case of unrounded nuclei, long in the case of rounded nuclei). Moreover, words with these diphthongs may be assumed not to originate in the most recent layer of loanwords, since more recent loanwords have often filled their original positions in the vowel space. The general schema is as follows:

(47) ɛ:C	>	iaC	eC	>	iəC
ʌ:C	>	ɯaC	ɤC	>	ɯəC
			oC	>	uəC

The only regular exception to this rule is in the case of velar-final rimes which, as in the case of some of the Hlai languages, provided an environment for the diphthongization of long high vowels (where *K* represents both oral and nasal velar stops):

(48) i:K	>	iəK	>	iaK
ɯ:K	>	ɯəK	>	a:K
u:K	>	uəK	>	uaK

There are two specific areas in which Jiamao is particularly sporadic in its correspondences, which suggest that the categories in question were not available in the early language. The first is the class of Hlai *ɯ* rimes, both open and closed, long and short. Reflexes of this rime class, while not completely random, are dispersed into an above-average number of categories, most often ending up in one of the Hlai *ə* categories, but also into the *i* and *u* categories as well. This suggests that there was simply no original Jiamao *ɯ* category (although there certainly is in present-day Jiamao), and that words were assigned to other rime categories in accordance with how they were perceived at the time of borrowing.

The second category which shows a large amount of unpredictable variation is vowel length. The correlation with Hlai vowel length improves in the more recent stratum of loans, but in the earlier stratum (or strata), there is noticeable variation in all categories except *a:C*, a category which contained only long members in PHl. Even in this category, Jiamao displays a sharp tendency to favor short rimes if the coda is a bilabial stop (nasal or oral).

Due to the difficulty of fixing rime strata to specific stages of Hlai, only Proto-Hlai forms will be compared below, even if their initials indicate a Pre-Hlai borrowing.

5.2.1 *Tone Categories*

The Jiamao table of tone values is repeated below:

(49)	*Tone Category*	*High*	*Tone*	*Low*	*Tone*
	A	55	(1)	11	(4)
	X	51	(5)	31	(2)
	DLong	53	(9)	31	(8)
	DShort	55	(7)	22	(10)

With the exception of the rimes which end in an oral stop (category D), the default category for borrowed Hlai vocabulary is Jiamao category A. There is also a significant minority of forms in Jiamao category X, which seem to be represented more or less equally across Hlai categories A, B, and C. The only regular correlation with Jiamao category X is with long Hlai rimes with final velars, which lenited to glottal stops in Jiamao, conditioning tone X before finally disappearing:

(50) V:k > V:ʔ > V:^{X}

Examples of this are given below:

(51)	*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	shoulder pole	$\text{*f}^{\text{h}}\text{i:k}$	pia^{5}	*ɦiəʔ
	termite	*m-lu:k	lua^{5}	*ʔluəʔ
	gill	*C-ŋa:k	ŋɯa^{5}	*ʔŋɯəʔ

Examples of Jiamao category X in correlation with other Hlai tone categories are given below:

(52)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	mountain valley	$\text{*k}^{\text{h}}\text{ə:ŋ}$	$\text{k}^{\text{h}}\text{ɔ:ŋ}^{5}$	$\text{*k}^{\text{h}}\text{ʌ:ŋʔ}$
		burn	*ɓəŋ	ɓɔŋ^{5}	*ɓʌŋʔ
		pickle	*C-mə:ŋ	mɔ:ŋ^{5}	*ʔmʌ:ŋʔ

(b)	cockscomb	*fʰi:wɦ	pi:w^{5}	*ɦəwʔ
	drink	*hru:nɦ	ku:n^{5}	*guənʔ
	branch (tree)	*C-ŋa:mɦ	ŋəm^{2}	*ŋɐmʔ
(c)	partridge	*tʰa:nʔ	ɗa:n^{5}	*tə:nʔ
	beard	*hmɯ:mʔ	mum^{2}	*mu:mʔ
	neck	*hljoŋʔ	tsaŋ^{2}	*ɾjəŋʔ

It is possible that in a small number of cases, Jiamao category X represents faithful borrowings of Hlai category C words with glottal stop (the examples in 52c above all appear to be early loans). In general, however, this lack of correlation between tone categories throughout apparently all vocabulary strata is an important piece of evidence that the Hlai vocabulary in Jiamao is borrowed, not native, because it strongly indicates that the cues correlating with tone category were not perceived in the context in which these words were learned, and that the learners were biased towards other kinds of cues (such as vowel length, discussed below).

Although there is no discernible correlation between the Jiamao A and X categories on the one hand, and the Hlai A, B, and C categories on the other, this distinction seems to have been preserved in another way, where high vowels (53a–f) and short mid central rimes (53g–j) in Hlai tone categories B and C underwent lengthening, often followed by the lowering of the nucleus, but not always:

(53)

		PHl	*Jiamao*			*PHl*	*Jiamao*
(a)	this	*C-ni:ɦ	nɛ:^{5}	(b)	uncle	*tçʰi:ʔ	tsʰa:j^{1}
					small sore	*C-ni:ʔ	na:j^{1}
					cry	*C-ŋi:ʔ	ŋa:j^{1}
(c)	get up	*Cuʔɯ:ɦ	ʔa:^{1}	(d)	short	*tʰɯ:ʔ	tʰa:^{1}
					near	*m-lɯ:ʔ	la:^{1}
(e)	blow	*ʔu:ɦ	ʔa:w^{1}	(f)	ash	*sʰu:ʔ	tsʰa:w^{1}
	power	*kʰu:ɦ	kʰa:w^{1}		memorial	*C-mu:ʔ	ma:w^{1}
	turtle	*tʰu:ɦ	ɗa:w^{1}		three	*ʈʂʰuʔ	ta:w^{1}
(g)	fall down	*ɗəwɦ	ɗa:w^{1}	(h)	Fas y. sis husb	*hjəwʔ	tsi:w^{1}
	tomorrow	*ɦəwɦ	ziaw^{4}		head	*Cuhrəwʔ	ki:w^{1}
					fill w/ rice	*kʰəwʔ	hi:w^{1}

(i)	water	*C-nəmʔ	na:m^1	(j)	meat	*hrəmʔ	kə:m^1
	clothing clsfr	*f^{h}ənʔ	pa:n^1		wet	*hmənʔ	pə:n^4
	instruct	*C-ŋənʔ	ŋa:n^1		open (eyes)	*C-ləŋʔ	lə:ŋ^1

The diphthongization and lengthening of the rimes in (53a–f) above is an exaggerated case of the diphthongization which occurred in Greater Hlai in the same environment.

It must be noted that from this point on, the terms *Pre-Hlai* and *Proto-Hlai* are replaced with *Stratum 1* and *Stratum 2* respectively, as the points of Jiamao borrowing from the point of view of the rimes is quite difficult to fix with any certainty. This is because for the initials, there is one important change (*main-syllable aspiration*) which occurred toward the end of the Pre-Hlai period and therefore makes periodization rather easy; in the case of the rimes, these kinds of obvious changes are for the most part absent (it is likely that Jiamao borrowing began after *peripheral vowel raising*, which is the only real change in the rimes which could have been used this way).

An example illustrating this point is the following:

(54)		*Gloss*	*Pre-Hlai*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	jar	*Cəʔgə:ŋʔ	*kə:ŋʔ	kɔ:ŋ^1	*gʌ:ŋ
		pickle	*C-mə:ŋ	*C-mə:ŋ	mɔ:ŋ^5	*ʔmʌ:ŋʔ
	(b)	sap	*tə:ŋ	*t^{h}ə:ŋ	ɗa:^{1}	*tə̃:
		together	*tə:ŋʔ	*t^{h}ə:ŋʔ	t^{h}a:^{1}	*t^{h}ə̃:

It is argued below that the change *ə:ŋ > *ɔ:ŋ* preceded the change *ə:ŋ > *a*: in Jiamao, so that the examples in (54a) above are assumed to have been borrowed at a period prior to those in (54b). However, the initial of *sap* indicates that it was borrowed in Pre-Hlai, before main-syllable aspiration, whereas the initial of *together* indicates that it was borrowed after main-syllable aspiration had already occurred. These would therefore be assigned to different strata of borrowing based on the initials, but it is clear that they both participated in the same change in the rime, which the items in (54a) did not. The only logical conclusion is that *sap* was borrowed first, followed by *together*, and that both were preceded by *jar* and *pickle*. There are many instances of this phenomenon in the Jiamao lexicon, but although it complicates periodization, it is important to underscore that the periodization of the initials and that of the rimes never conflict, despite the difficulty in linearizing them absolutely. It is for this reason, therefore, that the labels Pre-Hlai and Proto-Hlai are replaced with Stratum 1 and Stratum 2 below.

5.2.2 *Open Rimes*

The open rimes, as in the case of the initials, generally have two discernible layers of loans with occasional exceptions. The Jiamao reflexes of the open rimes are shown below:

(55)

Proto-Hlai	*Jiamao*
*iː	iː, aj
*ɯː	iː, aː
*uː	uː, aw
*iːɦ/ʔ	aːj, aj
*ɯːɦ/ʔ	aː, əː
*uːɦ	ɔː, aːw
*uːʔ	aːw
*eː	ɛː
*aː	ɔː, ɯː, ow, oː

The loan chronology and subsequent changes of the Hlai open rimes are shown below:

(56)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*iː	→	iː > iː	*iːɦ/ʔ		
	↓			↓		
Stratum 2	*əj	→	əj > aj	*əjɦ/ʔ	→	əːj > aːj
	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɯː	→	ɯː > iː	*ɯːɦ/ʔ	→	ɤɰ > əː
	↓			↓		
Stratum 2	*əɰ	→	əɰ > aː	*əɰɦ/ʔ	→	əːɰ > aː
	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*uː	→	uː > uː	*uːɦ(/ʔ)	→	əw > ɔw > ɔː
	↓			↓		
Stratum 2	*əw	→	əw > aw	*əwɦ/ʔ	→	əːw > aːw

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1				*a:	→	a: > ɔ:/ɤ: > ɔ:/ɯ:
				↓		
Stratum 2	*e:	→	e: > ɛ:	*a:	→	a: > o:/u: > o:/ow

The two strata of loans pattern similarly throughout the high vowels. In the earliest layer, Hlai (or more specifically Greater Hlai) vowels were still pure. By the time of the second layer, these vowels had lengthened, and they underwent a process of diphthongization just as they did in the Hlai languages. The difference, however, is that in the Hlai languages they were kept distinct from the original series of short schwa-centered diphthongs (*əj and *əw) by lowering only to mid vowels; in Jiamao, they lowered completely, allowing the two series to merge:

(57)	*i:	>	*əj	>	aj
	*ɯ:	>	*əɰ	>	a:
	*u:	>	*əw	>	aw
	*əj	>	*əj	>	aj
	*əw	>	*əw	>	aw

The development of high vowels with final laryngeals is shown below. In the earlier stratum, the vowel was still pure, but diphthongized in Jiamao due to the final laryngeal. In the later stratum, it patterned with the other high vowels with final laryngeals, so it was borrowed as a diphthong and then lengthened, again due to the final laryngeal:

(58)	Stratum 1	*i:ɦ/ʔ	→	—				
		*ɯ:ɦ/ʔ	→	əɰ	>	ɤɰ	>	ə:
		*u:ɦ/ʔ	→	əw	>	ɔw	>	ɔ:
	Stratum 2	*əjɦ/ʔ	→	ə:j	>	a:j		
		*əɰɦ/ʔ	→	ə:ɰ	>	a:		
		*əwɦ/ʔ		ə:w	>	a:w		

Finally, the low vowel *a: has a total of four reflexes, two of them with specific conditioning factors. In the first layer, backing occurred; it was modified to a back unrounded vowel if preceded by a high back vowel, which then raised to a high vowel. In the second layer, *a: first raised to *o:, where it remained if preceded by a palatal glide; otherwise it finally diphthongized to *əw* with subsequent coloring of the nucleus:

(59)

Stratum 1	a:	>	a:	>	ɔ:	>	ɔ:
	uCa:	>	uCɤ:	>	ɤ:	>	ɯ:
Stratum 2	a:	>	o:	>	əw	>	ow
	ja:	>	jo:	>	jo:		

Examples are given below:

(60)

(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
mos y. bros wife	*hmi:	mi:^{4}	snail	*tç^{h}i:	ts^{h}aj^{1}
			go	*f^{h}i:	paj^{1}
			fire	*f^{h}i:	paj^{1}

(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
leaf	*ɓɯ:	pi:^{1}	ladder	*p^{h}ɯ:	ɓa:^{1}
shoot	*hɲɯ:	ni:^{4}	hand	*C-mɯ:	ma:^{1}
card (cotton)	*hɲɯ:	ni:^{4}	spirit	*Cuɦɯ:	ha:^{4}

(e)	*PHl*	*Jiamao*	(f)	*PHl*	*Jiamao*
eight	*hru:	ku:^{1}	seven	*t^{h}u:	ɗaw^{1}
knee	*ɾu:	lu:^{4}	head louse	*Cuʈʂ^{h}u:	taw^{1}
o. bros wife	*tçu:	ts^{h}u:^{1}	I	*ɦu:	kaw^{1}

(g)	*PHl*	*Jiamao*
uncle	*tç^{h}i:ʔ	ts^{h}a:j^{1}
small sore	*C-ni:ʔ	na:j^{1}
cry	*C-ŋi:ʔ	ŋa:j^{1}

(h)	*PHl*	*Jiamao*	(i)	*PHl*	*Jiamao*
nine	*C-wɯ:ʔ	fə:^{1}	short	*t^{h}ɯ:ʔ	t^{h}a:^{1}
grandma	*tçɯ:ʔ	tsə:^{2}	near	*m-lɯ:ʔ	la:^{1}
			get up	*Cuʔɯ:ɦ	ʔa:^{1}

(j)	*PHl*	*Jiamao*	(k)	*PHl*	*Jiamao*
sleep (lie)	*hŋu:ɦ	ŋɔ:^{4}	turtle	*t^{h}u:ɦ	ɗa:w^{1}
distribute	*ku:ɦ	kɔ:^{1}	power	*k^{h}u:ɦ	k^{h}a:w^{1}
run	*Cuhru:ɦ	kɔ:^{1}	blow	*ʔu:ɦ	ʔa:w^{1}

(l)	*PHl*	*Jiamao*
ash	*sʰu:ʔ	tsʰa:w^{1}
memorial	*C-mu:ʔ	ma:w^{1}
three	*Cuʈʂʰuʔ	ta:w^{1}

(m)	*PHl*	*Jiamao*
rice cake	*C-ɲe:ɦ	ɲe:^{2}

(n)	*PHl*	*Jiamao*
boat	*Cuɾa:	lɔ:^{4}
overflow	*ɓa:ɦ	pɔ:^{1}
grandfather	*na:ʔ	nɔ:^{4}

(o)	*PHl*	*Jiamao*
fork (road)	*pʰa:	ɓow^{1}
dog	*hma:	pow^{4}
field	*hna:ɦ	tow^{4}

(p)	*PHl*	*Jiamao*
to plant	*Cuhra:	kɯ:^{1}

(q)	*PHl*	*Jiamao*
old	*hja:	tso:^{1}
smoke	*hja:	tso:^{1}
medicine	*hja:	tso:^{1}

Exceptions are listed below:

(61)	*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
(a)	this	*C-ni:ɦ	nɛ:^{5}	*ʔne:ʔ
(b)	navel	*Cuɾɯ:	lo:^{2}	*ɾ[a:]ʔ
	return	*hmɯ:	pə:^{4}	*hmɐ:
(c)	thin	*hrɯ:	kaj^{1}	*gəj
	k.o. frog	*hŋɯ:ɦ	ŋaj^{1}	*ʔŋəj
	you	*C-mɯ:	məj^{1}	*ʔmɐj
	look up at	*hŋɯ:ʔ	ŋəj^{4}	*ŋɐj
(d)	year	*hmu:ɦ	ma:^{1}	*ʔmə:
	feed	*ɓu:ɦ	fo:^{4}	*ʋ[a:]
(e)	two	*hlu:ʔ	ɬiaw^{4}	*le:w
(f)	five	*hma:	pu:^{4}	*hmu:
	mat. grandfather	*ʈʂʰa:ʔ	tə:^{1}	*ʈɐ:

The Jiamao reflex of *two* in (61e) is what would normally be expected for PHl *əwɦ/ʔ (see section 5.2.7 below), which indicates that this is how it was borrowed.

5.2.3 *High Front Rimes*

The correspondences between PHl and Jiamao rimes with high front nuclei are given below:

(62)	*Proto-Hlai*	*Jiamao*		*Proto-Hlai*	*Jiamao*
(a)	*i:w	ew, iw, i:w	(b)	*iw	ew, iw
	*i:m	em		*im	em, im
	*i:p	ep, ip		*ip	ep, ip
	*i:n	iən, in, i:n		*in	in
	*i:t	et, it, i:t		*it	et, it
	*i:ŋ	eŋ, ia, i:ŋ		*iŋ	i:ŋ
	*i:k	ia^{x}, i:^{x}		*ik	et, i:k, it

The Jiamao reflexes can be generally grouped into three sets in the case of the long rimes, and two in the case of the short rimes. The long rime reflexes could be interpreted in two ways—they could either reflect three strata of borrowing, or otherwise two of the reflexes could represent a single strata, with variation resulting from inconsistency at the point of borrowing. While recognizing both possibilities, I tentatively choose the latter hypothesis, under the assumption that there was a great deal of confusion in borrowing words with long rimes, some borrowed long and some borrowed short:

(63)	*Hlai*		*Jiamao*
Stratum 1	*i:w	→	i:w > iw
		↘	
	↓		iw > ew
Stratum 2	*i:w	→	i:w

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*i:m	→	—	*i:p	→	i:p > ip
		↘			↘	
	↓		im > em	↓		ip > ep
Stratum 2	*i:m	→	—	*i:p	→	—

	Hlai		*Jiamao*	*Hlai*		Jiamao
Stratum 1	*i:n	→	i:n > in	*i:t	→	i:t > it
		↘			↘	
	↓		in > en > iən	↓		it > et
Stratum 2	*i:n	→	i:n	*i:t	→	i:t

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*i:ŋ	→	iəŋ > ia	*i:k	→	iək > iaʔ > ia^{X}
		↘			↘	
	↓		iŋ > eŋ	↓		—
Stratum 2	*i:ŋ	→	i:ŋ	*i:k	→	i:k > i:ʔ > i:^{X}

There was no similar confusion in the case of the short rimes:

(64)

	Hlai		*Jiamao*
Stratum 1	*iw	→	iw > ew
	↓		
Stratum 2	*iw	→	iw

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*im	→	im > em	*ip	→	ip > ep
	↓			↓		
Stratum 2	*im	→	im	*ip	→	ip

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*in	→	—	*it	→	it > et
	↓			↓		
Stratum 2	*in	→	in	*it	→	it

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*iŋ	→	—	*ik	→	it > et
	↓			↓		
Stratum 2	*iŋ	→	iŋ > i:ŋ	*ik	→	ik > i:k

After the first layer of borrowing, there was a lowering of the nucleus of short rimes and a shortening of the nucleus of long rimes, similar to what occurred in NCHl:

(65)	i:C	>	iC
	iC	>	eC

This shift appears to have occurred early enough before the alveolar nasal to allow it to participate in the diphthongization of short mid vowels which affected the rimes *eC and *ɤC. Length distinctions seem to have remained intact in this final layer of borrowing.

Examples are given below. Stratum one borrowings corresponding to long rimes are given in (66a), and stratum two borrowings in (66b). Stratum one borrowings corresponding to short rimes are given in (66c), and stratum two in (66d):

(66)	(a)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
	sound	*tʰi:w	tsʰew^{1}	able	*ki:w	kiw^{1}
	blue	*kʰi:w	kʰew^{1}			
	necklace	*hɟi:w	kew^{4}			
	plug up	*tçʰi:m	tsʰem^{1}			
	bear fruit	*tçi:ŋ	tseŋ^{1}	hang	*ɾi:ŋʔ	lin^{4}
	stick into	*C-ɲi:p	ɲep^{7}	centipede	*ɾi:p	lip^{8}
	chopsticks	*tʰi:p	tsʰep^{7}			
	fingernail	*C-li:p	lep^{7}			
	bail water	*hwi:t	vet^{7}	to heat	*sʰi:t	tsʰit^{7}
	underwear	*fʰi:nɦ	piən^{1}	money	*tçi:n	tsin^{1}
	skirt	*ɾi:nʔ	liən^{2}	roll (child)	*m-li:n	lin^{1}
	decorate	*ɓi:nɦ	ɓiən^{5}			
	finger	*hlji:ŋɦ	tsia^{4}			
	slap	*pʰi:k	ɓia^{5}	to tear	*C-ɲi:k	ɲit^{7}
	full	*tʰi:k	tsʰia^{5}			
	shoulder pole	*fʰi:k	pia^{5}			
	(b)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
	cockscomb	*fʰi:wɦ	pi:w^{5}			
	wild	*hlji:w	tsi:w^{4}			
	sell	*hri:wʔ	ki:w^{1}			

wear (lower)	*p^{h}i:n	p^{h}i:n^{1}	be cheap	*k^{h}i:t	k^{h}i:t^{9}
tongue	*hli:nʔ	ɬi:n^{4}			
ill omen	*hwi:n	vi:n^{1}			
make way	*p^{h}i:ŋʔ	p^{h}i:^{1}	wing	*p^{h}i:k	p^{h}i:^{5}
rice wine	*ɓi:ŋɦ	ɓi:ŋ^{5}	carry	*ɓi:k	fi:^{2}
slant	*ki:ŋ	ki:ŋ^{1}	chimney	*ɗi:k	ti:^{2}

(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
bundle of rice	*hwiw	vew^{1}	escape	*p^{h}iw	p^{h}iw^{1}
mouse	*hniw	kew^{4}			
taste	*tɕ^{h}im	tsem^{4}	poison	*kimʔ	kim^{1}
			a pinch	*C-ɲimʔ	ɲim^{1}
			calf	*hrjinʔ	tsin^{4}
			fly	*ɓin	fin^{4}
			bright	*ɗinʔ	ɗin^{1}
dogbean	*tɕ^{h}ip	ts^{h}ep^{7}	lightning	*hljip	lip^{7}
duck	*ɓit	ɓet^{7}	throw away	*f^{h}it	fit^{7}
wrinkle	*C-ɲit	ɲet^{7}			
			leech	*hljiŋ	tsi:ŋ^{4}
sweep	*hrjik	tset^{10}	silence	*ʔik	ʔi:k^{9}

The handful of exceptions in this category are given below:

(67)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	polished rice	*tɕi:mʔ	tsiam^{1}	*ɟe:m
		hemp	*hmi:n	mian^{1}	*ʔme:n
	(b)	pus	*Cuhriwʔ	ku:^{1}	*gu:
		cow	*C-ɲiw	naw^{1}	*ʔnəw
	(c)	splash	*tɕ^{h}inɦ	ts^{h}it^{7}	*tɕ^{h}i:t
		Gloss	*PHl*	*Jiamao*	*Lauhut*
	(d)	clean	*tɕ^{h}i:ŋɦ	ts^{h}iəŋ^{5}	ts^{h}i:ŋ^{2}

The word *splash* in (67c) is one of two cases in Jiamao where the precursor to Tone B influenced transmission in such a way as to result in the replacement of the final nasal with a stop at the same place of articulation. The word *clean* in (67d) is probably a loan from Lauhut.

5.2.4 *High Back Unrounded Rimes*

The following are the correspondences long *ɯ:C* rimes and short *ɯC* rimes:

(68)

	Proto-Hlai	*Jiamao*		*Proto-Hlai*	*Jiamao*
(a)	*ɯ:j	uəj	(b)		
	*ɯ:m	um, ɔm, ɔ:m			
	*ɯ:p	up, uəp		*ɯp	ɔ:p
	*ɯ:n	ɯŋ		*ɯn	aŋ, ɔ:n
				*ɯt	uət
	*ɯ:ŋ	ɔŋ, a:ŋ			
	*ɯ:k	iək, a:k			

It is more difficult to suggest a chronology for this series of rimes, although we can at least infer that rimes in *ɔ* and with diphthongs are not the most recent layer. It can also be assumed that mid vowels in some cases correspond to high vowels that were borrowed as short rimes and then underwent lowering, as in the case of the high front rimes above. I tentatively suggest the following chronology:

(69) (a)

	Hlai		*Jiamao*
Stratum 1	*ɯ:j	→	əj > oj > uəj

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɯ:m	→	u:m > um	*ɯ:p	→	u:p > up
		↘			↘	
	↓		əm > ɔm	↓		əp > op > uəp
Stratum 2	*ɯ:m	→	ə:m > ɔ:m	*ɯ:p	→	—

	Hlai		*Jiamao*
Stratum 1	*ɯ:n	→	ɯ:ŋ > ɯŋ
		↘	
			əŋ > aŋ

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɯ:ŋ	→	əŋ > ɔŋ	*ɯ:k	→	ək > ek > iək
	↓			↓		
Stratum 2	*ɯ:ŋ	→	ə:ŋ > a:ŋ	*ɯ:k	→	ə:k > a:k

(b)	*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɯm	→	—	*ɯp	→	ə:p > ɔ:p
	↓			↓		
Stratum 2	*ɯm	→	—	*ɯp	→	

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɯn	→	ə:n > ɔ:n	*ɯt	→	ət > ot > uət
	↓			↓		
Stratum 2	*ɯn	→	əŋ > aŋ	*ɯt	→	—

There is a tendency (but not an absolute rule) for back vowels to trigger velarization of an alveolar coda:

(70)	ɯ:n	→	ɯ:ŋ > ɯŋ
	ɯn	→	əŋ > aŋ

Examples are given below. Stratum one borrowings corresponding to long rimes are given in (71a), and stratum two borrowings in (71b). Stratum one borrowings corresponding to short rimes are given in (71c), and stratum two in (71d):

(71)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	bamboo	*m-lɯ:jɦ	luəj^{5}			
	beard	*hmɯ:mʔ	mum^{2}	crawl	*Cuɦɯ:m	hɔ:m^{4}
	egg	*hjɯ:m	tsum^{1}	cheat	*pʰɯ:m	pʰɔ:m^{1}
	rice knife	*kʰɯ:p	hup^{7}			
	rotten	*tʰɯ:m	ɗɔm^{1}			
	full	*kʰɯ:m	kʰɔm^{1}			
	wash	*fʰ[j]ɯ:p	tsʰuəp^{9}			
	pt nosed turtle	*tʰɯ:p	ɗuəp^{9}			
	pumpkin	*Cuɦɯ:p	huəp^{8}			
	come	*hmɯ:n	mɯŋ^{4}	shallow	*tʰɯ[:]nʔ	ɗaŋ^{1}
	castrate	*ɗɯ:n	ɬɯŋ^{4}			
	pheasant	*ɗɯ:n	tʰɯŋ^{4}			

let go	*pʰɯ:ŋʔ	ɓɔŋ^{5}	poke a hole	*sʰɯ:ŋʔ	tsʰa:ŋ^{5}
			clear (sky)	*hlɯ:ŋʔ	ɬa:ŋ^{2}
			bamboo shoot	*C-nɯ:ŋ	na:ŋ^{1}
child	*hlɯ:k	ɬiək^{8}	ripe	*sʰɯ:k	tsʰa:k^{9}
bone	*Cuɾɯ:k	liək^{10}	weave (fabric)	*Cuʈʂʰɯ:k	ta:k^{9}
(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
handlength	*Cuɦɯp	hɔ:p^{8}			
heavy	*kʰɯn	kʰɔ:n^{1}	thorn	*Cuɦɯnʔ	haŋ^{4}
			astringent	*hmɯnʔ	paŋ^{4}
break (pull)	*tʰɯt	ɗuət^{9}			

The exceptions in this category are the following:

(72)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	filth	*C-nɯnɦ	nɯa^{1}	*ʔnɯə̃
		two	*C-lɯ:ŋɦ	lɯaŋ^{5}	*ʔlɤ:ŋʔ
		measure (rice)	*C-lɯ:ŋʔ	ɬɔ:ŋ^{4}	*lʌ:ŋ
		Gloss	*PHl*	*Jiamao*	*Baoting*
	(b)	ginger	*kʰɯ:ŋ	kʰɯəŋ^{5}	kʰɯ:ŋ^{1}
		Gloss	*PHl*	*Jiamao*	*Zandui*
		not know	*hlɯmʔ	tʰum^{4}	ɬum^{3}
		pull tight	*kɯŋ	kɯŋ^{5}	kɯŋ^{1}

Three of these (72b) may be recent loans from either Baoting or Zandui.

5.2.5 *High Back Rounded Rimes*

The reflexes of the *u:C* and *uC* rimes are given below:

(73)		*Proto-Hlai*	*Jiamao*		*Proto-Hlai*	*Jiamao*
	(a)	*u:j	uj, u:j	(b)	*uj	ej, uəj, uj
		*u:n	uən, u:n		*un	ɔŋ, uŋ, un
		*u:t	uət		*ut	ɔk, ut
					*uɲ	ɔn
		*u:c	(uət)		*uc	uət, ut
		*u:ŋ	ua, u:ŋ			
		*u:k	ua^{X}, u:ʔ			

These reflexes can also be organized into a rough framework of two layers, in which short reflexes which later lowered to mid vowels are a distinguishing feature of the first layer:

(74) (a)

	Hlai		*Jiamao*
Stratum 1	*u:j	→	uj
	↓		
Stratum 2	*u:j	→	u:j

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*u:n	→	on > uən	*u:t	→	ot > uət
	↓			↓		
Stratum 2	*u:n	→	u:n	*u:t	→	—

	Hlai		*Jiamao*	*Hlai*		Jiamao
Stratum 1	*u:ɲ	→	—	*u:c	→	(ot > uət)
	↓			↓		
Stratum 2	*u:ɲ	→	—	*u:c	→	—

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*u:ŋ	→	uəŋ > ua	*u:k	→	uəʔ > ua^{X}
	↓			↓		
Stratum 2	*u:ŋ	→	u:ŋ	*u:k	→	u:k > u:ʔ

(b)

	Hlai		*Jiamao*
Stratum 1	*uj	→	u:j > uj
		↘	
	↓		əj > ej
Stratum 2	*uj	→	oj > uəj

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*un	→	əŋ > ɔŋ	*ut	→	ək > ɔk
	↓			↓		
Stratum 2	*un	→	un > uŋ	*ut	→	—

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*uɲ	→	ən > ɔn	*uc	→	ot > uət
	↓			↓		
Stratum 2	*uɲ	→	—	*uc	→	ut

In the case of the short rimes, the back vowel conditioned velarization of alveolar codas:

(75)	un	→	əŋ > ɔŋ
	un	→	un > uŋ
	ut	→	ək > ɔk

Examples are given below. Stratum one borrowings corresponding to long rimes are given in (76a), and stratum two borrowings in (76b). Stratum one borrowings corresponding to short rimes are given in (76c), and stratum two in (76d):

(76)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	fat	*hru:jʔ	kuj^1	plum tree	*C-mu:j	mu:j^1
	wild	*sʰu:n	tsʰuən^1	drink	*hru:nɦ	ku:n^5
	tree clsfr	*tʰu:nʔ	ɗuən^1	sow (seed)	*C-mu:nʔ	mu:n^1
	body	*Cuɦu:n	huən^4	stand	*tçu:n	tsʰu:n^1
	fart	*tʰu:t	ɗuət^9			
	ten	*fʰu:t	puət^9			
	wash	*ʔu:t	ʔuət^9			
	hole	*tçʰu:ŋʔ	tsʰua^1	daughter	*ʔu:ŋ	ʔu:^{1}
				copper	*ɗu:ŋ	tu:ŋ^1
	white hair	*hŋu:k	kua^2	wrap	*tʰu:k	tʰu:ʔ^9
	termite	*m-lu:k	lua^5	brain	*hlu:k	ɬu:ʔ^8
				nest	*ɾu:k	lu:ʔ^8

	(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
	water buffalo	*sʰujʔ	tsʰej^1			
	burn	*tçʰujʔ	tsej^1			
	dissect	*ɓujɦ	puj^1	drunk	*hmuj	puəj^4
	thief	*ɓuj	fuj^4	done	*C-wuj	fuəj^1
	bear	*C-muj	muj^4	lead	*hrujʔ	luəj^2
	rain	*fʰun	pɔŋ^1	household clsfr	*ɗun	tuŋ^1
	rainbow	*ʈʂʰun	tɔŋ^1	lips (upper)	*sʰunʔ	tsʰuŋ^1
	lead	*Cutʃhun	tɔŋ^1	a group of ten	*hmun	puŋ^4
	nod	*C-ɲut	ŋɔk^7			
	return	*sʰut	tsɔk^7			
	get away	*C-luɲʔ	lɔn^1			
				tail	*tçʰuc	tsʰuət^9
				ant	*hmuc	puət^8
				needle	*hŋuc	kuət^8

Exceptions are given below:

(77)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	door	*C-mu:n	muan^{1}	*ʔmo:n
		fold	*C-mu:n	ma:n^{1}	*ʔmə:n
	(b)	pond	*Ciɦu:ŋɦ	ʔjɔŋ^{5}	*ʔjʌŋʔ
	(c)	have	*ɗu:k	tɔk^{9}	*ʔdʌk
	(d)	fur	*Cuɦun	hɔ:ŋ^{4}	*ɦʌ:ŋ
		swollen	*ʔun	fun^{4}	*ʋu:n
	(e)	big	*C-luŋ	lo:^{1}	*ʔl[a:]
		Gloss	*PHl*	*Jiamao*	*Tongzha*
	(f)	steam	*CiʔunɦV	tsun^{1}	zun^{5}
		Gloss	*PHl*	*Jiamao*	*Baoting*
	(g)	rotten	*tʰuj	tʰɯj^{5}	tʰuj^{1}
		dust	*fʰu:ŋʔ	puəŋ^{5}	fu:ŋ^{3}
		cricket	*Curu:ŋʔ	fuəŋ^{4}	fu:ŋ^{6}
		pimple	*Curut	lup^{8}	lup^{8}
		worship	*pʰuc	pʰut^{7}	pʰut^{7}
		Gloss	*PHl*	*Jiamao*	*Zandui*
	(h)	parrot (black)	*tçu:ŋɦ	tsuaŋ^{5}	tsuaŋ^{5}
		vine basket	*ku:ŋʔ	kuaŋ^{1}	kuaŋ^{3}

The majority of these (77f-h) appear to be more recent loans from various Qi languages.

5.2.6 *Mid Front Rimes*

The Jiamao reflexes of this small number of forms are all completely regular, and are presumably of recent origin given the lack of diphthongization of these rimes:

(78)	*Proto-Hlai*	*Jiamao*
	*e:m	e:m
	*e:p	e:p
	*e:n	e:n

(79)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 2	*e:m	>	e:m	e:p	>	e:p

	Hlai		*Jiamao*
Stratum 2	*e:n	>	e:n

Examples are given below:

(80)

	PHl	*Jiamao*
ringworm	*C-le:mɦ	le:m⁵
board	*ɓe:nɦ	ɓe:n⁵
sunken	*ɓe:p	pe:p⁹

The initial of the last form would normally indicate an early level of borrowing; it is possible that this could merely be a mistransmission of the initial.

5.2.7 *Mid Central Rimes*

There is a very large amount of variation in this rime class, with the nucleus having been influenced by both the preceding initial as well as the tone category and the place of the coda. There is less variation in the long rimes; the variation in the short rimes, on the other hand, is unmatched (there are a total of seven 'regular' correspondences of *ən).

(81)

Proto-Hlai	*Jiamao*	*Proto-Hlai*	*Jiamao*
*ə:j	ej, ɯj, uj, uəj, a:j	*əj	i:, aj, a:j
		*əɰ	ə:, a:
		*əw	u:, aw, a:w
		*əwɦ/ʔ	iaw, i:w
*ə:m	ɔ:m, iam, am	*əm	ə:m, a:m
*ə:p	əp, ap	*əp	ɔ:p, ep, əp, ap
*ə:n	ɯan	*ən	ɔ:n, iən, uən, en, ə:n, an, a:n
*ə:t	ɯət, ɯat	*ət	ɔ:t, at
		*əɲ	ɯən, ɔn
		*əc	iət, et, a:t, at
*ə:ŋ	ɔŋ, ɔ:ŋ, a:	*əŋ	ɔŋ, ɔ:ŋ, ə:ŋ, aŋ
*ə:k	ɔk, ɔ:k, a:, ak	*ək	ɔk, ak

The following tentative schema, as in the case of the *ɯ* rime class, should be considered only an approximation, with details to be worked out as work on Jiamao becomes more refined:

(82)	(a)	*Hlai*		*Jiamao*			
	Stratum 1	*ə:j	→	ɯj, əj > ej			
			↘				
		↓		uj, oj > uəj			
	Stratum 2	*ə:j	→	ə:j > a:j			
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*ə:m	→	om > əm > am	*ə:p	→	op > əp > ap
			↘			↘	
		↓		ə:m > ɔ:m	↓		op > əp
	Stratum 2	*ə:m	→	ɛ:m > iam	*ə:p	→	—
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*ə:n	→	—	*ə:t	→	ɤt > ɯət
		↓			↓		
	Stratum 2	*ə:n	→	ʌ:n > ɯan	*ə:t	→	ʌ:t > ɯat
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*ə:ŋ	→	əŋ > ɔŋ	*ə:k	→	ək > ɔk
			↘			↘	
		↓		ə:ŋ > ɔ:ŋ	↓		ə:k > ɔ:k
	Stratum 2	*ə:ŋ	→	ə:ŋ > a:	*ə:k	→	ə:k > a:
	(b)	*Hlai*		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*əj	→	əj > i:	*əɰ	→	əɰ > ə:
		↓			↓		
	Stratum 2	*əj	→	əj > aj/a:j	*əɰ	→	ə: > a:
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*əw	→	əw > u:	*əwɦ/ʔ	→	ɛ:w > iaw
		↓			↓		
	Stratum 2	*əw	→	əw > aw/a:w	*əwɦ/ʔ	→	e:w > i:w
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Stratum 1	*əm	→	—	*əp	→	op > əp
			↘			↘	
		↓		—	↓		əp > ɔ:p
	Stratum 2	*əm	→	ə:m > a:m	*əp	→	əp > ap

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ən	→	en/on > iən/uən	*ət	→	—
		↘			↘	
	↓		en, ən > ɔ:n	↓		ət > ɔ:t
Stratum 2	*ən	→	ə[:]n > a[:]n	*ət	→	ət > at

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*əɲ	→	ɤn > ɯən	*əc	→	et > iət, ət > at
	↓			↓		
Stratum 2	*əɲ	→	—	*əc	→	et, ə:t > a:t

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*əŋ	→	ə[:]ŋ > ɔ[:]ŋ	*ək	→	ək > ɔk
	↓			↓		
Stratum 2	*əŋ	→	əŋ > aŋ	*ək	→	ək > ak

The various reflexes in the first stratum of *ə:j appear to be conditioned by the preceding initial, according to whether or not it is bilabial (*uəj*), alveolar (*ɯj*), lateral (*ej*), or rhotic (*uj*) (see examples below in (87)).

There are a small number of rimes in modern Jiamao with a schwa nucleus. In order to explain their lack of lowering to *a*, I hypothesize that these forms had an *o* nucleus until recently, when it dissimilated with the following coda, as in the following example:

(83) ə:p > op > əp

The tendency for short rimes in Hlai tone category C to lengthen has already been mentioned above, and need not be repeated here. Another interesting development in the short diphthongs is the tendency in the earliest stratum to monophthongize when in category A:

(84) əj > i:
əw > u:

The nucleus of Hlai *əwɦ/ʔ seems to have been prone to fronting in Jiamao:

(85)	Stratum 1	*əwɦ/ʔ	>	e:w	>	iaw
	Stratum 2	*əwɦ/ʔ	>	iəw	>	i:w

Besides cases where lengthening is induced via association with Hlai tone C, there were two other situations in which lengthening occurred. The first was in the case of items participating in the change ə > ɔ (86a), and the other was before oral palatal stops (86b):

(86) (a) əp > ɔ:p
əm > ɔ:n
ət > ɔ:t
əŋ > ɔ:ŋ

(b) əc > a:t

In some instances, rimes before an oral palatal stop were fronted:

(87) (a) əc > et > iət
(b) əc > et

Examples are given below. Stratum one borrowings corresponding to long rimes are given in (88a), and stratum two borrowings in (88b). Stratum one borrowings corresponding to short rimes are given in (88c), and stratum two in (88d):

(88)

(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
rope	*ɗə:j	tɯj^1	hen	*hrə:j	ka:j^5
saliva	*hlə:j	ɬɯj^4			
muntjac	*C-lə:j	lej^1			
many	*hlə:j	ɬej^4			
cicada	*hrə:j	kuj^1	widow	*hmə:jʔ	puəj^4
iron	*hrə:j	kuj^1	times (hit)	*C-wə:j	fuəj^1
			foreigner	*C-mə:j	muəj^1
kidney	*C-nə:m	nam^1	sharp	*tɕ^{h}ə:m	ts^{h}iam^1
			redeem	*ʈʂ^{h}ə:mʔ	tiam^1
solid	*t^{h}ə:mɦ	t^{h}ɔ:m^5	bitter	*ɦə:m	ziam^4
close (eyes)	*hɲə:p	ɲap^7	pile up	*hrə:p	kəp^7
break	*p^{h}ə:nʔ	ɓɯan^1			
stay	*ʈʂ^{h}ə:nɦ	tɯan^1			
to smoke	*Cuɦə:n	hɯan^4			

arrow	*C-ɲə:t	ŋɯət^{7}	wind	*hŋwə:t	vɯat^{7}
chew	*Cuɦə:t	hɯət^{10}	ghost	*hwə:t	vɯat^{9}
dense	*ʔə:t	ʔɯət^{7}			
sap	*tʰə:ŋ	ɗa:^{1}	jar	*kə:ŋʔ	kɔ:ŋ^{1}
together	*tʰə:ŋʔ	tʰa:^{1}	pickle	*C-mə:ŋ	mɔ:ŋ^{5}
skin	*C-nə:ŋ	na:^{1}	crooked	*hwə:ŋɦ	vɔ:ŋ^{5}
			spread water	*pʰə:ŋɦ	pʰɔŋ^{1}
			imitate	*tçʰə:ŋ	tsʰɔŋ^{5}
wash	*sʰə:k	tsʰa:^{5}	exchange	*ɓə:k	ɓɔ:k^{7}
deaf	*hlə:k	ɬa:^{2}			
deep	*hlə:k	ɬa:^{2}	overhear/see	*pʰə:k	pʰɔk^{7}
			hide	*pʰə:k	pʰak^{7}
(c)	*PHl*	*Jiamao*	(d)	*PHl*	*Jiamao*
porcupine	*ɗəj	ti:^{1}	chicken	*kəj	kʰaj^{1}
gall bladder	*ɗəj	ti:^{1}	Hlai	*ləj	ɬaj^{4}
			far	*C-ləj	laj^{1}
float	*ɓəw	fu:^{4}	you (pl)	*sʰəw	tsʰaw^{1}
mortar	*ɾəw	lu:^{4}	pot	*tʰəw	ɗaw^{1}
			horn	*ɦəw	haw^{4}
tomorrow	*ɦəwɦ	ziaw^{4}	Fas y. sis hus	*hjəwʔ	tsi:w^{1}
wear (hat)	*Cuŋəwʔ	ɲiaw^{1}	head	*Cuhrəwʔ	ki:w^{1}
banyan	*tʰəwʔ	ɗiaw^{1}	fill w/rice	*kʰəwʔ	hi:w^{1}
water	*C-nəmʔ	na:m^{1}	meat/wild pig	*hrəmʔ	kə:m^{1}
evening	*tçʰəp	tsʰɔ:p^{9}	care for (sprout)	*ɗəp	ɗep^{7}
sew	*C-ɲəp	ɲɔ:p^{9}	extinguish	*tçəp	tsep^{7}
leak	*Ciɦəp	hɔ:p^{9}			
cloth	*ɗəp	təp^{7}	hang up	*hŋəp	kap^{8}
rice	*Cuɾəp	ləp^{8}			

longyan	*ɓənʔ	piən^{1}	livestock clsfr	*hmən	puən^{4}
long/thin thing	*ɗənɦ	tiən^{1}	reins	*hmən	puən^{4}
long clsfr	*ʋənʔ	viən^{4}	silver	*hŋən	kuən^{4}
louse	*t^{h}ən	ten^{1}	take turns	*tç^{h}ən	ts^{h}an^{1}
hungry	*C-ɾən	len^{4}	seed	*f^{h}ən	ts^{h}an^{1}
earth	*Cuɾən	len^{4}	move	*ɦənɦ	han^{2}
tooth	*f^{h}jən	ts^{h}aŋ^{1}			
feed (n.)	*k^{h}ən	haŋ^{1}			
rub (rope)	*p^{h}ən	ɓɔ:n^{1}	clothing clsfr	*f^{h}ənʔ	pa:n^{1}
dream	*f^{h}ən	pɔ:n^{1}	instruct	*C-ŋənʔ	ŋa:n^{1}
day	*hŋwən	vɔ:n^{1}	stem	*C-ŋən	ŋa:n^{1}
			wet	*hmənʔ	pə:n^{4}
			grass	*hŋənʔ	kə:n^{4}
wear	*tç^{h}ət	ts^{h}ɔ:t^{9}	close	*C-ŋət	ŋat^{7}
gnat	*C-mət	mɔ:t^{9}			
nose	*k^{h}ət	hɔ:t^{9}			
sneeze	*ɗəɲ	tɯən^{1}	choose	*hləɲ	tsɔn^{4}
pinch	*ɗəɲʔ	tɯən^{1}			
sparrow	*p^{h}əc	ɓat^{7}	clear land	*hməc	pet^{8}
strangle	*ɾəc	lat^{10}			
tree core	*Cuɦəc	ʔiət^{7}	buy	*ʈʂ^{h}əc	ta:t^{9}
red vine	*kəc	kiət^{7}	forbidden food	*C-ŋəc	ŋa:t^{9}
			drag out	*hwəc	va:t^{9}
drum	*C-ləŋ	lɔ:ŋ^{1}	burn	*ɓəŋ	ɓɔŋ^{5}
pry	*k^{h}əŋɦ	k^{h}aŋ^{1}	dragon	*hnəŋ	tə:ŋ^{4}
be	*tçəŋʔ	tsaŋ^{1}	open eyes	*C-ləŋʔ	lə:ŋ^{1}
finger	*tçək	tsɔk^{7}	stick to	*p^{h}ək	p^{h}ak^{7}

The exceptions in this group are given below:

(89)		*Gloss*	*PHl*	*Jiamao*	*Pre-Jiamao*
	(a)	soak	*ɗə:mʔ	tsiəm^4	*[ɾj]em
	(b)	sink	*tçə:n	tsen^4	*[ɾj]in
	(c)	lid	*hɲə:t	ɲɯt^8	*ɲɯ:t
	(d)	sift	*[ɾj]əw	tsi:w^4	*ɾjiəw
		four	*ʈʂʰəwʔ	tiəw^1	*ʈew
		below	*Cuʈʂʰəw	ta:w^1	*ʈə:w
		fall down	*ɗəwɦ	ɗa:w^1	*ɗə:w
	(e)	mouth	*hməmʔ	muəŋ^4	*moŋ
	(f)	bug	*Ciɦənɦ	zɔ:t^8	*jʌ:t
	(g)	groan	*kəŋ	kiəŋ^1	*geŋ
	(h)	greedy	*ɓət	ɓɯt^7	*ɓɯ:t
		Gloss	*PHl*	*Jiamao*	*Baoting*
	(i)	to hoe	*ɓəwɦ	ɓɔ:w^5	ɓɔ:^{5}

The form in (89e) shows the same dissimilation between the initial and coda which occurred in Cunhua: *mom > *moŋ > muəŋ^4. The form in (89f) is another form which is in tone category B in Hlai, and which seems to have conditioned the misperception of the final nasal as an oral stop in Jiamao. The word *to hoe* (89h) is probably a recent loan from Baoting.

5.2.8 *Mid Back Rimes*

The reflexes of the PHl *oC rimes are given below:

(90)	*Proto-Hlai*	*Jiamao*
	*om	um, əm, ɔ:m, a:m, am
	*op	up, ɔp
	*oŋ	uŋ, əŋ, ɔŋ, a:ŋ, aŋ, uəŋ
	*ok	ɔ:k, a:k

These reflexes overlap to a very large extent with the short *əC rimes above, and it is likely that there was mistransmission in both directions, with both *oC rimes being borrowed as *əC*, and *əC rimes as *oC*. This is also the one case where an *ɔ:C* or *ɔC* reflex may not reflect descent from an earlier schwa-medial form. A tentative schema of borrowing is given below:

(91)

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɔm	→	ɔ:m, om > əm	*ɔp	→	ɔp
		↘				
	↓		ə[:]m > a[:]m	↓		
Stratum 2	*om	→	um	*op	→	up

	Hlai		*Jiamao*	*Hlai*		*Jiamao*
Stratum 1	*ɔŋ	→	ɔŋ, oŋ > əŋ	*ɔk	→	—
		↘			↘	
	↓		ə[:]ŋ > a[:]ŋ	↓		ə:k > a:k
Stratum 2	*oŋ	→	uŋ	*ok	→	ɔ:k

There are two examples of rimes which I hypothesize to have been oC, only recently shifting to əC:

(92) om > əm
oŋ > əŋ

There are also cases where an *oC rime either raised to *uC* or was borrowed that way to begin with:

(93) om > um
op > up
oŋ > uŋ

Examples are given below. Stratum one borrowings are given in (94a), and stratum two borrowings in (94b):

(94)

(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
bamboo (big)	*ɗom	təm^{1}	bamboo (big)	*ɗom	ɗum^{5}
husk	*hrom	kəm^{1}	bury	*hlomɦ	ɬum^{4}
six	*hnom	nəm^{4}	simmer	*m-lomʔ	tʰum^{4}

thing clsfr	*ɦom	kɔːm⁴	ambush	*tʰomʔ	tʰam¹
mute	*C-ŋom	ŋɔːm¹	itch	*kʰom	kʰam¹
wine medicine	*Cuɦom	hɔːm⁴			
cover	*kʰop	kʰɔp⁷	carry	*ʔop	ʔup⁷
winnow basket	*ɗoŋʔ	tuəŋ¹	well	*tʰoŋɦ	tʰɔŋ⁵
to clean	*koŋʔ	kuəŋ¹	thing	*koŋ	kɔŋ¹
shake	*C-ɲoŋɦ	ɲuəŋ⁴	hunchback	*koŋ	kɔŋ¹
neck	*hljoŋʔ	tsaŋ²	vine basket	*ɓoŋ	puŋ¹
resemble	*ɗoŋ	ɗaŋ¹	messy	*C-ɲoŋʔ	ɲuŋ¹
to fish	*ɾoŋʔ	ləŋ²	insert forcefully	*tçʰoŋʔ	tsʰaːŋ⁵
fall	*tʰok	ɗɔːk⁹	sick	*ʈʂʰok	taːk⁹
monkey	*C-nok	nɔːk⁹	steal	*hljok	tsaːk⁸
leg	*kʰok	hɔːk⁹			

There are a small number of exceptions in this category:

		Gloss	*PHl*	*Jiamao*	*Pre-Jiamao*
(95)	(a)	sit	*tçoŋʔ	tsiəŋ¹	*ɟeŋ
		dive	*tçom	tsem¹	*ɟim
	(b)	rice husk	*hmok	pəːk⁸	*hmɐːk
	(c)	pomelo	*ɓom	ɓuəŋ⁵	*ɓoŋʔ

The nucleus of the two words in (95a) seems to have been fronted under the influence of the preceding palatal initials. (95c) appears to be another case of dissimilation, as in the case of *mouth* above: *ɓom > *ɓoŋ > ɓuəŋ⁵.

5.2.9 *Low Rimes*

The *aːC rimes, like the rimes at the other points of the cardinal vowel triangle, are more straightforward and predictable than rimes in other categories (although there is still an appreciable amount of variation). The reflexes of these rimes are given below:

(96) *Proto-Hlai* *Jiamao*

*a:j	ɯj, ɯaj, a:j
*a:w	u:, ɯ:w, ə:w, ɔ:w, a:w
*a:m	əm, ɔm, ɔ:m, a:m
*a:p	ɯp, ɔ:p
*a:n	ɯ:n, uən, ɔ:n, a:n
*a:t	(ɯ:t)
*a:c	uət, a:t
*a:ŋ	ɯ:, ɯa, e:ŋ
*a:k	ɯ:, ɯa

One salient feature of the diphthongs is that there was an early stratum of *a:w rimes which were apparently borrowed as *əw, later shortening to *u:*.

(97) *a:w → əw > u:

There seems to have been a strong tendency towards raising in the first stratum of *a:C loans, which followed the progression below:

(98) *a:C > ɤ:C > ɯ:C

This was the first change which apparently led to the creation of a *ɯ:C category in Jiamao, where none had existed before when Hlai *ɯ[:]C rimes were in the process of being borrowed (generally mixing with the Hlai *ə[:]C category).

The outcome of the second raising which occurred in the *a:C category at a later point in time depended on the codas:

(99) a:j > ʌ:j > ɯaj
a:w > ɔ:w
a:P > ɔ:P
a:T > oT > uəT
a:ŋ > ɛ:ŋ > e:ŋ
a:k > ʌ:ʔ > ɯa^{B}

The tendency for long rimes with bilabial codas to be shortened can be observed here as well:

(100) a:m > om > əm
a:m > əm > ɔm
a:p > ɯp

A schema of borrowing and subsequent changes is given below:

(101)

		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*a:j	→	ɤ:j > ɯj	*a:w	→	əw > u:, ɤ:w > ɯ:w
			↘			↘	
		↓		ʌ:j > ɯaj	↓		ɔ:w
	PHl	*a:j	→	a:j	*a:w	→	ə:w, a:w
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*a:m	→	om > əm	*a:p	→	ɤ:p > ɯp
			↘			↘	
		↓		ɔ:m, əm > ɔm	↓		ɔ:p
	PHl	*a:m	→	a:m	*a:p	→	—
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*a:n	→	ɤ:w > ɯ:n	*a:t/a:c	→	ɤ:t > ɯ:t
			↘			↘	
		↓		on > uən	↓		ot > uət
	PHl	*a:n	→	a:n	*a:t/a:c	→	a:t
		Hlai		*Jiamao*	*Hlai*		*Jiamao*
	Pre-Hlai	*a:ŋ	→	ɤ̃: > ɯ:~ɯʔ	*a:k	→	ɤ:ʔ > ɯ:^{X}
		↓			↓		
	PHl	*a:ŋ	→	ɛ:ŋ > e:ŋ	*a:k	→	ʌ:ʔ > ɯa^{X}

Examples of each stratum are given below. Stratum one borrowings are given in (102a), and stratum two borrowings in (102b):

(102)	(a)	*PHl*	*Jiamao*	(b)	*PHl*	*Jiamao*
	end	*ɓa:jʔ	pɯj^{5}	service	*ɗa:jɦ	ɗa:j^{5}
	intestine	*ɾa:jʔ	lɯj^{4}	envy	*C-ŋa:jɦ	ŋa:j^{1}

cold	*kʰa:jɦ	kʰɯaj^{1}			
sugarcane	*C-ma:jʔ	mɯaj^{1}			
shit	*ɦa:jʔ	hɯaj^{2}			
forehead	*ɗa:w	tu:^{1}	fog	*hŋa:wʔ	kɔ:w^{4}
laugh	*hrja:w	tsu:^{4}	salt	*C-ɲa:wʔ	nɔ:w^{4}
fishy	*kʰa:w	hu:^{1}	cotton	*ɦa:wʔ	hɔ:w^{4}
surround	*hɲa:wʔ	nə:w^{2}	stew	*C-ŋa:wɦ	ŋa:w^{5}
alcohol	*C-ŋa:wɦ	ŋə:w^{2}	spade	*hlja:wɦ	za:w^{4}
mountain forest	*ɗa:wʔ	tɯ:w^{1}			
lift (two people)	*ʈʂʰa:m	təm^{1}	step	*C-ɦa:mɦ	hɔ:m^{2}
branch (tree)	*C-ŋa:mɦ	ŋəm^{2}	step	*Ciɦa:mɦ	za:m^{5}
carry on shoulder	*ʈʂʰa:p	tɔ:p^{9}	bathe	*ʔa:p	ʔɯp^{9}
yawn	*hŋa:p	hɔ:p^{8}			
partridge	*tʰa:nʔ	ɗa:n^{5}			
grind (rice)	*ka:nɦ	ka:n^{5}			
red	*hra:nʔ	ɬɯ:n^{4}	remainders	*ɗa:n	ɗuən^{1}
100	*Cuhra:n	kɯ:n^{1}	village	*C-wa:n	fuən^{1}
snore	*Cuɾa:n	lɯ:n^{4}	moon	*C-ɲa:n	nuən^{1}
poor	*ʋa:t	fɯ:t^{8}			
blood	*hla:c	ɬuət^{8}	stop (turn off)	*C-ŋa:c	ŋa:t^{9}
name	*pʰa:ŋ	pʰɯ:^{1}	ribs	*kʰa:ŋʔ	kʰe:ŋ^{1}
master	*ʋa:ŋ	vɯ:^{4}	crippled	*Ciɦa:ŋɦ	he:ŋ^{2}
			big brother	*ʔa:ŋʔ	ʔe:ŋ^{1}
sweet	*ɗa:ŋ	tɯ:ʔ^{7}			
sheep	*hja:ŋ	tsɯ:ʔ^{7}			
high	*pʰa:k	pʰɯ:^{5}	land leech	*tʰa:k	ɗɯa^{5}
dregs	*ɗa:k	tɯ:^{5}	gill	*C-ŋa:k	ŋɯa^{5}
otter	*hna:k	nɯ:^{2}	plantain	*hwa:k	vɯa^{5}

The following exceptions exist in this series of rimes:

(103)		Gloss	PHl	Jiamao	Pre-Jiamao
	(a)	smell	*ɦa:j	huəj⁴	*ɦoj
	(b)	yawn	*ka:w	hɔ:⁵	*hʌ:ʔ
	(c)	white	*kʰa:w	kʰow¹	*kʰa:
		long	*hna:wʔ	tow⁴	*hna:
		steer	*C-na:w	now¹	*C-na:
	(d)	clothes	*ʋa:ŋʔ	vo:⁴	*w[a:]
	(e)	testicle	*hma:nʔ	pɔ:n²	*hmʌ:nʔ
	(f)	millet	*fʰa:ŋʔ	pɯa¹	*fɯə
		skin (of fruit)	*fʰa:k	pua⁵	*fuəʔ
	(g)	phlegm	*ɦa:k	ha:k⁸	*ɦə:k

The examples in (103c) all lost their labiovelar codas, either at the point of borrowing or sometime afterwards, and followed the regular development of *a:.

5.2.10 *Summary*

The Jiamao to Hlai rime correspondences are significantly more complex than those of the initials, which may suggest a number of possible facts. The first is that there may have been more than two discrete periods of borrowing, as implied by the initial correspondences, or that the two periods of borrowing may not have been discrete. On the other hand, this high degree of variation in rime reflexes may indicate that the speakers of Jiamao were less adept at perceiving differences in the Hlai rime categories than those of the initials, and that the higher degree of confusion over rime identity resulted in the Hlai loans being dispersed cross-categorically in a less-discriminating fashion.

It is apparent that part of the confusion in rime transmission involved the Hlai tone categories. The fact that Hlai tone categories B and C correlate with Jiamao rime length in specific contexts mentioned above indicates that Thurgood (1991: 427) is correct when he suggests that Jiamao speakers 'focused on Hlai voice quality characteristics, ignoring pitch characteristics.'

5.3 The Non-Hlai Lexicon of Jiamao

A select group of Jiamao core vocabulary is discussed in this section, with the twofold purpose of exemplifying its differences with Hlai on the one hand, and of highlighting the non-Hlai core vocabulary for other scholars who may see a connection with another language or language family.

5.3.1 *Prounouns*

The pronoun schema (including the deictics) for PHl and Jiamao is given below:

(104)

	PHl	*Jiamao*		*PHl*	*Jiamao*
1SG	*ɦu:	kaw¹	2SG	*C-mɯ:	məj¹
1PL EXCL	*fʰəw	ʔaw¹	2PL	*sʰəw	tshaw¹
1PL INCL	*hrəw	tej¹			
3SG	*C-na:	nej⁵	this (proximal)	*C-ni:ɦ	nɛ:⁵
3PL	*ɾu:ɦ	mow⁵	that (medial)	*ɦəɰɦ	kɛ:⁴
			that (distal)	*C-ma:ɦ	mɔ:⁵

Of the Jiamao personal pronouns given above, the only ones which seem to be directly related to the Hlai ones are in the second person (and even there, the rime of the 2SG pronoun is irregular). Although the 1sg pronoun appears related (more so because of its resemblance to PTai), the resemblance may be deceptive, as the initial *k* in Jiamao is normally a reflex of either PHl *k or *hr (although see the alternate explanation in section 5.1). Amongst the deictics, the proximal and distal pronouns appear to be related to Hlai (although in the case of the proximal pronoun, the vowel is irregular) but the medial appears to be unrelated.

5.3.2 *Numerals*

The PHl numerals and their Jiamao equivalents are given below:

(105)

	PHl	*Jiamao*		*PHl*	*Jiamao*
one	*tɕʰɯ:	kɯ:²	six	*hnom	nəm⁴
two	*hlu:ʔ	ɬiaw⁴	seven	*tʰu:	ɗaw¹
three	*Cuʈʂʰuʔ	ta:w¹	eight	*hru:	ku:¹
four	*ʈʂʰəwʔ	tiəw¹	nine	*C-wɯ:ʔ	fə:¹
five	*hma:	pu:⁴	ten	*ɦu:t	puət⁹
100	*Cuhra:n	kɯ:n¹			

On the face of it, this semantic group seems to be more uniform, as all of the Jiamao numerals are related to their Hlai counterparts (the numeral *one* is only tentatively reconstructible in PHl, and shouldn't therefore be considered a counterexample). However, in cases where it is discernible, it becomes clear that these numerals were not all borrowed at the same time. Focusing on the initials, it becomes clear that *five* (with an oral stop reflex), is part of a later stratum than *six* (with a nasal stop reflex); *seven* also appears to be part of an earlier stratum. Moving to the rimes (and remembering that as a category they are generally more complex), *eight* (with a pure vowel) appears to be earlier than that of *seven* (with a diphthong).

5.3.3 *Kinship Terms*

There are several kinship terms which stand out in Jiamao as being of non-Hlai origin:

(106)

	PHl	*Jiamao*		*PHl*	*Jiamao*
ancestor	*pʰut pʰu:ʔ	pə:w⁴ tuən⁴	man	*pʰa:ʔ C-ma:n	pʰɯ¹ tsə:⁴
			woman	*hmi:ʔ kʰəwɦ	mɯ² ta:w¹
wife	*kʰəwɦ	na:w⁵	child	*hlɯ:k C-lik	ɬiək⁸ lat⁷
Father's y. sister	*fʰɯ:ʔ	ɦi:⁴	younger sibling	*hru:ŋ	nuəj⁵

The words for *man*, *woman*, and *child* above are interesting for the reason that they all seem to have compounded the initial part of each Hlai form (also compounds themselves) to an older, native form; the rimes of the first two can be explained to be the result of neutralization, common in the case of the first member of Jiamao compound words.

5.3.4 *Body Parts*

There is a large amount of basic body terminology which is unique to Jiamao, such as the following:

(107)

	PHl	*Jiamao*		*PHl*	*Jiamao*
face	*ɗəŋ	pʰan¹	chin	*ɦa:ŋ	tsʰɔ:ŋ¹
ear	*hljəj	kɔ:¹	throat	*kʰə:k	lɔ:k⁸
shoulder	*ʋa:ɦ	vet¹⁰	breast	*tçi:ɦ	ɲen⁵
arm	*kʰi:n	tɯ:n¹	lung	*kəwɦ	vuəŋ⁴
sweat	*Cuʔən	ʔɯat⁷	urine	*ɗu:	tsem⁵

Of these, the words for *face* (~ *nose*), *shoulder*, *arm*, and *chin* are particularly diagnostic of Western Kam-Tai languages, and the absence of the usual Kra-Dai forms here is conspicuous.

5.3.5 *Animals, Insects, and Plants*

Jiamao words for animals (a), insects (b), and plants (c), are compared below:

(108)	(a)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
	horse	*hŋa:ʔ	pə:⁵	pig	*hməw	pəj⁴
	cat	*C-mi:wɦ	ɲa:w⁵	monkey	*C-nok	nɔ:k⁹ tsʰa:ŋ¹
	pangolin	*C-mɯnʔ	tsa:⁴	porcupine	*tçʰinʔ	lu:⁴ low²
	squirrel	*C-ɲa:t	lə:n⁵	bat	*Cuhrɯ:k	tʰiək⁷
	crab	*ɓu:ɦ	tsʰa:k⁹	shrimp	*Cuɾa:ŋ	ʔɔ:⁵
	bird	*sʰəc	nɔ:k⁹	snake	*hlja:ɦ	ɓuət⁷
	(b)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
	gadfly	*hlja:k	nɯa⁵	bee	*kə:j	tej¹
	mosquito	*C-ɲu:ŋ	tsʰak⁷	moth	*tʰəmʔ	tsi:w⁴
	beetle	*ɾa:p	pa:p⁸	bedbug	*kɯp	ɗɔ:p⁹
	(c)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
	bamboo (thin)	*C-la:w	ɓa:¹	white rattan (sm)	*kəc	lej¹
	wt sesame hemp	*kʰa:n	ven⁴	mat grass	*hrji:wʔ	lə:p⁷
	muskmelon	*ʔəj	haŋ¹	coconut	*Ciʔunɦ	pɔ:⁵ tshuək⁷
	mushroom	*ɗit	tsʰaŋ¹	flower	*ʈʂʰa:ŋ	ŋɯa¹
	cotton	*ɦa:wʔ	ɓɔk⁷ hɔ:w⁴	fruit	*ʈʂʰə:m	mɯat⁷
	pit (fruit)	*ʔu:k	hɯət⁷	blighted grain	*hli:p	vu:⁴ vit⁸
	sesame	*hŋɯ:	tiaw⁴			

Of the terms above, it is interesting to note that the Jiamao word for *bird* is very similar to words with that meaning in other branches of Kra-Dai (compare PTai *ɳok), whereas Hlai has an unrelated word. See below for other Jiamao-Tai parallels.

5.3.6 *Natural Objects*

The following words are common vocabulary falling under the general semantic umbrella of *nature*:

(109)

	PHl	*Jiamao*		*PHl*	*Jiamao*
sky	*f^{h}a:ʔ	vuəj^{1}	star	*ɾa:w	tsap^{7}tsin^{5}
hail	*s^{h}inɦ	ts^{h}a:^{5}	frost	*hljin	nɔ:w^{4} vuəj^{1}
wasteland	*hmu:ŋ	fa:^{2}	forest	*hrəŋ	ɲuən^{5}
mountain	*Cuɦəwʔ	tsow^{1}	typhoon	*hwənɦ	p^{h}a:ŋ^{1}
ash	*s^{h}u:ʔ	fa:^{1}	sand	*p^{h}u:ɦ	ɗej^{1}

5.3.7 *Material Culture*

The following words relate to material culture, and are generally well-represented within the Hlai languages proper:

(110)

	PHl	*Jiamao*		*PHl*	*Jiamao*
house	*hrɯ:n	ɬɯ:^{2}	child's house	*kujʔ	ɗɔ:^{1}
animal pen	*s^{h}u:nɦ	ŋat^{7}	trough	*[ʈʂ]^{h}u:	tɔ:ŋ^{1}
bench	*t^{h}imɦ	ɲuən^{1}	mat	*t^{h}ɯ:k	tsiək^{8}
cradle	*ʔu:	ʔə:j^{1}	road	*ku:n	tin^{1}
bamboo hat	*hla:ŋʔ	kuən^{3} lɔ:j^{5}	earring	*hwi:ŋɦ	ts^{h}iaw^{1}
shoes	*kə:mʔ	ləm^{5}	arrow	*s^{h}i:p	pe:^{1}
net (small)	*hrə:jʔ	piw^{1}	fish basket	*C-li:k	ɓa:w^{1}
fan	*hwoŋʔ	p^{h}aŋ^{5}	vine basket	*tç^{h}əwɦ	ɓi:n^{1} lɔ:^{1}
jar	*kəj	lej^{5}	bowl/basin	*Cuʔa:w	la:k^{9}
dagger	*hljiwʔ	ɬiək^{8} k^{h}ua^{1}	handle (knife)	*f^{h}i:nʔ	ɓuən^{1}

5.3.8 *Adjectives and Verbs*

The following list of adjectives (111) and verbs (112) contain a large amount of basic vocabulary, some of which is regularly represented in all branches of Kra-Dai (and conspicuous by its absence in Jiamao):

(111)

	PHl	*Jiamao*		*PHl*	*Jiamao*
black	*ɗəmʔ	ts^{h}ej^{1}	grey	*hma:wɦ	p^{h}u:^{1}
yellow	*hlja:ŋ	tsaj^{4}	indigo	*tç^{h}i:ŋ	ta:^{1}
salty	*Cuɦa:nʔ	taŋ^{2}	spicy	*hrit	kəŋ^{5}
good	*hlin	maŋ^{1}	bad	*ɾja:k	ʔaj^{1}
old (thing)	*ka:wʔ	ʔjɔ:t^{9}	new	*hma:n	ɬaw^{4}
early	*ka:wʔ	puət^{8}	late	*f^{h}əŋ	liaw^{1}
fast	*hjinʔ	ts^{h}iaŋ^{5}	slow	*s^{h}i:ʔ	tsəŋ^{2}

wide	*ɓa:ɲ	vi:^{4}	narrow	*ɓi:p	vi:n^{5}
hard	*tɕ^{h}ə:nʔ	lə:w^{4}	soft	*hmu:t	puək^{7}
dense	*t^{h}i:t	ni:t^{9}	sparse	*hɲwa:nʔ	fuən^{1}
live, fresh	*Cuɾi:p	ɬuət^{8}	rotten	*ʔɯ:nʔ	ɲɯ:t^{8}
vertical	*ɾinɦ	ləŋ^{4}	horizontal	*ɦən	tiam^{1}
blind	*m-la:w	k^{h}iw^{1}	lazy	*C-la:nʔ	lɯam^{2}
beautiful	*hlin C-mɯ:n	nɔk^{7}	young	*hlɯ:k C-mɯ:n	mɯ^{2} niaw^{1}
hot	*Cuʈʂ^{h}əwʔ	ʔjuŋ^{1}	cool (water)	*hrən	ɓe:k^{7}
afraid	*ɗa:ʔ	ɬɔ:^{4}	thin	*C-li:ʔ	ŋa:w^{1}
dry	*ɾa:nɦ	k^{h}a:^{1}	sterile (egg)	*Cuhra:wʔ	tsum^{1} luəŋ^{2}
round	*Cuhrom	la:w^{1}	few	*ɾjəwɦ	tə:k^{8}
empty	*Cuɾajɦ	k^{h}aŋ^{1}	straight	*C-mu:c	kɯŋ^{5}
fine	*ʔu:t	ɲə:p^{8}			

(112)

	PHl	*Jiamao*		*PHl*	*Jiamao*
do	*ʋu:k	leŋ^{1}	understand	*k^{h}u:ŋ	min^{4} taj^{2}
listen	*m-lɯ:	ŋej^{2}	look	*kiw	maj^{1}
eat	*C-lu:ɦ	tej^{5}	swallow	*Ciʔə:mɦ	kuat^{10}
vomit	*f^{h}a:k	ʔɔŋ^{1}	lick	*hlji:mɦ	ɬe:p^{8}
bite	*hŋa:ɲʔ	ɗa:n^{1}	hold in mouth	*f^{h}ə:m	tɔm^{5}
hit	*t^{h}a:jɦ	təp^{8}	cast (seed)	*f^{h}ə:nɦ	ʔia^{1}
cut rice	*t^{h}un	p^{h}ɯ:w^{1}	winnow	*f^{h}ənɦ	vat^{7}
light fire	*ʔɯmɦ	tu:^{5}	boil	*ɗa:n	puət^{8}
flow	*C-ma:w	lɔ:t^{8}	swim	*m-li:	lɔn^{1}
take	*hmət	mi:^{2}	pick up	*tɕ^{h}i:wʔ	k^{h}ɛ:^{5} lə:w^{4}
kill	*ɦu:ʔ	tse:^{2}	call	*tɕa:n	kow^{4}
play	*hrjɯ:k	liaw^{1}	arrive	*ɗa:nʔ	vow^{1}
get	*C-m[e]:k	mɯən^{1}	give	*ɗɯ:	mɯan^{1}
answer	*t^{h}in	hɔ:n^{4}	die	*hla:wɦ; *hlju:j	lɔ:t^{9}
fall	*hla:ɦ	ʔa:^{5}	braid (lg)	*m-li:	ta:^{1}
weave (net)	*k^{h}u:t	ts^{h}a:^{1}	weave (fabric)	*hwi:	ts^{h}up^{7}

5.3.9 *Locatives, Time Words, and Classifiers*

Finally, the following are three groups of lexically closed groups, each with its own collection of basic vocabulary. The first group lists locatives (113a), the second time words (113b), and the final one classifiers (113c):

(113)

(a)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
top	*pʰi:ʔ hnɯ:	law^{1}law^1	inside	*pʰi:ʔ ʔu:k	tsʰu:^{1} ke:^{4}
front	*pʰi:ʔ ɗəŋ	pʰa:j^5 tʰiəŋ^4	outside	*hljɯ:n	lɔ:w^4
side	*fʰa:ŋ	pʰa:j^5	opposite side	*hlɯnɦ	ʔe:k^9
left	*pʰi:ʔ hwi:ŋ	haj^2 huəj^4	right	*pʰi:ʔ hninɦ	pʰa:j^5 pet^{10}
everywhere	*hŋom hŋa:jʔ	vow^1 la:j^4			

(b)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
2 years ago	*hmu:ɦ ɾɯ:	mɯ^2 lut^{10}	3 days later	*hwən Cuɦa:t	kɯ^2 kut^{10}
2 days ago	*hwən ɾɯ:	vɔ:n^1 tsu:n^4	2 days later	*hwən Cuɦɯ:	kɯ^2 ka:^{2}
from before	*tçʰi kʰu:nɦ	tsʰi^1 vɔ:n^1 mɔ:^{5}	morning	*ka:wʔ ɗom	ziaw^4 hɔm^4
last year	*hmu:ɦ pʰənʔ	mɯ^2 lə:j^4	noon	*ʈʂʰa: hŋwən	kɯ^2 ɗuən^5
next year	*hmu:ɦ ɗəŋ	ma:^{1} tʰiəŋ^4			

(c)	*PHl*	*Jiamao*		*PHl*	*Jiamao*
trip clsfr	*ku:n	lem^1	tree clsfr	*kʰɯ:ŋɦ	nɔ:w^5
pile clfr	*C-le:p	ɓa:k^9	needle clsfr	*tçʰu:ŋ	tsʰin^5
land measure	*tçʰa:n	hɯan^1	pile clsfr	*pʰəwʔ	tsu:n^5
person clsfr	*tçu:n	ŋuən^1	speech clsfr	*fʰa:k	tuəŋ^5
bundle clsfr	*ɓi:k	puək^9	long clsfr	*Ciɦa:ɦ	tɯj^1
layer	*hlɯt	fɯ:n^4	pair (of)	*hlɯ:m^C	ʔum^1
piece (of)	*tʰun	ɗat^7			

5.4 Conclusion

Although there is no doubt about the significance of the Hlai component in the Jiamao vocabulary, the data in the previous sections indicate strongly that this vocabulary is ultimately borrowed, and that Jiamao was not originally a

Hlai language (contra Ostapirat (2004)). The correspondence between Hlai and Jiamao initials indicate strongly that there have been at least two stages of borrowing, the first occurring during what was probably late Pre-Hlai, and the second during and/or shortly after the period of Proto-Hlai unity itself.

There is nothing to indicate that Jiamao began borrowing Hlai vocabulary until sometime after the first occurrence of devoicing, intervocalic lenition and the first instance of vocalic transfer occurred in Pre-Hlai. It is possible that Jiamao came into contact with Hlai before the first monosyllabification which occurred before obstruents, and certainly before main-syllable aspiration occurred in Hlai. It also seems unlikely that Jiamao began borrowing before peripheral mid vowel raising, but given the large degree of variation in the Jiamao rime correspondences, it is difficult to be absolutely certain.

There are a handful of lexical items which appear related to Tai:

(114)	*Gloss*	*Jiamao*	*Pre-Jiamao*	*PTai*	*PNT*	*PST*
	rake	pʰə:^{1}	*pʰɐ:	—	—	*pʰɯə
	expose to sun	tɯa^{5}	*[t̪/d]ɯəʔ	*p-ta:k	*p-ta:k	*p-ta:k
	fern	kɯ:t^{9}	*gɯət	*ku[:]t	*kut	*ku:t
	turbid	huət^{8}	*ɦot	—	—	*got
	butterfly	ɓɯa^{1}	*ɓɯə	*ʔbwa:ʔ	*ʔba:^{C}	*ʔbɯə^{C}
	sting	ɗa:n^{4}	*[ɗ]ə:n	—	—	*ʔdan^{C}
	don't	ʔjow^{5}	*ʔja:ʔ	*ʔja:h	*ʔjɯə^{B}	*ʔja:^{B}
	elbow	tsʰua^{5}	*suəʔ	*s[uo]k	*s[uə]k	*so:k
	chisel	tsʰi:w^{5}	*siəwʔ	*si:wh	*si:w^{B}	*si:w^{B}
	official	hɯa^{2}	*ɦɯəʔ	—	*ha:k	—
	firewood	fɯŋ^{4}	*ʋɯ:ŋ	*vwɯ:l	*vwɯl	*vwɯ:n
	answer	hɔ:n^{4}	*ɦʌ:n	*N-xa:n	*hɲa:n	*xa:n
	coarse	ɲə:p^{8}	*ɲɐ:p	*ɲ̊a:p	*ɲ̊a:p	*ɲ̊a:p
	fear	ɬɔ:^{4}	*lʌ:	*l̥a:w	*l̥a:w	*l̥a:w
	slippery	ɲɯan^{5}	*ʔɲɤ:nʔ	*mlɯ:lh	*mlɯ[:]n^{B}	*mlɯ:n^{B}
	scale (of fish)	li:t^{9}	*ʔliət	*klec	*klec	*klet
	last (year)	lə:j^{4}	*ɾɐ:j	*kla:j	*kla:j	*kla:j
	bird	nɔ:k^{9}	*ʔnʌ:k	*ɳok	*ɳok	*nok
	to play	liaw^{1}	*ʔle:w	—	—	*liəw^{B}
	to bark	ki:w^{1}	*giəw	*ʀawh	*hraw^{B}	*haw^{B}
	ear	kɔ:^{1}	*gʌ:	*C-ʀwɯə	*rɯə	*kʰʀu:
	winnow	vat^{7}	*hwət	—	—	*fat
	a cold	vɯat^{7}	*hwɤ:t	—	—	*hwat

It is difficult to know what to make of these parallels. The items above are not numerous enough to suggest that Jiamao is a Tai language with a heavy Hlai superstratum, and the correspondences (particularly in tone) aren't always what would be expected, which suggests that the Tai vocabulary represents another layer of loanwords in Jiamao.

As Thurgood (1997: fn. 7) points out, Jiamao is of extreme value in the reconstruction of Proto-Hlai, and the validation of the stage of Pre-Hlai which existed prior to main-syllable aspiration is particularly important. It is vexing that the origin of the native Jiamao vocabulary is not more forthcoming, but future research (including non-linguistic data) may yet provide further clues into the elusive origin of this Southeast Asian language isolate.

CHAPTER 6

Conclusion

This final chapter is divided into three sections. The first section presents a summary of findings throughout the various parts of this book, and the second provides an overview of the empirical and theoretical contributions of this book. The final section provides a brief discussion of future research.

6.1 Summary of Findings

There are a number of issues which have been treated in this book and, hopefully, clarified to some degree. The first of these is the phylogenetic structure of the Hlai language family. The evidence presented in chapter one provided evidence for a phylogenetic tree, based on innovations inferred from comparison of daughter branches and languages with Proto-Hlai. This tree retains all of the traditional groups from Ouyang & Zheng (1983) except for the Ha branch, where it was shown that each 'Ha' language either represents (Bouhin and Ha Em) or is part of (Lauhut) a separate branch of Hlai, and that these are probably grouped together based on shared cultural context as opposed to actual common descent. It was also argued that vocalic transfer across approximants was more likely to be shared via common descent as opposed to cross-language diffusion, and that this criteria was therefore a valuable one for subgrouping the Central Hlai languages. It was shown that subsequent to the fission of Proto-Hlai into branches, and of these branches into daughter languages, there were several points of intimate contact between various languages in different areas around the island. This contact shows up primarily through loan words, which are discernible through irregular reflexes of segments and tones, but also through various sound changes which have diffused within their respective areas.

An inventory of initials was reconstructed in chapter two for Proto-Hlai and evidence was provided for two types of words, monosyllabic and sesquisyllabic. There is occasionally evidence for the nature of the first vowel in a sesquisyllabic word, preserved in coarticulations on (primarily) approximants which occurred as a result of vocalic transfer. There is a noticeable difference in the kinds of initials which are reconstructed as word-initial as opposed to syllable-initial within a sesquisyllabic word. Most in the former category are reconstructed as aspirated, whereas most in the second category (with the

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exception of the glottal stop) are more sonorous, and include primarily voiced members. Perhaps the most important force driving the evolution of Hlai initials was shown to be temporal compression, which led to continuous reduction of multiple segments in the onset until only a single segment remained.

The rime inventory was reconstructed in chapter three, including both the laryngeal as well as segmental components of the Proto-Hlai rimes. The four Kra-Dai tone categories were examined in the context of Proto-Hlai, and the three-way contrast in the first three categories (the fourth category ending in voiceless oral obstruents) was reconstructed as plain versus breathy voice versus constricted glottis. The segmental rime inventory was reconstructed, with three levels of height, three degrees of backness, and a length distinction in closed rimes. Several places of interaction between rime nuclei and final laryngeal elements were highlighted, including the diphthongization of high vowels before laryngeals in Greater Hlai.

Proto-Hlai was compared with Proto-Tai in chapter four. Comparison with Proto-Tai enabled a tentative reconstruction of Proto-Western Kam-Tai, from which a general evolution to Proto-Hlai could be inferred. Several changes were illustrated involving the initials, the most far-reaching of which include the first initial devoicing, intervocalic lenition and main-syllable aspiration. Two processes which began in Pre-Hlai but were only completed after the breakup of Proto-Hlai were monosyllabification and vocalic transfer. The most fundamental change in the rimes was shown to be peripheral mid vowel raising, which led the original mid vowels *e and *o and the secondarily-derived *ɤ to rise and merge with original *i, *u and *ɯ, allowing original *ɛ to rise in turn to *e.

The Jiamao language was the focus of chapter five. Jiamao has been a consistent enigma in the area of Hlai comparative work, and the idea originally advanced in Thurgood (1992) that Jiamao is originally a non-Hlai language was reinforced heavily in this chapter. Data was presented which shows that a subset of the Jiamao initials have two reflexes of Proto-Hlai initials, indicating two layers of borrowing; the nature of these reflexes also indicate that the earliest contact with Jiamao occurred during a later period of Pre-Hlai. Comparison of the rimes supported this analysis and, if anything, showed that it may be necessary to invoke more than two strata of loanwords in order to explain Jiamao variation, although another factor was undoubtedly transmission errors during borrowing. The fact that the Jiamao tone system is only loosely correlated with that of Proto-Hlai, along with the evidence given for a large group of core vocabulary of non-Hlai origin, serves to underscore the ultimately non-genetic relationship between Jiamao and Hlai.

6.2 Empirical and Theoretical Contributions

The empirical contributions of this book include the collection of the lexicon of Nadouhua, the documentation of Changjiang as a previously unrecorded Hlai language and the collection of much of its lexicon, and the double-checking of the data collected in Ouyang & Zheng (1983) and Ouyang (1998) for the other ten Hlai languages and Jiamao. Audio recordings of approximately two hundred basic vocabulary items were also made in all thirteen languages used in this book with the help of the consultants listed in chapter one. The cumulative data for over 1,000 vocabulary items has been included in the appendix, with accompanying reconstructions based on the analysis given herein.

The collective study of the Hlai languages provides an excellent case study in the dynamics of language contact in a delimited linguistic area, and this book has contributed to an better understanding of the complexities of language contact. While the products of contact with non-Hlai languages (especially Chinese) are easily recognized, the effects of intra-family language contact can be more difficult to distinguish and interpret. Because of the amount of contact which has taken place between the various Hlai languages, there are two principles which have been necessarily emphasized. The first is that when using lexical criteria for subgrouping, it is extremely important to check for regular correspondences. It was noted that in most cases, irregular correspondences are not random, but are the consequence of replacement by a cognate form from a related language. Irregular correspondences are therefore not only important to note for theoretical reasons, but also because they can provide crucial clues about a contact situation which has either gone unrecognized or been underappreciated. The second principle is that when using phonological changes as criteria for subgrouping, care must be taken to separate less common changes which are likely one-time events from more common changes which are prone either to diffusion or to independent occurrence within languages. Less common changes which can be argued to have occurred before the diffusion of more general changes are particularly important evidence in subgrouping, as the likelihood is high that these kinds of changes are in evidence only in languages which have descended from a common ancestor. The implementation of the two principles above has allowed a subgrouping of the Hlai languages to be performed with high confidence, the most notable features of which are the recognition of the initial split between Bouhin and Greater Hlai, and the use of vocalic transfer as a crucial criterion for inclusion in the Central Hlai subgroup.

There are several theoretical contributions which have been made in this book which pertain to an understanding of language change. One outstanding generalization is that speakers of languages in contact situations which are under pressure to conform to a particular template (the monosyllable in this case) may adopt different strategies on their way to convergence. For example, while consonant clusters were generally disfavored, the strategy adopted in Central Hlai to form monosyllables in the case of *m-l sesquisyllables was to allow the ultimate formation of a cluster (most commonly *pl*), whereas the initial consonant was lost in Bouhin and Ha Em. A similar example occurred in the case of post-PHl vocalic transfer, where the information from an original high vowel in a presyllable was preserved as a coarticulation on the main syllable initial in Central Hlai; all information from these vowels was lost completely in Bouhin and Ha Em. This fact is of great value in the enterprise of phonological reconstruction, as the greater the degree of variation is between the daughter languages, the larger the total amount of information which is retained for comparison.

Another important generalization which can be made based on the data in this book is that the more heterogeneous the reflexes of the daughter language, the more complex the proto-phoneme is likely to be from which they descended. It was shown in chapter one that general similarity among the reflexes of the daughter languages is indicative that an identical, or nearly-identical, proto-phoneme can be reconstructed. When there is a large degree of variation, as in the case of the initials which either hosted coarticulations in Proto-Hlai or gained them later in Central Hlai, a more complex phoneme must necessarily be reconstructed in order to account for the variation. The reason for this is that there are fewer opportunities for mistransmission in the case of simple phonemes, whereas the chances that mistransmission will occur in the case of complex phonemes is higher. This can be due to misperception on the part of the learner (Change in Blevins' (2004) model), to variation on the part of the speaker (Choice in the same model), or some combination of both.

A third generalization which can be made is that language change, being non-teleological, can sometimes drift away from the typological norm; the results of such a change may be inherently unstable, however, and further change back toward the typological norm may occur due to biases inherent in the articulatory and auditory systems. An example of this was the change called *main-syllable aspiration*, which resulted in the aspiration of obstruents and the preaspiration of sonorants if they were initial both in the word and the main syllable. This change resulted in a typologically marked situation in Proto-Hlai, in which only preaspirated sonorants occurred in this environment, to the exclusion of plain sonorants. However, this ended up being a temporary state of affairs, as the preaspirated nasals either became unaspirated (Bouhin) or became poststopped nasals (Greater Hlai), and the glides were reanalyzed as weak fricatives, leaving the liquids as the only sonorants which remain preaspirated in some of the daughter languages. In most cases the end results of these changes were either merger with existing categories or repopulation of former categories, a change referred to here as *systemic realignment*.

A fourth generalization is that when the evidence forces the conclusion that the same sound change has occurred multiple times in the history of a language family, it should be considered that a general constraint is involved. This was seen to be true in Hlai in the case of a constraint against voiced obstruents. It was shown in chapter four that PWKT voiced obstruents underwent devoicing in Pre-Hlai. It was also shown in chapter two that devoicing occurred again after the break-up of Proto-Hlai but before registrogenesis, and a third time after registrogenesis. Since there is no evidence which suggests that voiced obstruents (which arise as the result of sound change) remain voiced for any duration, the most economical analysis is therefore to recognize a general constraint against voiced obstruents which may apply whenever the appropriate environment is created; this is preferable to positing three separate obstruent devoicings which were ultimately unrelated.

There are three generalizations which can be made about vocalic transfer. The first is that in situations which involve prosodic change (i.e. the several examples give in chapter four, section 4.3.3), the linearization of consonant and vowel phonemes becomes more easily confused, often leading to a reanalysis of vowel position within the word. In Hlai, this led to a form of metathesis in which the features of original presyllable high vowels were reanalyzed as coarticulated glides hosted by the following consonant. The second generalization is that vocalic transfer interacts with sonority, and it was observed that the higher the sonority of a consonant, the greater the chances of vocalic transfer occurring across it (the one exception being the glides, which may have been exempt from this change due to their inherent similarity with high vowels). The third generalization is that vocalic transfer did not occur simultaneously in the case of the two high vowels. In several cases, vocalic transfer of the front vowel *i* had already occurred in Pre-Hlai, but vocalic transfer of the back vowel *u* did not occur until the break-up of Proto-Hlai, in Central Hlai, although it occurred in several of the same environments.

Finally, this book has made theoretical contributions involving the reconstruction of two important constituents of the Proto-Hlai (and ultimately Kra-Dai) phonological word. The first is the presyllable and the sesquisyllabic word. Ostapirat (2004, 2005) presented the first formal reconstruction of Proto-Hlai in which the existence of sesquisyllabic forms were necessary to fully explain the reflexes of the daughter languages. This book has elaborated on Ostapirat's important observation by refining the reconstruction of sesquisyllabic forms (chapter two) and using this knowledge to improve our understanding of Proto-Western Kam-Tai word shape and related changes in Proto-Tai (chapter four).

The second constituent which has been reconstructed is the category of word-final laryngeals which were the precursors of the tone categories B and C. The evidence supporting the reconstruction of final laryngeals was given in chapter three, and the methodology for the reconstruction of these laryngeals for Hlai was proposed here for the first time. Although the analysis provided here is exploratory, this is a significant achievement in Hlai comparative studies, and provides a model which can be used in other parts of the Kra-Dai phylum (and ultimately in other language families and phyla of Southeast Asia where paradigmatic tone categories exist).

6.3 Future Research

The purpose of this final section is to outline several possible ways for potential research to proceed, and reasons to do so. Focusing first on Hlai-internal research, the Lauhut dictionary compiled by Zheng & Ouyang (1993) is solid proof that additional data collection is both possible and worthwhile. The dictionary is a valuable collection of the Lauhut lexicon which is probably nearly exhaustive. While it becomes obvious upon close inspection that a large portion of the modern lexicon contains borrowings from various Hainan Chinese sources, it also demonstrates that there are a number of native Hlai words which exist that were not available in Ouyang & Zheng (1983). The dictionary therefore offers a ready-made list of vocabulary which may be elicited in the other Hlai languages, offering the possibility of greatly expanding the inventory of Proto-Hlai forms included in this book. It is also highly recommended that data collection is done in parts of Hainan which have not yet been sampled. The 'discovery' of Changjiang during the preparatory fieldwork for this book, coupled with the anecdotal accounts of my consultants, indicates that the existence of as-yet unrecorded Hlai languages or dialects is likely, and all of these have the potential to add evidence to Proto-Hlai reconstruction (as well as other areas of inquiry), as Changjiang has done here. Finally, as the present reconstruction has focused solely on phonological reconstruction of the lexicon, there is obviously room for reconstruction in other parts of the grammar, most notably syntax. It also goes without saying that sociolinguistic research will pay dividends, given the complex mosaic of ethnic and social groups which interact with each other across Hainan. As the Hlai languages in general, and some languages in particular (most notably Nadouhua and Yuanmen) are under pressure from Chinese, resulting in gradual but steady language-shift, any research yet to be done upon Hlai languages is better done sooner rather than later. This is especially true since, while Hlai (like many minority languages) is recognized by the Chinese government, there has never been a writing system developed for any of the Hlai languages and there is no apparent effort being made by the government toward language preservation.

Moving to the topic of Hlai-external research, reconstructions of other Kra-Dai branches need to be revisited and brought current with advances in Western Kam-Tai, including the theory developed here of sesquisyllabic proto-forms. Advances in this area are already being made: Ostapirat's (1999) reconstruction of Proto-Kra already relies on sesquisyllabic theory to a certain degree, and Andy Castro (Castro 2011, Castro & Pan 2014) has advanced a sesquisyllabic analysis for some aspects of Proto-Kam-Sui. As compatative work continues which includes more recently available language data, the reconstruction of Kra and Kam-Sui will ultimately enable a comparison with PWKT, allowing a reconstruction of Proto-Kra-Dai itself; this will also allow the Kra-Dai subgrouping presented in chapter one to be tested more rigorously. It is only at this point that Kra-Dai can best be compared with other language phyla with an eye to uncovering the nature of their prehistorical relationships. The present state of Austronesian studies makes this a promising venture, and recent work on Mon-Khmer family reconstructions, largely due to the work of Paul Sidwell, will enable further comparisons. Continuing work on Sino-Tibetan and Hmong-Mien reconstruction is also desirable; Ratliff (2010) marks a recent advance in the latter. Detailed materials continue to be published (the majority by Chinese linguists) which will faciliate these endeavors, and once appropriate family- and phylum-level reconstructions have been performed, the relevance to Kra-Dai may be pleasantly surprising.

References

Baxter, William & Laurent Sagart. 2014. *Old Chinese: A New Reconstruction*. Oxford University Press.

Benedict, Paul K. 1942. 'Thai, Kadai, and Indonesian: A New Alignment in Southeastern Asia'. *American Anthropologist*, n.s. 44: 576–601.

———. 1975. *Austro-Thai: Language and Culture with a Glossary of Roots*. New Haven: HRAF Press.

Bhaskararao, P. & Peter Ladefoged. 1991. 'Two Types of Voiceless Nasals'. *Journal of the International Phonetic Association* 21.2: 80–88.

Blevins, Juliette. 2004. *Evolutionary Phonology: The Emergence of Sound Patterns*. Cambridge; New York: Cambridge University Press.

Blevins, Juliette & Andrew Garrett. 1998. 'The Origins of Consonant-Vowel Metathesis'. *Language* 74:3. 508–556.

Blust, Robert. 1995a. 'Notes on Berawan Consonant Gemination'. *Oceanic Linguistics* 34 (1): 123–38.

———. 1997a. 'Ablaut in Northwest Borneo'. *Diachronica* 14 (1): 1–30.

———. 1997b. 'Nasals and Nasalization in Borneo'. *Oceanic Linguistics* 36 (1): 149–79.

———. 1998. 'The Position of the Languages of Sabah'. In *Pagtanáw: Essays on Language in Honor of Teodoro A. Llamzon*, Ma. Lourdes S. Bautista (ed.). 29–52. Manila: Linguistic Society of the Philippines.

———. 1999. 'Subgrouping, Circularity, and Extinction: Some Issues in Austronesian Comparative Linguistics'. In *Selected Papers from the Eighth International Conference on Austronesian Linguistics*. Edited by Elizabeth Zeitoun and Paul Jen-Kuei Li. Symposium series of the Institute of Linguistics no. 1. Taipei: Academica Sinica: 31–94.

———. 2000. 'Low-Vowel Fronting in Northern Sarawak'. *Oceanic Linguistics* 39 (2): 285–319.

———. 2001. 'Language, Dialect, and Riotous Sound Change: The Case of Sa'ban'. In *Papers from the Ninth Annual Meeting of the Southeast Asian Linguistics Society 1999*, Graham Thurgood (ed.). 249–359. Arizona State University Program for Southeast Asian Studies, Monograph Series Press, Tempe: Arizona State University.

———. 2002. 'Kiput Historical Phonology'. *Oceanic Linguistics* 41 (2): 384–438.

———. 2006. 'The Origin of the Kelabit Voiced Aspirates: A Historical Hypothesis Revisited'. *Oceanic Linguistics* 45 (2): 311–38.

———. 2007. 'Òma Lóngh Historical Phonology'. *Oceanic Linguistics* 46 (1): 1–53.

Bradley, David. 1978. *Proto-Loloish*. (Scandinavian Institute of Asian Studies Monograph Series, 4.) London: Curzon Press.

Bybee, Joan. 2001. *Phonology and Language Use*. Cambridge; New York: Cambridge University Press.

Campbell, Lyle. 2004. *Historical Linguistics: An Introduction*. Cambridge: The MIT Press.

Castro, Andy. 2011. 'Southern Sui: A Fourth Sui dialect'. *Journal of the Southeast Asian Linguistics Society* (JSEALS) 4(2): 1–31.

Castro, Andy & Pan Xingwen (eds). 2014. *Sui Dialect Research*. Ms. (Originally published in Chinese as 水语调查研究 by Guizhou People's Press, Guiyang, 2014).

Cho, Young-mee & Tracy Holloway King. 1996. Semi-syllables and Georgian Clusters. *TREND VI*, Stanford University.

———. 2003. 'Semi-syllables and Universal Syllabification'. In *The Syllable in Optimality Theory*. Edited by Caroline Féry & Ruben van de Vijver. Cambridge; New York: Cambridge University Press: 183–212.

Crothers, John. 1978. 'Typology and Universals of Vowel Systems'. In Greenberg, Joseph H., ed. 1978. *Universals of human language 2: Phonology*. Stanford: Stanford University Press: 93–152.

Edmondson, Jerold A. *et al.* 2004. 'Sui phonetics'. *Mon-Khmer Studies* XXXIV: 47–66.

Edmondson, Jerold A. & David B Solnit (eds.) 1988. *Comparative Kadai: Linguistic Studies Beyond Tai*. Arlington: Summer Institute of Linguistics, University of Texas.

———. 1997. *Comparative Kadai: The Tai Branch*. Arlington: Summer Institute of Linguistics, University of Texas.

Enfield, N.J. 2005. 'Areal Linguistics and Mainland Southeast Asia'. In *Annual Review of Anthropology* 34: 181–206.

Ferlus, Michel. 1992a. 'Histoire abregee de l'evolution des consonnes initiales du vietnamien'. *Mon-Khmer Studies* XX: 111–126.

———. 1992b. 'Essai de phonetique historique du Khmer'. *Mon-Khmer Studies* XXI: 57–90.

Fu Guangzhong. 1997. *Hainan Cunhua*. Guangzhou: Huanan Ligong Daxue Chubanshe.

Fu Zhennan. 1983. ' "Cun speech" on the West Coast of Hainan Island'. *Minzu Yuwen* 4: 68–71.

———. 1990. 'A dialect island of Li—Natou hua'. *Minzu Yuwen* 1990: 14–18.

Gedney, William J. 1989. *Selected Papers on Comparative Tai Studies*. Ann Arbor: Central South and Southeastern Asian Studies, University of Michigan.

Hansell, Mark. 1988. 'The Relation of Be to Tai: Evidence from Tones and Initials'. In Jerold A. Edmondson & David B. Solnit (eds): 239–288.

Haudricourt, Andre G. 1984. 'La tonologie du Li de Hainan'. *Minzu Yuwen* 4: 17–25.

———. 1989. 'La tonologie du Li de Hainan'. In *South-East Asian Linguistics: Essays in honour of Eugenie J.A. Henderson*. Edited by Jeremy H.C.S. Davidson. University of London: School of Oriental and African Studies.

Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies*. University of Chicago Press.

Heinz, Jeffrey. 2005. 'Optional Partial Metathesis in Kwara'ae'. In *UCLA Working Papers in Linguistics, no. 12, September 2005. Proceedings of AFLA XII, Heinz & Ntelitheos* (*eds.*)

Honda, Koichi. 2005. 'Tone correspondences and tonogenesis in Vietic'. In *Papers from the 15th annual meeting of the Southeast Asian Linguistics Society* (*SEALS XV*). Edited by Paul Sidwell. Canberra: Pacific Linguistics: 177–192.

Kingston, John. 2005. 'The Phonetics of Athabaskan Tonogenesis'. In *Athabaskan Prosody*. Edited by Sharon L. Hargus and Keren D. Rice. John Benjamins: 137–184.

Kwok, Bit-chee. 2006. 'The Role of Language Strata in Language Evolution: Three Hainan Min Dialects'. *Journal of Chinese Linguistics* 34.2: 147–182.

Ladefoged, Peter & Ian Maddieson. 1996. *The Sounds of the World's Languages*. Oxford: Blackwell Publishers, Ltd.

Lavoie, Lisa Marie. 1999. *Phonological Patterns and Phonetic Manifestations of Consonant Weakening*. PhD dissertation, Cornell University.

Li Fangkuei. 1977. *A Handbook of Comparative Tai*. Honolulu: The University Press of Hawaii.

Liang Min & Zhang Junru. 1996. *Dongtaiyuzu Gailun*. Beijing: Zhongguo Shehui Kexue Chubanshe.

L-Thongkum, Theraphan. 1992. 'A Preliminary Reconstruction of Proto-Lakkja (Cha Shan Yao)'. *Mon-Khmer Studies*, 20: 57–90.

Maddieson, Ian. 1984. *Patterns of Sounds*. Cambridge University Press.

Mathangwane, Joyce T. 1999. *Ikalanga Phonetics and Phonology: A Synchronic and Diachronic Study*. Stanford: CSLI Publications.

Matisoff, James A. 1973. 'Tonogenesis in Southeast Asia'. In Larry M. Hyman (ed.), *Consonant Types and Tone* (*Southern California Occasional Papers in Linguistics 1*), 71–95. Los Angeles: University of Southern California.

———. 1975. 'Rhinoglottophilia: The Mysterious Connection Between Nasality and Glottality'. In *Nasalfest: Papers from a Symposium on Nasals and Nasalization*. Edited by Charles Ferguson, Larry M. Hyman, & John Ohala. Stanford University Language Universals Project. Stanford, California: 265–87.

———. 1988. 'Proto-Hlai Initials and Tones: A First Approximation'. In Jerold A. Edmondson and David B. Solnit (eds): 289–321.

Mortensen, David. 2006. 'Tonally Conditioned Vowel Raising in Shuijingping Hmong'. Talk delivered at the 80th annual meeting of the LSA, Albequerque, New Mexico, on January 6th.

Myers, James & Jane Tsay. 2003. 'A Formal Functional Model of Tone'. *Language and Linguistics* 4: 105–138.

Norman, Jerry. 1969. *The Kienyang Dialect of Fukien*. Ph.D. Dissertation: University of California, Berkeley.

Norquest, Peter. 2001. 'The Collapse of the Foot in Oceanic'. In *Proceedings of* WECOL *2001*. University of Washington.

———. 2005. 'Word Structure in Chamic: Prosodic Alignment versus Segmental Faithfulness'. In *Chamic and Beyond: Studies in mainland Austronesian languages*. Edited by Anthony Grant & Paul Sidwell.

———. 2007. *A Phonological Reconstruction of Proto-Hlai*. Ph.D. Dissertation: University of Arizona.

Norquest, Peter & Sean Downey. 2013. 'Expanding the PAn Consonant Inventory'. *Journal of the Southeast Asian Linguistics Society* (JSEALS) 6: 99–145.

Ostapirat, Weera. 1993a. *Proto-Hlai Vowel System*. Masters thesis, Mahidol University.

———. 1993b. 'Evidences of Hlai Dental and Velar Clusters from Savina's Day Variety'. *Mon-Khmer Studies* XXIII: 133–137.

———. 1996. 'Kadai dummy *-ɰ'. *Mon-Khmer Studies* XXVI: 79–89.

———. 1999. *Proto-Kra*. Doctoral dissertation, University of Michigan.

———. 2004. 'Proto-Hlai Sound System and Lexicons'. In *Studies on Sino-Tibetan Languages: Papers in Honor of Professor Hwang-cherng Gong on His Seventieth Birthday*. Edited by Ying-chin Lin *et al.*. Institute of Linguistics. Academia Sinica, Taipei, Taiwan: 121–175.

———. 2005. 'Kra-Dai and Austronesian: Notes on Phonological Correspondences and Vocabulary Distribution'. In *The Peopling of East Asia: Putting Together Archaeology, Linguistics and Genetics*. Edited by Laurent Sagart, Roger Blench & Alicia Sanchez-Mazas. New York: RoutledgeCurzon: 107–131.

———. 2009. 'Proto-Tai and Kra-Dai Finals *-l and *-c'. *Journal of Language and Culture* Vol. 28 No. 2: 42–56.

Ouyang Jueya. 1992. *Li-Han Cidian*. Chengdu: Sichuan Minzu Chubanshe.

———. 1998. *Cunhua. Zhongguo xinfaxian yuyan yanjiu congshu*. Shanghai: Shanghai Yuandong Chubanshe.

Ouyang Jueya & Fu Zhennan. 1988. 'On the Issues of the Genetic Classification of Cunhua on Hainan Island'. *Minzu Yuwen* 1: 8–17.

Ouyang Jueya & Zheng Yiqing. 1980. 'A Brief Description of Li (Hainan)'. *Chinese Minority People's Language*, basic description series. Beijing.

———. 1983. *Liyu diaocha yanjiu*. Beijing: Zhongguo Shehui Kexue Chubanshe: Xinhua shudian Beijing faxingsuo faxing.

Peiros, Ilia. 1998. *Comparative Linguistics in Southeast Asia*. Canberra: Pacific Linguistics series C-142.

Pittayaporn, Pittayawat. 2007. 'Directionality of Tone Change'. In *Proceedings of the ICPhS* XVI, August 6–10, Saarbrucken, Germany.

———. 2009. *The Phonology of Proto-Tai*. Ph.D. dissertation. Department of Linguistics, Cornell University.

Ratliff, Martha. 2010. *Hmong-Mien Language History*. Canberra: Pacific Linguistics.

Ross, Malcolm D. 1988. *Proto-Oceanic and the Austronesian languages of Western Melanesia*. Canberra: Pacific Linguistics.

Savina. Francois M. 1931. 'Lexique Dai-Francais accompagne d'un petit lexique Francais-Day et d'un tableau des differences dialects'. *Bulletin de l'ecole Francais d'Extreme-Orient* 31: 103–199.

Shafer, Robert. 1957. 'Quelque equations phonetiques pour les langues li d'Hainan'. *Rocznik Orientalistyczny* 21: 385–407.

Shaw, Patricia. 1993. 'The Prosodic Constituency of Minor Syllables'. *WCCFL 12*: 117–132.

Shearer, Walter & Sun Hongkai. 2002. *Speakers of the non-Han dialects of China*. Chinese studies vol. 20. Lewiston: The Edwin Mellen Press.

Shintani, Tadahiko L.A. 1991. 'Preglottalized Consonants in the Languages of Hainan Island, China'. *Journal of Asian and African Studies* 41: 1–10.

Sidwell, Paul. 2000. *Proto-South Bahnaric: A Reconstruction of a Mon-Khmer language of Indo-China*. Canberra: Pacific Linguistics 501.

Smith, Norval. 1997. 'Shrinking and Hopping Vowels in Northern Cape York: Minimally Different Systems'. In *Variation, Change, and Phonological Theory*. Edited by Frans Hinskens, Roeland van Hout & W. Leo Wetzels. Amsterdam: John Benjamins: 267–302.

Solnit, David B. 1982. 'Linguistic Contact in ancient Southern China: The Case of Hainan Chinese, Be and Vietnamese'. *Proceedings of the Eighth Annual Meeting of the Berkeley Linguistics Society: 13–15 February, 1982*. Edited by Monica Macaulay *et al.*

———. 1988. 'The Position of Lakkia within Kadai'. In Jerold A. Edmondson & David B. Solnit (eds): 219–238.

Svantesson, Jan-Olof. 1983. *Kammu Phonology and Morphology*. Lund: Liber Förlag.

Thurgood, Graham. 1982. 'Subgrouping on the Basis of Shared Phonological Innovations: A Lolo-Burmese Case Study'. *BLS* (=Berkeley Linguistics Society), pp. 251–260.

———. 1988a. 'Notes on the Reconstruction of Kam-Sui'. In Jerold A. Edmondson and David B. Solnit (eds): 179–218.

———. 1988b. 'K-prefixes in Kam-Sui and Kadai: Some Notes'. In *Languages and History in East Asia: Festschrift for Tatsuo Nishida on the Occasion of his 60th Birthday*. Edited by Paul K. Eguchi *et al.*. Kyoto: Shokado: 229–235.

———. 1991. 'Proto-Hlai (Li): A Look at the Initials, Tones, and Finals'. In *Kadai: Discussions in Kadai and SE Asian Linguistics* III: 1–49.

———. 1992. 'The Aberrancy of the Jiamao Dialect of Hlai: Speculation on its Origins and History'. In *Papers from the first annual meeting of the Southeast Asian Linguistics Society*. Edited by Martha Ratliff & Eric Schiller. Arizona State University Program for Southeast Asian Studies: 417–433.

———. 1994. 'Tai-Kadai and Austronesian: The Nature of the Historical Relationship'. *Oceanic Linguistics* 33.2: 346–368.

———. 1999. *From Ancient Cham to Modern Dialects: Two Thousand Years of Language Contact and Change*. Honolulu: The University of Hawaii Press.

———. 2002. 'Vietnamese and Tonogenesis: Revising the Model and the Analysis'. *Diachronica* 19.2: 333–363.

Wang Li & Qian Sun. 1951. 'First Steps in the White Sand Li Language of Hainan'. *Lingnan Science Journal* 2.11: 253–300.

Weidert, Alfons. 1987. *Tibeto-Burman Tonology*. Amsterdam: John Benjamins.

Yip, Moira. 2002. *Tone*. Cambridge: Cambridge University Press.

Zheng, Yiqing & Ouyang Jueya. 1993. *Li Han cidian*. Chengdu: Sichuan Minzu Chubanshe.

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