A PHONOLOGICAL RECONSTRUCTION OF PROTO-HLAI

by

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This dissertation is dedicated to my wife, Grace, for her enduring support and companionship during our fieldwork in Hainan and the following years of writing this dissertation, and to my parents, Erik and Karen, for encouraging me to follow my own path of learning and discovery.

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ABSTRACT

This dissertation 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, followed by a discussion of contact relationships and a discussion of reconstruction methodology. 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; the initial inventory 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 features 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, Proto-Be, and Proto-Southwest Tai, and a preliminary reconstruction of Proto-Southern Kra-Dai (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 obstruent lenition, vocalic transfer, aspiration of word-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 reveal at least two layers of Hlai loanwords in Jiamao, and evidence Jiamao was originally very different from Hlai structurally. Finally, the Proto-Hlai lexicon is compared with those of other Southeast Asian language phyla, and it is shown that Hlai retains evidence of shared lexicon (via either a genetic or contact relationship) with Sino-Tibetan, Mon-Khmer, Hmong-Mien, and Austronesian, the last of which is particularly striking. The dissertation concludes with a summary of findings, empirical and theoretical contributions, and suggestions for future research.

CHAPTER ONE: INTRODUCTION

The purpose of this dissertation 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 thirteen languages have been used in the reconstruction, all of which are spoken on the island of Hainan, China. The theoretical goal of this dissertation are 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 dissertation is a significant contribution to the field of Kra-Dai (and more generally Southeast Asian) historical linguistics, in that it 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 reconstructive 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-Southwest Tai and Proto-Be. An analysis of the relationship between Jiamao, a non-Hlai language isolate, and the rest of Hlai with which it has been in longstanding contact is treated in chapter 5. The conclusion of the dissertation (chapter 6) includes a discussion of prehistoric relationships with other Southeast Asian language families and phyla.
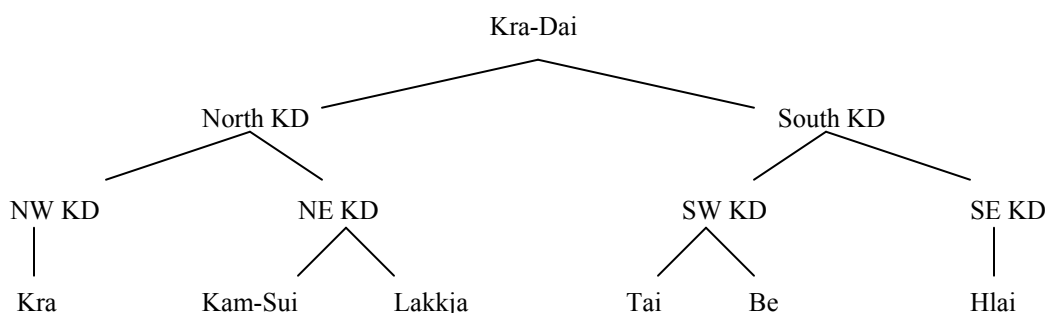
1.1 Background

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

(1)   Kra   Hlai
        Kam-Sui   Tai
        Lakkja   Be

Of these six groups, Lakkja and Be are relatively small, consisting of only a few languages each. It is generally felt that Lakkja is 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; Thongkum (1992), on the other hand, considers Lakkja closer to Tai based on a count of 243 reconstructed Lakkja lexical items. When compared with the three traditional subgroups of Tai (Southwest, Central, and Northern), Be bears a resemblance specifically to Northern Tai, indicating that it may not only be part of the Tai group proper, but could form a subgroup with Northern Tai, having become divergent largely through its own displacement to Hainan; confirmation of this hypothesis, however, must await a full reconstruction of Proto-Tai (especially Northern Tai). Ostapirat (2005:108) also hypothesizes that at the highest levels of the Kra-Dai phylogenetic tree, Kra and Kam-Sui form a subgroup in opposition to another subgroup formed by Tai and Hlai, effectively constituting a Northern Kra-Dai versus a Southern Kra-Dai. 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 lends some credibility to Ostapirat's hypothesis. Bearing in mind that this classification is still tentative and awaiting final proof, the figure below represents a more articulated working model of the Kra-Dai family:

(2)   Figure 1:   Kra-Dai Phylogenetic Tree

```
                              Kra-Dai
                   _____|_____
                  |                                 |
              North KD                          South KD
          _____|_____                    _____|_____
         |               |                  |             |
       NW KD           NE KD              SW KD         SE KD
         |            ___|___             __|__           |
         |           |       |           |     |          |
        Kra       Kam-Sui  Lakkja       Tai    Be        Hlai
```

Although reconstructions of various degrees of detail exist for all of the families above, Proto-Hlai will be compared specifically with other Southern Kra-Dai proto-languages (Proto-Be and Proto-Southwest Tai) in chapter four, since they are tentatively assumed to be its closest relatives within Kra-Dai.

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 1993:1), 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 classified here 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
	NWCHl			62,500
		Cunhua (Ngan Fon)		60,000
		Nadouhua (Dongfang)		2,500
	Jiamao			52,300

As can be seen from the figure 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 Methodology and Materials

Data for this dissertation 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, I 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 'discovered' and recorded 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 (1993: 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 Hiai, includes a smaller number of words (150), and is obviously a Qi language, although it is more difficult to associate it with one of the three specific languages used in the present study. These languages were recorded in Vietnamese script, 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 -*ɯ* (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), which is a large and detailed reference on the Hlai languages that provides data on nine Hlai 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, 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 2000), which is the term adopted here for the reasons argued therein.

According to Ostapirat (1993:17), Shafer (1957) was the first to present comparative work on Hlai; this reference has unfortunately been unavailable to me.

Solnit (1982), using data from Ouyang & Zheng (1980), treated registrogenesis and its connection with Hlai nasals and fricatives (Ostapirat 1993:17; this conference paper has also been unavailable to me).

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 (1991a) 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 (1991b) 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 (1991a). 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 -*ɯ*, 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 are often both 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 1.6. 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)), but 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 models.

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

(5)

Language A——*Change Y*————————➤
                    ↑
Proto-Language ———*Change X*————<   Separate innovations
                    ↑   ↓
          Single innovation   Language B——*Change Z*————————➤

However, all evidence indicates that although there were some important changes which happened in 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 spread 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 branch of Southern Min Chinese spoken on Hainan (Hainanese), have participated in more recent changes such as stop implosivization 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 the changes were effected. This is a 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 informally 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 was 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 Subgrouping

This section is divided into three parts. The first part (1.5.1) outlines and explains the theory of subgrouping which will be used to subgroup the Hlai languages, the second part (1.5.2) gives the Hlai family tree itself, and the third (1.5.3) 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:

(7)   Order of the Hlai languages when given in examples

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

1.5.1 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, which there is nevertheless enough data for 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 be 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 is an innovation. The fact that the first and second languages retain an inherited form in (8a) 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 (8b), 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:

(8)   (a)   *X   (b)   *X
                   / \   / \
                 /   *X   /   *Y
                /   / \   /   / \
              X   X   Y   X   Y   Y

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

(9) Gloss   Proto-Hlai   Hlai language data

     pound rice   *tɕʰaːk   tsʰaːʔ⁷ tsʰeːʔ⁷ tsʰeːk⁷ tsʰeːʔ⁷ tsʰeːʔ⁷ tsʰeːʔ⁷

                                     tsʰɛk²   sɛʔ⁴   tsʰeːʔ⁷ tsʰɯː²   pʰaw³   pʰaw³

It must occasionally be asked if a reconstructed form is truly a descendant 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:

(10)   (a)   *X   (b)   ?

                  *X   *Y

       X   X   Y   X   Y   Y

In (10a), 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 (10b), 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 innovation can be identified in a situation like that shown in (10b) 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 for several examples). An example of

this is given below:

(11)   Gloss   Hlai language data

       house   rɯːn¹   luŋ³   ploŋ³   ploŋ³   poŋ³   ploŋ³
                       kɯn¹   pjaŋ³   poŋ³   ploŋ³   ploŋ³   ploŋ³

In this case, the evidence at face value seems to strongly indicate that the Proto-Hlai form should be reconstructed as *p-loŋʔ, with innovations in Bouhin and Cunhua. However, there is evidence from both the Southwest Tai (*rɯən) and Be (*ra:n) branches of Kra-Dai 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.

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, which can give 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 Chinese 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:

(12) <u>Gloss</u>   <u>Hlai language data</u>

kick $t^hi{:}ʔ^8$ t^ham^2 $t^he{:}k^8$ $t^he{:}ʔ^7$ $t^hi{:}ʔ^9$ t^hek^9
                ----   ----   ---- $t^he{:}k^8$ t^het^7 $tiaʔ^7$

Although all of the forms 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 the rest of these words as loans. The first is that the tone indicated with 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 the one in Baoting, they reflect a variety of earlier rimes including *i:k, *a:k and *it.

Finally, these can be compared with Chinese 踢 (Mandarin $t^hi{:}^1$), to which the general shape of the Hlai

forms 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):

(13)   <u>Gloss</u>   <u>Proto-Hlai</u>   <u>Hlai language data</u>

         a fly   *hwa:ŋʔ   va:ŋ³   ve:ŋ³   hwe:ŋ³   ve:ŋ³   nuaŋ⁴tʰa:⁵ ɲuaŋ¹
                                               zuy¹   veŋ³   ve:ŋ³   ve:ŋ³   ɲuŋ¹tʰa:² ɲuŋ⁴tʰa:⁵

In this case, the Proto-Hlai form *hwa:ŋʔ has been inherited in most 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 cause a critical misanalysis as long as the criteria outlined below are adhered to.

1.5.1.1 Subgrouping: The Lexicon

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

(14)   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 (14a) is that an innovation which occurs at some intermediate level should be inherited by all daughter languages and only those languages. The rationale for (14b) is that irregular sound correspondences are more likely to indicate a lateral contact relationship (where one language has borrowed from another) rather than one of vertical inheritance.

If both of these criteria are met, then the only remaining consideration is to what extent (14a) holds true. Technically, two languages can be subgrouped together on the basis of a single lexical item which fulfills the requirements of (14) above. On a more practical level, however, 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.

1.5.1.2 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 unlikely 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 onto 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 separate occurrences seem unlikely, and therefore the languages which exhibit the change are 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, tʃ^h and ʃ to the alveolar phonemes ts, ts^h and s. This change occurred in the majority 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, but 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 *tʃ^h:

(15)   Proto-Hlai   Hlai language data

| *tʃʰ | tsʰ | tsʰ | tsʰ | tsʰ | tsʰ | tsʰ |
| | h | h | tsʰ | tsʰ | tsʰ | tsʰ |

While the common change from *tʃʰ to *tsʰ* 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 *tʃʰ to *h* occurred in the direct ancestor of Cunhua and Nadouhua

(Northwest Central Hlai), after which the change from *tʃʰ to *tsʰ* diffused throughout the remaining

subgroups and daughter languages at some later point.

Another example can be seen in the following reflexes of PHl *lj (the use of bold font indicates

low register – see chapter two):

(16)   Proto-Hlai   Hlai language data

| *lj | 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 *lj to *z*. The Qi languages, on the other hand, all show the reflex *ɬ*. It is

therefore assumed that Proto-Qi *lj changed to *ɬ* (via the intermediate stage of *ɮ*) during the time that most

if not all other Hlai languages still retained original *lj*. The change *lj to *z* then 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.

1.5.2 Subgrouping the Hlai Languages

   The subgrouping of Hlai languages adopted in this dissertation largely overlaps but is non-identical with the traditional classification given in figure (3) above. 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* (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 language contact which would have accompanied it[1]. 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 (1993) 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

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

the case is that the Hlai groups which were not in contact with other more recent (primarily Chinese) immigrants at 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 dissertation is given in (17), with alternative language names found in the literature given below the names used here (subgroup labels are explained below):

(17)   Figure 2:   Hlai Phylogenetic Tree

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. This map is deceptive in one sense, in that it gives the illusion that languages are restricted to a particular area, which is somewhat true of the Central Hlai languages, but not of the rest. 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.

 (18)   Figure 3:   Locations of the Hlai and Be languages of Hainan

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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 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[2] 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 West 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).

1.5.3 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.

1.5.3.1 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

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[2] The name *Moyfaw* is derived from PHl *C-məːy tʃʰwəw > PWCHl *ʔmɔːy fəw 'below Chinese', or '(those) under the Chinese'.

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 pre-aspirated at the stage of Proto Hlai. In Bouhin, the pre-aspirated 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 *r merged in Bouhin with PHl

*ɾ, while it changed to a rhotic approximant in Greater Hlai:

(19)   PHl   BH   GHl

        *hm   m   *mb
        *hn   n   *nd
        *hɲ   ɲ   *ɲɟ
        *hŋ   ŋ   *ŋg
        *hl   ɗ   *hl
        *(h)r   ɾ   *ɹ

In addition to this, there was a constraint which developed in Bouhin against fricatives; the

defricativization of the labial fricatives are a specifically Bouhin innovation:

(20)   PHl   BH   GHl

        *f p^h *f
        *C-β   p (< b < β)   *C-β

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:

(21)   PHl   BH   GHl

        *i:ɦ/ʔ $ey^{B/C}$ $(< i:^{B/C})$ $*əy^{B/C}$
        *ɯ:ɦ/ʔ $əɰ^{B/C}$ $(< ɯ:^{B/C})$ $*əɰ^{B/C}$
        *u:ɦ/ʔ $ow^{B/C}$ $(< u:^{B/C})$ $*əw^{B/C}$

In rimes with a schwa nucleus closed by stops, Bouhin has undergone two innovative developments. In the short series of rimes, the nucleus was colored by the following stop (22a). 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 (22b):

(22)	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 the velar-closed rimes with long low nuclei. These remained unchanged in Bouhin, whereas they fronted in Greater Hlai to low front vowels.

(23)	PHl	BH	GHl
	*a:ŋ	a:ŋ	*ɛ:ŋ
	*a:k	a:ʔ	*ɛ:k

1.5.3.2 Bouhin and Ha Em vs Central Hlai

There are certain initials in PHl which actually represent the initial of a main syllable preceded by a sesquisyllable. In general, there is a strong prohibition against liquid clusters in the Hlai languages. However, there is one exception, that being PHl *p-l. In Bouhin and Ha Em (HE), the initial consonant debuccalized and merged with PHl *C-l. In Central Hlai, on the other hand, the two consonants merged into a cluster (24a).

There are another set of initials which included coarticulated glides at the stage of Proto-Hlai. Of the three initials which had labiovelar glides, these were deleted in two of them (24b) (with the third, PHl *hŋw, merging with *hw as it did in most other languages).

In several other instances where a PHl presyllable contained a high vowel, it was 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 (24c). This metathesis, as an innovation, is the most important diagnostic feature of the Central Hlai group:

(24)	PHl	BH	HE	CHl
(a)	*p-l	l	l	*pl
(b)	*tʃʰw	tsʰ	tsʰ	*tʃʰw
	*Cuŋw	ŋ	ŋ	*Cuŋw
(c)	*Cuɾ	ɾ	ɾ	*Cuɾw
	*Cur	ɾ	g	*Cuɹw
	*Ciɦ	h	h	*Ciɦj
	*Cuɦ	h	h	*Cuɦw
	*Ciʔ	ʔ	ʔ	*ʔj
	*Cuʔ	ʔ	ʔ	*ʔw

1.5.3.3 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:

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

A chain shift occurred in NCHl involving the rimes with high vowels, where rimes with long high vowels were shortened, and those with short high vowels were lowered to mid vowels; both categories were preserved in ECHl:

(26) <u>PHl</u>   <u>CHl</u>   <u>ECHl</u>   <u>NCHl</u>

*i:C   *i:C   *i:C   *iC
*ɯ:C   *ɯ:C   *ɯ:C   *ɯC
*u:C   *u:C   *u:C   *uC

*iC   *iC   *iC   *eC
*ɯC   *ɯC   *ɯC   *ɤC
*uC   *uC   *uC   *oC

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

(27) <u>PHl</u>   <u>CHl</u>   <u>ECHl</u>   <u>NCHl</u>

*oŋ   *oŋ   *oŋ   *ɔŋ
*ok   *ok   *ok   *ɔk

1.5.3.4 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 coarticulated initials. First, the PHl affricate *tʃʰw became *f* in Lauhut but merely reduced to *tʃʰ in the Qi languages. In the case of *lj, Lauhut simplified this to the glide *j (then becoming *z*), while in Qi it became a voiced lateral fricative *ɮ. PHl *Ciɾj and *Cuɾw became *r and *rw respectively in ECHl, and both underwent fortition in Qi to *d and *v respectively, whereas the former remained *r* and the latter simplified to *w* in Lauhut.

(28)

PHl	ECHl	LH	Qi
*tʃʰw	*tʃʰw	f	*tʃʰ
*lj	*lj	z	*ʐ
*Ciɾj	*r	r	*d
*Cuɾw	*rw	v (< w)	*v

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

(29)

PHl	ECHl	LH	Qi
*ə:y	*ə:y	o:y	*a:y

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

(30)   Development of palatal finals in ECHl

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 which were closed by velars diphthongized in Qi, but remained pure in Lauhut:

(31)

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

1.5.3.5 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 *tʃʰ, which remained an affricate in NECHl, but which deaffricated to a fricative in NWCHl (a parallel development with Proto-Be) (32a).   While PHl *s remained alveolar in NECHl, it interdentalized to *θ in NWCHl (32b). Finally, NWCHl is also 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 (32c):

(32)	PHl	NCHl	NWCHl	NECHl
(a)	*tʃʰ	*tʃʰ	*x	*tʃʰ
(b)	*s	*s	*θ	*s
(c)	*hŋw	*hŋw	*ɣw	*w

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:

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

1.5.3.6 Meifu vs Run

There are four different lines of evidence supporting the distinction between Meifu and Run in the initials. The first is PH *s, which remained *s in Meifu but which affricated to *tsʰ in Run. The PHl palatalized coronals *lj and *Cirj developed differently; the first simplified to *j in Meifu but remained unchanged in Run, whereas the latter depalatalized to the variants *d and *r in Meifu, but was in variation in Run between *d and palatalized *rj. Finally, NECHl *C-β and *Cuɾw both simplified to *ʔw in Meifu, but became labial fricatives in Run:

(34)   PHl   NECHl   Meifu   Run

     *s   *s   *s   *tsʰ
     *lj   *lj   *j   *lj
     *Ciɾj   *rj   *d~r   *d~rj
     *C-β   *C-β   *ʔw   *β
     *Cuɾ   *Cuɾw   *ʔw   *v

There are several rimes which underwent diphthongization in Run but which retained long pure

nuclei in Meifu (35a). In addition, PHl *ə:k underwent the same changes as other *ə:C rimes in Meifu, but

shortened idiosyncratically in Run (35b):

(35)   PHl   NECHl   Meifu   Run

(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

1.5.4 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 *Cifij and *Cufiw 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

*tʃʰ, *s, and *hŋw, but also by a handful of other changes. Finally, Meifu and Run are distinguished by

developments primarily in the approximants 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).

1.6 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.

1.6.1 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.

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[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.

1.6.1.1 Ha Em to Bouhin

At some point in the individual development of Bouhin, there was a change from PHl *f 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:

(36)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
hold in mouth	*fə:m	fo:m[1]	po:m[1]	p^ham[1]
side	*fa:ŋ	fe:ŋ[1]	pe:ŋ[1]	p^ha:ŋ[1]
shoulder pole	*fi:k	fi:ʔ[7]	pi:ʔ[9]	p^hi:ʔ[7]

In (37), 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:

(37)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
k.o. reed	*fa:w	fa:w[1]	fa:w[1]	p^ha:w[1]
vicious	*fən	fan[1]	fan[1]	p^hen[1]

The examples in (38) 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). These irregular initials are accompanied by irregular rimes in all but two cases:

(38)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
stupid	*hmə:y	po:y[1]	po:y[1]	ma:y[1]
widow(er)	*hmə:yʔ	po:y[3]	po:y[3]	ma:y[3]
tadpole	*hnu:ɦ	tow[2]	tow[2]	now[2]
pocket	*hni:ɦ	tay[2]	tay[2]	ney[2]
chop	*hnək	tak[7]	tak[7]	nok[7]
carp	*hŋa: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*:

(39)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
hear it said	*hli:ŋ	ɬi:ŋ^1	ti:ŋ^1 (< si:ŋ^1)	ɗi:ŋ^1
plague	*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:

(40)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
pile up	*rə:p	go:p^7	go:p^7	rap^7
cool (water)	*rən	gan^1	gan^1	ren^1
not	*Curi:ɦ	gay^2	gay^2	rey^2

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

(41)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
drip (cntr)	*k^{h}ok	k^{h}uk^7	k^{h}uk^7	k^{h}ok^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:

(42)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
bee	*kə:y	ko:y^1	ko:y^1	ka:y^1
hold in mouth	*fə:m	fo:m^1	po:m^1	pam^1
love (enjoy)	*ʔə:p	ʔo:p^7	ʔo:p^7	ʔap^7
sleep	*tɕə:n	tso:n^1	tso:n^1	tsan^1
(tie) tight	*fə:t	fo:t^7	p^{h}o:t^7	p^{h}at^7

pickle	*C-mə:ŋ	mo:ŋ^1	mo:ŋ^1	maŋ^1
heart	*Cufiə: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:

(43)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
shrimp	*Cuɾa:ŋ	re:ŋ^1	re:ŋ^1	ra:ŋ^1
phlegm	*fia: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:

(44)

Gloss	PHl	Ha Em	Bouhin	Expected Bouhin
empty	*Cuɾi:fi	ray^2	ray^2	rey^2
crocodile	*ki:ʔ	kay^3	kay^3	key^3
village	*ɓu:ʔ	ɓaw^3	ɓaw^3	ɓow^3
care for	*ɗəp	ɗap^7	ɗap^7	ɗop^7
curse	*tʰən	tʰan^1	tʰan^1	tʰen^1
gnat	*C-mət	mat^7	mat^7	met^7
groan	*kəŋ	kaŋ^1	kaŋ^1	koŋ^1
stick to	*pʰək	pʰak^7	pʰak^7	pʰok^7

1.6.1.2 Bouhin to Ha Em

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

(45)

Gloss	PHl	Bouhin	Ha Em	Expected Ha Em
mother	*hmi:ʔ	mey^3	mey^3	pay^3
mat. grandmother	*hna:ʔ	na:^{3}	na:^{3}	ta:^{3}
aunt	*hŋi:n	ŋi:n^1	ŋi:n^1	ki:n^1
fall	*hla:ɦ	ɗa:^{2}	ɗa:^{2}	ɬa:^{2}
bat (animal)	*Curɯ:k	rɯ:k^7	rɯ:k^7	gɯ:k^7
to plant	*Cura:	ra:^{1}	ra:^{1}	ga:^{1}

1.6.2 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:

(46)

Gloss	PHl	Jiamao	Ha Em	Bouhin
exchange	*p-ləy	ɓɔ:k^7	ɓo:ʔ^7	ɓo:ʔ^7
well (n.)	*tɕʰu:ŋʔ	tʰɔŋ^5	tʰuŋ^2	tʰuŋ^2
be	*C-mən	tsaŋ^1	tsaŋ^3	tsaŋ^3

1.6.3 Jiamao and Baoting

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

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

(47)

Gloss	PHl	Jiamao	Baoting	Expected Baoting
roll around	*p-li:n	lin^1	li:n^1	pli:n^1
non-rtns. rice	*tɕi:mʔ	tsiam^1	tsiam^1	tsi:m^3
dirty	*si:k	tsʰiak^7	tiak^9	tiak^7
solemn silence	*ʔik	ʔi:k^9	ʔi:k^7	ʔik^7
blackhead	*Cuɾɯp	lup^8	lup^8	lɯp^8
grandfather	*pʰu:ʔ	pə:w^4	pʰə:w^6	pʰaw^3
die out	*tɕəp	tsep^7	tsep^7	tsap^7
cloth	*ɗəp	təp^7	ɗəp^7	ɗap^7
alcohol	*C-ŋa:wʔ	ŋə:w^2	ŋə:w^5	ŋa:w^3
goose	*C-ŋa:nɦ	ŋə:n^5	ŋə:n^5	ŋa:n^5

1.6.4 The Qi branch

There has been a certain amount of interaction within the Qi branch in terms of contact. 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 (48) are probable loanwords from Zandui into Tongzha:

(48)

Gloss	PHl	Zandui	Tongzha	Expected Tongzha
flood	*vəc	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:

(49) | Gloss | PHl | Tongzha | Zandui | Expected Zandui |
|---|---|---|---|---|
| kiss | *ɾjuːc | tuːt^8 | tuːt^8 | tʰuːt^8 |
| scratch | *rɯnɦ | gɯn^2 | kɯn^5 | hɯn^2 |
| aim at | *rəɲ | gan^4 | gan^4 | han^4 |
| cricket | *Cuɾuːŋʔ | fuːŋ^6 | fuːŋ^6 | fuaŋ^6 |
| spider | *kʰuːŋ | kʰuːŋ^1 | kʰuːŋ^1 | kʰuaŋ^1 |
| mix | *ɾəp | rop^8 | lop^9 | lap^8 |
| care for (sprout) | *ɗəp | ɗop^7 | ɗop^7 | ɗap^7 |

The following are examples of loans from Tongzha into Baoting:

(50) | Gloss | PHl | Tongzha | Baoting | Expected Baoting |
|---|---|---|---|---|
| box the ears | *pʰiːk | pʰiaʔ^7 | pʰiaʔ^7 | pʰiak^7 |
| toe | *sit | 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 | kʰoː^5 | kʰoː^5 | kʰɔː^5 |

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

(51) | Gloss | PHl | Jiamao | Zandui | Expected Zandui |
|---|---|---|---|---|
| steel | Cuɦaːc | huaʔ^7 | huaʔ^7 | vaːt^7 |

1.6.5 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:

(52)

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 the genesis of contour tones. It can be seen that Moyfaw is nearly identical, the only exception being in category C. Changjiang is a bit 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 Moyfaw, but which have parallels in Lauhut:

(53)

Gloss	PHl	Lauhut	Moyfaw	Expected Moyfaw
arrow	*si:p	ti:p^7	tip^7	sip^7
calf	*ɾjinʔ	reɲ^3	ren^3	ten^3
leopard	*Cufiu:yʔ	hu:y^3	huy^3	ŋuy^3
clear	*ra:w	ga:w^1	ɣa:w^1	xa:w^1
cast (sand)	*Curuy	vuy^1	vuy^1	ɣuy^1

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

(54)

Gloss	PHl	Lauhut	Moyfaw	Expected Moyfaw
unhusked rice	*C-mi:nʔ	mi:n^3	min^3	miŋ^3
connect	*tɕʰu:nʔ	tsʰu:n^3	tsʰun^3	tsʰuŋ^3
tumor	*fə:n	fo:n^1	fon^1	fo:ŋ^1
just now	*ʔənʔ	ʔan^3	ʔan^3	ʔaŋ^3
coffin	*koɲɦ	koŋ^2	koŋ^2	kɔŋ^2
flea	*hmə:t	po:t^7	po:t^9	po:k^7
greedy	*ɓət	ɓat^7	ɓat^7	ɓak^7
to dip	*ɗok	ɗok^7	ɗok^7	ɗɔk^7
spade	*tɕʰa:c	tsʰa:c^7	tsʰa:t^7	tsʰo:t^7
vomit	*fa:k	fe:k^7	fek^7	fɯ:^{2}

1.6.6 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]:

(55)

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)

---

[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*.

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:

(56)

	Gloss	PHl	Moyfaw	Baisha	Expected Baisha
(a)	stone	*$tɕ^hi$:n	$ts^hiŋ^1$	$ts^hiŋ^4$	$ts^hiŋ^1$
	o. bros wife	*$tɕu$:	$tsow^1$	$tsow^4$	$tsow^1$
	aunt	*hmi:	pey^1	pey^4	pey^1
	aunt	*hŋi:n	$kiŋ^1$	$kiŋ^4$	$kiŋ^1$

	Gloss	PHl	Moyfaw	Baisha	Expected Baisha
(b)	woman	*$k^hə$wɦ	k^ho:^{2}	k^ho:^{5}	k^ho:^{2}
	finger	*lji: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	*p^hut	p^hok^7	p^hok^7	p^hok^8
	late	*$tɕ^hə$p	ts^hap^7	ts^hap^7	ts^hap^8
	nose	*$k^hə$t	k^hak^7	k^hak^7	k^hak^8
	ten	*fu:t	fut^7	fut^7	fut^8

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

(57)

	Gloss	PHl	Baisha	Moyfaw	Expected Moyfaw
	snore	Cuɾa:n	fa:$ŋ^1$	fa:$ŋ^1$	$ɣa$:$ŋ^1$

1.6.7 Baisha and Yuanmen

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

(58)

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:

(59)

	Gloss	PHl	Baisha	Yuanmen	Expected Yuanmen
(a)	gecko	*CuʔaːW	vaːw^1	vaːw^4	vaːw^1
(b)	pull tight	*kɯŋɦ	kəŋ^2	kəŋ^2	kəŋ^5
	turtle	*tʰuːɦ	tʰaw^2	tʰow^2	tʰaw^5
	energy	*kʰuːɦ	kʰaw^2	kʰaw^2	kʰaw^5
	rice	*tʰaːɦ	tʰaː^2	tʰaː^2	tʰaː^5
(c)	complete	*C-muːŋʔ	muŋ^3	muŋ^3	muŋ^6
	armpit	*C-ɲiːʔ	ŋay^3	ŋay^3	ŋay^6
	brave water	*hnuɲʔ	ton^3	tən^3	tən^6
	stretch	*hjaːʔ	zaː^3	zaː^3	zaː^6

	Gloss	PHl	Baisha	Yuanmen	Expected Yuanmen
(d)	have	*ɗəːk	ɗɔʔ^8	ɗɔʔ^8	ɗɔʔ^7
	lash child	*fiːt	fit^8	fit^8	fit^7
	throw	*səːp	tsʰuap^8	tsʰuap^8	tsʰuap^7
	bird	*səc	tsʰat^8	tsʰat^8	tsʰat^7

1.6.8 Run and Qi

There seems to have been, from 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). NWCHl and Meifu have been included below for comparison to highlight the similarities

between Run and Qi:

(60) | PHl | NWCHl | Meifu | Run | Qi |
|------|-------|-------|-----|-----|
| *fj | *fj | *ɕ | *f | *f |
| *ɾj | *ɾj | *d~r | *d~rj | *d |
| *Cuɾw | *w | *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 *lj:

(61) | PHl | Baisha | Yuanmen | Qi |
|------|--------|---------|-----|
| *lj | *j | *dʑ | *ʐ |

Moreover, the development of tones as well as the occurrence of registrogenesis in Yuanmen

seems to have been directly related to Tongzha:

(62)

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

1.6.9 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):

(63)

Gloss	PHl	Meifu	Nadouhua	Expected Nadouhua
flower	*tʃʰɛːŋ	*tsʰeːŋ¹	feŋ¹ (< seŋ¹)	heŋ¹
pus	*Curiw	*ʔwiw³	ʔiw³	ŋiw³
know	*Curɯː	*ʔwəɰ¹	ʔwɛʔ⁴	ŋɛʔ⁴

Nadouhua has apparently also borrowed from Cunhua. The following examples show words with original PHl *r, which have apparently been borrowed from Cunhua when *r 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:

(64)

Gloss	PHl	Cunhua	Nadouhua	Expected Nadouhua
sell	*riːwʔ	hiw⁴	ziː³	ŋiː³
spicy	*rit	het⁴	zeʔ⁵	ŋeʔ⁴
fat	*ruːyʔ	huy⁴	vuy³	ŋuy³

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

(65)

Gloss	Pre-Cunhua		Pre-Nadouhua		Nadouhua
sell	*ɦiːwʔ	>	*jiːwʔ	>	ziː³
fat	*ɦuːyʔ	>	*wuːyʔ	>	vuy³

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

(66)

Gloss	PHl	Cunhua	Nadouhua	Expected Nadouhua
flea	*hməːt	ɓat⁴	paʔ⁴	pɔʔ⁴
son-in-law	*hlɯː	tθow¹	low²	lɛ(w)²
do	*ʋuːk	vok⁴	voʔ⁴	vuʔ⁴
vine basket	*ɓoŋ	ɓoŋ[1]	ɓoŋ¹	ɓɔŋ¹

1.6.10 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:

(67) | Gloss | PHl | Lauhut | Cunhua | Expected Cunhua |
|-------|-----|--------|--------|-----------------|
| weave (fabric) | *hwi: | hwey^1 | huy^5 | vεy^1 |
| you (pl) | *C-mɯ: | məɰ^1 | ma:^{1} (< mə:^{1}) | mow^1 |
| look | *kiw | kiw^1 | ʔiw^1 | kɔy^1 |
| cotton | *ɓu:y^C | ɓu:y^3 | ɓu:(y)^3 | ɓuy^3 |
| wear (lower) | *p^{h}i:n | p^{h}i:n^1 | p^{h}i:n^1 | p^{h}in^1 |
| stick into | *C-ŋi:p | ɲi:p^7 | ni:p^2 | ŋip^2 |
| adze | *p^{h}u:n | p^{h}u:n^1 | p^{h}u:n^3 | p^{h}un^1 |
| kiss | *rju:c | ru:c^7 | lu:t^2 | zut^4 |

1.6.11 Summary

Following the breakup of Proto-Hlai into various branches, and these branches into individual languages, it is apparent that there has been intimate contact between several non-sibling branches 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, and particularly between Yuanmen and Tongzha. In the West half of the island, there has been an interesting unidirectionality of influence, first of 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 Nadou, which has also borrowed at least a few items from Meifu (or probably more specifically, Chanjiang). 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):

(68)   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).

1.7 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 towards 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 subscribe in general to both 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:

(69)   (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 explanations 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 dissertation are due to mistransmission, but will only categorize it according to Blevins' model when it is straightforward to do so.

1.7.1 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.

1.7.1.1 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 (70a) is more likely, and the second (70b) less likely:

(70)   (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 (71a) and (71b) below are more likely to occur than the simultaneous change of two features in (71c):

(71)   (a) tɕ > tʃ
        (b) tɕ > tɕʰ
        (c) tɕ > tʃʰ

        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.

1.7.1.2 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 used in this dissertation[6]:

(72)   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:

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

---

[6] The specific order and identity of these twelve languages is given in the next chapter.

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 needing 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:

(74) $\quad$ ts^h $\quad$ ts^h $\quad$ f $\quad$ ts^h $\quad$ ts^h $\quad$ ts^h
$\qquad\qquad$ f $\qquad$ f $\qquad$ f $\qquad$ f $\qquad$ f $\qquad$ pf^h

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 *ts^h > *f* or *f > *ts^h*, then the reconstruction of a complex proto-phoneme should be considered (in this case *tʃ^{h}w – again, see chapter two for the details).

1.7.1.3 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 will become a glide, for example *kl > *kj*. Knowing this, and using again example (74) above, it would be logical to consider the following two potential reconstructions for this series of initials:

(75)   (a) *tʃʰw
       (b) *tʃʰr

The reason that one might consider the reconstruction in (75b) 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 lenited 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, but there are other possibilities such as the influence of a presyllable (as reconstructed for (73) above) or influence from a following vowel. Unless direct evidence comes to light for the reconstruction in (75b), the better reconstruction is therefore that in (75a), since that in (75b) requires an extra step to have taken place which is not necessary to account for the reflexes in the daughter languages.

1.7.1.4 Symmetry of System

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).

1.7.2 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 (69) 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.

1.8 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.

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.

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.

Finally, 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 system symmetry.

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 TWO: 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 will result 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 current 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:

(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 *initial 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 connected to 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 deteriorioration 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 the chapter four; however, there are also sound changes treated in this chapter which can serve to illustrate this kind of sound change:

(1)   <u>Examples of temporal compression</u>   <u>Source</u>

(a)	fj	>	ç	NWCHl, Meifu
	tʃʰw	>	f	NCHl and Lauhut
(b)	ŋw	>	ɱ	Yuanmen
	lj	>	dʑ	Run
(c)	hŋw	>	hw	Various
	Cuɹw	>	ʔw	NECHl
	Cuɦw	>	ʔw	Western Qi
(d)	ʔl	>	l	All
	lj	>	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)   fj   >   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   >   m̩

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

(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)   Cɥw   >   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	>	pf^h	Yuanmen
	s	>	ts^h	Run
(c)	hl	>	d	Bouhin
	lj	>	dʑ	Run
	ɾ	>	d	Run, Meifu, Qi
(d)	hw	>	v	All
	hj	>	ʑ	All
	ʋ	>	v	Various
	ɹ	>	ɣ	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 the change called *initial 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
        ɾj   >   lj   (lj already in system)   Yuanmen

(b)   v   >   f   (f already in system)   Tongzha, Run
        ʐ   >   ɬ   (ɬ already in system)   Qi

(c)   Cifij   >   ʔɲ   (ʔɲ already in system)   NCHl
        Cufiw   >   ʔŋw   (ʔŋw already in system)   NCHl

(d)   Cuɹw   >   ʔw   (ʔw already in system)   NECHl
        Cuɾw   >   ʔw   (ʔw already in system)   Meifu

(e)   s   >   t   (original *t → tʰ)   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 changes 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 either simultaneously or 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 as soon as 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
    *Cuɦ   >   ɦ(w)   >   h(w)   *Cuɦ   >   C-ŋw

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

(9)   Other Hlai   Meifu

    *C-β   >   β   >   ɸ > f   *C-β   >   ʔw

An example in which devoicing occurred on a smaller scale is in the Run branch, where PHl *ɾj

and *r underwent fortitions to voiced obstruents which subsequently underwent devoicing:

(10)　　Run

　　　　*ɾj　　>　　d　　>　　t
　　　　*r　　>　　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　　>　　hn^d　　>　　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 the level of 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 of initials (for a more detailed comparison, 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   dʑ   g
v   z   ʑ   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. 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 only occurred 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[7]:

(16)   Register split in the Hlai languages

         (a)   <u>No register split</u>

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)   <u>Register split in category A only</u>

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)   <u>Register split in categories A, C, D</u>

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

         (d)   <u>Register split in all categories</u>

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 figure 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[8]:

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[7] 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.
[8] 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 categories A, B, C, and D

(17)   Tone numbers in registrogenetic languages

Tone Category	Register	Nadou[9]	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 those in the low register. The exception to this rule is in 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 figure, which shows the actual pitch values of the tones in the registrogenetic languages:

---

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.

[9] Nadouhua and Changjiang tone 4 is always accompanied by glottal constriction within the rhyme.

(18)   Tone values in registrogenetic languages

Language	Tone	High	Low[10]	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	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 became initial and devoiced in all languages prior to registrogenesis:

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[10] There is one exceptional property which is shared by Nadouhua and Changjiang, indicating close areal contact at directly preceding and during 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.

(19)	PHl	Cun	Nadou	CJ	YM	TZ	ZD	BT
(a)	*pʰ	pʰ	pʰ	pʰ	pʰ	pʰ	pʰ	pʰ
	*tʰ	tʰ~tsʰ	tʰ	tʰ	tʰ	tʰ	tʰ	tʰ
	*tʃʰ	h	h	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ
	*tʃʰw	f	f	f	pfʰ	tsʰ	tsʰ	tsʰ
	*tɕʰ	tsʰ	s	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ
	*kʰ	kʰ	kʰ	kʰ	kʰ	kʰ	kʰ	kʰ
	*tɕ	ts	ts	ts	t	ts	ts	ts
	*k	k	k	k	k	k	k	k
	*f	f	f	f	pfʰ	f	f	f
	*fj	s	f	s	pfʰ	f	f	f
	*s	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-β	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	[ɲ̊]	z	z	hj
	*Cuɦ	ŋ	ŋ(w)	ŋ	[m̥]	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 | m | ŋw | ŋ | ŋw |
| *C-l | l | l | l | l | l | l | l |

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

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

The conditioning of low register is unexpected in this case, as an initial voiceless obstruent is expected to condition high register; an explanation for this is offered below in section 2.3.2.3.

The fifth category is comprised of initials which exhibit low register in Nadouhua and the Qi languages; it also includes only one member, medial *r:

(23) | PHl | Cun | Nadou | CJ | YM | TZ | ZD | BT |
|---|---|---|---|---|---|---|---|
| *Cur | 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) *C-ʋ	v	v	v	v	f	v	v
*ɾj	z	l	t	t~ts	t	tʰ	t
*Cuɾ	v	v	kw	f	f	f	f
*r	h	ŋ	g	kʰ	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 palatalized lateral and (c) the 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) *lj	l	z	z	ts	ɬ	ɬ	ɬ
(c) *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 the 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 my 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 (1993), 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 being technically classified 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

<u>Bhin</u>	<u>Ha Em</u>	<u>Lhut</u>	<u>Tzha</u>	<u>Zdui</u>	<u>Bting</u>	<u>Cun[11]</u>	<u>Nadou</u>	<u>Cjiang</u>	<u>Mfaw</u>	<u>Baisha</u>	<u>Ymen</u>
p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h	p^h
t^h	t^h	t^h	t^h	t^h	t^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	k^h	k^h	k^h	k^h	k^h	k^h

<u>S. Hlai (Savina)</u>	<u>C. Hlai (Savina)</u>	<u>Baisha (Wang & Qian)</u>
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 of 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 t^h and ts^h (29a). This phenomenon is also seen in other alveolar series, with split reflexes

in Cunhua for PHl *ɗ (ɗ and ts) (29b), PHl *s (tθ and ts^h) (29c), and only examples of ts for *hn (where ɗ

is expected) (29d):

---

[11] Where space requires, 'Cunhua' and 'Nadouhua' will be abbreviated as 'Cun' and 'Nadou', respectively.

(29)   Palatal variation in Cunhua alveolar initials

	Gloss	PHl	Cunhua	Gloss	PHl	Cunhua
(a)	answer	*tʰin	tʰen¹	half	*tʰom	tsʰom¹
	dam	*tʰə:mʔ	tʰam³	rice	*tʰa:ɦ	tsʰɔ:⁵
	fall	*tʰok	tʰɔk²	wrap	*tʰu:k	tsʰok²
(b)	castrate	*ɗɯ:n	ɗuun¹	want	*ɗɯ:	tsow¹
	forest	*ɗa:wʔ	ɗaw³	boil	*ɗa:n	tsɔn¹
	have	*ɗu:k	ɗok²	rear	*ɗu:ɲ	tsuən³
(c)	wild	*su:n	tθuən¹	step	*sɯ:m	tsʰam¹
	water buffalo	*suyʔ	tθɔy³	wart	*su:c	tsʰuət²
	ripe	*sɯ:k	tθɯək²	bird	*sɔc	tsʰiat²
(d)				top	*hnɯ:	tsow⁴
				six	*hnom	tsem⁴
				long	*hna:wʔ	tsa:w⁴

There is, however, no split in the *C-n category, where Cunhua reflexes are always *n*, so it appears that this phenomenon targets initial consonants, and not medials. Although there is not 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 *tɕʰ and *tɕ respectively. There does not seem to be any discernible conditioning factor in the rhymes 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. There are two instances where this variation occurs in two 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	zaŋ¹
banana	*hwa:k	zɛk²

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

(31)   Palatalization of Cunhua medial velar nasals

Gloss   PHl   Cunhua

envy   *C-ŋa:ɣɦ   ɲay⁵
straw   *Cuŋiŋ   ɲeŋ³

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

(32)   Matisoff   Thurgood   Peiros   Ostapirat   PHl

(a)   *pʰ   *pʰ   *pʰ   *(ʔ)p   *pʰ
(b)   *tʰ   *tʰ   *tʰ   *(ʔ)t   *tʰ
(c)   *kʰ   *kʰ   *kʰ   *k   *kʰ

Matisoff's, Thurgood's, and Peiros' 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. The examples below and hereafter will be presented with languages in the following order[12]:

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

---

[12] 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.

(33)   Examples of aspirated stops

(a)   ***pʰ**   (b)   ***tʰ**

翅膀   wing $*p^h i{:}k$ 屁   fart $*t^h u{:}t$

$p^h i{:}k^7$ $p^h i{:}ʔ^7$ $p^h i{:}ʔ^7$ $p^h iaʔ^7$ $p^h iaʔ^7$ $p^h iak^7$ $t^h u{:}t^7$ $t^h u{:}t^7$ $t^h u{:}t^7$ $t^h u{:}t^7$ $t^h u{:}t^7$ $t^h u{:}t^7$
$p^h iək^2$ $p^h iʔ^4$ $p^h iʔ^7$ $p^h ik^7$ $p^h it^8$ $p^h iʔ^7$ $t^h uət^2$ $t^h uʔ^4$ $t^h ut^7$ $t^h ut^7$ $t^h ut^8$ $t^h ut^7$

沙   sand $*p^h u{:}ɦ$ 飯   rice $*t^h a{:}ɦ$

$(p^h aw^2)$ $p^h aw^2$ $p^h ow^2$ $p^h aw^5$ $p^h o{:}^5$ $p^h ɔ{:}^5$ $t^h a{:}^2$ $t^h a{:}^2$ $t^h a{:}^2$ $t^h a{:}^5$ $t^h a{:}^5$ $t^h a{:}^5$
$p^h a{:}^5$ $p^h aw^2$ $p^h aw^2$ $p^h aw^2$ $p^h aw^2$ $p^h aw^5$ $ts^h ɔ{:}^5$ $t^h a{:}^2$ $t^h a{:}^2$ $t^h a{:}^2$ $t^h a{:}^2$ $t^h a{:}^2$

名字   name $*p^h a{:}ŋ$ 鍋   pot $*t^h əw$

$p^h a{:}ŋ^1$ $p^h e{:}ŋ^1$ $p^h e{:}ŋ^1$ $p^h e{:}ŋ^1$ $p^h e{:}ŋ^1$ $p^h e{:}ŋ^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$
$p^h ɛŋ^1$ $p^h eŋ^1$ $p^h e{:}ŋ^1$ $p^h e{:}ŋ^1$ $p^h iaŋ^1$ $p^h iaŋ^1$ $ts^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$ $t^h aw^1$

(c)   ***kʰ**

藍色   blue $*k^h i{:}w$

$k^h i{:}w^1$ $k^h i{:}w^1$ $k^h i{:}w^1$ $k^h i{:}w^1$ $k^h iw^1$ $k^h i{:}w^1$
$k^h iw^1$ $k^h i{:}^1$ $k^h iw^1$ $k^h iw^1$ $k^h iw^1$ $k^h iw^1$

腳   leg $*k^h ok$

$k^h ok^7$ $k^h uk^7$ $k^h ok^7$ $k^h ok^7$ $k^h oʔ^7$ $k^h ɔk^7$
$(k^h ok^2)$ $(k^h oʔ^4)$ $k^h ɔk^7$ $k^h ɔk^7$ $k^h ɔk^8$ $k^h ɔk^7$

輕   light $*k^h ɯ{:}ʔ$

$k^h əɥ^3$ $k^h aɥ^3$ $k^h aɥ^3$ $k^h aɥ^3$ $k^h aɥ^3$ $k^h aɥ^3$
$k^h ɔ{:}^3$ $k^h aw^3$ $k^h aɥ^3$ $k^h əɥ^3$ $k^h aɥ^3$ $k^h aɥ^3$

2.3.1.2 Affricates

        The reflexes of the PHl affricates are somewhat more complicated than those of the stops, and perhaps 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 affricates

Bhin	Ha Em	Lhut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	h	h	tsʰ	tsʰ	tsʰ	tsʰ
tsʰ	tsʰ	f	tsʰ	tsʰ	tsʰ	f	f	f	f	f	pfʰ
tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	tsʰ	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: postalveolar for the first two and palatal for the third. The two postalveolar initials are distinguished between plain and labialized:

(35)   *tʃʰ
        *tʃʰw
        *tɕʰ

Post-alveolar and palatal affricates are reconstructed based on the witness of Savina and Wang & Qian given above[13], and it is apparent that the shift to the alveolar place of articulation is a recent change.

The inventory of possible coarticulations for *tʃʰ is defective, including *w* but excluding *j*. This is the same pattern as occurs with PHl *r in Central Hlai:

(36)   *tʃʰ   *tʃʰw   (no *tʃʰj)
        *r   *Curw   (no *rj)

---

[13] 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 letters 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 *tsʰ*, namely <s> and <x>, respectively.

While these two phonemes do not synchronically form a natural class, it will be shown in chapter four that PHl *tʃʰ is the reflex of an earlier retroflex affricate, which would form a natural class with PHl *r (see chapter four, section 4.1.2).

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

(37)   tɕʰ

                  tʃʰ   >   tsʰ

         tʃʰ

The other reflex of *tʃʰ, in NWCHl, is *h*. Since *h* is otherwise only a reflex of *ɦ in NWCHl, it provides a point of departure for how this change might have occurred. While a change from *tʃʰ to *h* seems rather awkward, there is actually a parallel available in Spanish which provides a model. Bradley and Delforge (2006) show that the Northern Spanish of the 16th-17th centuries underwent the following changes:

(38)   dental: s̪   >   θ
         alveolar: s   >   s
         prepalatal: ʃ   >   x

If a parallel is made with developments in NWCHl, then the one significant development that must have happened was the deaffrication of *tʃʰ to *ʃ before the merger with *tɕʰ could occur, which happened in all other languages. Comparing this with the development of *s and *ɕ, a close parallel can be made with the Northern Spanish case:

(39)   alveolar: s   >   s̪   >   θ   >   tθ (Cun)/f (Nadou)
         retroflex: tʃʰ   >   ʃ   >   x   >   h
         palatal: ɕ   >   ɕ   >   ʃ   >   s

Alternatively, it can also be proposed that ʃ merely debuccalized, changing directly from ʃ to *h*.[14] There is presently not enough evidence to distinguish between these two alternatives.

The development of *tʃʰw also followed two distinct paths, these being more evenly distributed across languages. In Bouhin, Ha Em, and Qi, the labiovelar glide was simply lost, and *tʃʰw merged with *tʃʰ, developing in the same way. However, in Lauhut and NCHl, this phoneme developed into a bilabial fricative, merging with *f. 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 of *ʃ and the place features of *w̥, resulting in merger with the already existing category *f. This is compared with the development of the other two Hlai affricates below:

(40) *tʃʰ   >   tʃʰ   >   tsʰ

  *tʃʰw   >   tʃʰw̥   >   f

  *tɕʰ   >   tʃʰ   >   tsʰ

A comparison with other reconstructions is given below:

(41) | | Matisoff | Thurgood | Peiros | Ostapirat | PHl |
|---|---|---|---|---|---|
| (a) | --- | --- | --- | *-t- | *tʃʰ |
| (b) | *sr | *sr | *sw | *-ut- | *tʃʰw |
| (c) | *tsʰ | *tsʰ | *cʰ | *c | *tɕʰ |

None of Matisoff, Thurgood, or Peiros reconstruct an independent phoneme for the series of correspondences I reconstruct as *tʃʰ, 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.

---

[14] It should be noted that this is the same reflex as that found in the Be languages, which also have *h*.

Matisoff and Thurgood agree in reconstructing *sr for the series which I reconstruct as *tʃʰw. *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

(42)　Examples of aspirated affricates

(a)　　　　　　　　　　　　***tʃʰ**　　　　　　　(b)　　　　　　　***tʃʰw**

花　　flower　　　　　*tʃʰaːŋ　　　　　織　weave (fabric)　*tʃʰwɯːk

tsʰeːŋ¹　tsʰeːŋ¹　tsʰeːŋ¹　tsʰeːŋ¹　tsʰeːŋ¹　tsʰeːŋ¹　tsʰɯːʔ⁷　tsʰɯːʔ⁷　fɯːk⁷　(fɯːʔ⁷)　tsʰɯaʔ⁷　tsʰɯːʔ⁷
heŋ¹　(feŋ¹)　tsʰeːŋ¹　tsʰeːŋ¹　tsʰiaŋ¹　tsʰiaŋ¹　fɯək²　fuʔ⁴　fɯʔ⁷　fɯk⁷　fɯk⁸　pfʰɯʔ⁷

眼睛　eye　　　　　　*tʃʰaː　　　　　　三　three　　　　*tʃʰwuʔ

tsʰaː¹　tsʰaː¹　tsʰaː¹　tsʰaː¹　tsʰaː¹　tsʰaː¹　tsʰuː³　tsʰuː³　fuː³　tsʰuː³　tsʰuː³　tsʰuː³
hɔː¹　ha¹　tsʰaː¹　tsʰaː¹　tsʰaː¹　tsʰaː¹　fuː³　foː³　fuː³　fuː³　fuː³　pfʰuː³

抬　lift (2)　　　　　*tʃʰaːm　　　　　下面　bottom　　　*tʃʰwəw

tsʰaːm¹　tsʰaːm¹　tsʰaːm¹　tsʰaːm¹　tsʰaːm¹　tsʰaːm¹　tsʰaw¹　tsʰaw¹　fow¹　tsʰaw¹　tsʰaw¹　tsʰaw¹
hɔm¹　han¹　tsʰaːm¹　tsʰaːm¹　tsʰaːm¹　tsʰam¹　faw¹　faw¹　faw¹　faw¹　faw¹　pfaw¹

(c)　　　　　　　　　　***tɕʰ**

洞　hole　　　　　　*tɕʰuːŋʔ

tsʰuːŋ³　tsʰuːŋ³　tsʰuːŋ³　tsʰuːŋ³　tsʰuaŋ³　tsʰuːŋ³
tsʰoŋ³　suŋ³　tsʰuŋ³　tsʰuŋ³　tsʰuŋ³　tsʰuŋ³

硬　hard　　　　　　*tɕʰəːnʔ

tsʰan³　tsʰoːn³　tsʰoːn³　tsʰoːn³　tsʰɔːn³　tsʰɔːn³
tsʰan³　sɔn³　tsʰoːŋ³　tsʰoːŋ³　tsʰuaŋ³　tsʰuːn³

木杵　pestle　　　　　*tɕʰaːk

tsʰaːʔ⁷　tsʰeːʔ⁷　tsʰeːk⁷　tsʰeːʔ⁷　tsʰeːʔ⁷　tsʰeːʔ⁷
tsʰɛk²　sɛʔ⁴　tsʰeːʔ⁷　tsʰɯː²　tsʰeʔ⁸　tsʰiaʔ⁷

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.

(43)   Reflexes of PHl implosive and plain obstruents

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ
ɗ	ɗ	ɗ	ɗ	ɗ	ɗ	ɗ~ts	ɗ	ɗ	ɗ	ɗ	ɗ
ts	ts	ts	ts	ts	ts	ts	ts	ts	ts	ts	t
k	k	k	k	k	k	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:

(44)   *ɓ
         *ɗ
         *tɕ
         *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 Lingao (Shintani (1991)). Regarding the variation in Cunhua reflexes, see section 2.4.1 above.

For the third and fouth series of correspondences, I reconstruct *tɕ and *k. The development of *tɕ 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 there was systemic gap of an alveolar stop in the plain stop series, which was filled by the change of *tɕ to *t*. The general path of change for the plain voiced series is shown below:

(45)   PHl   Depalatalization   Alveolarization   (Desibilantization: Yuanmen)

*tɕ   >   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 de-affricated, 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 post-alveolars fail to undergo implosivation:

(46)   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:

(47)   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:

(48)   Matisoff   Thurgood   Peiros   Ostapirat   PHl

(a)   *ɓ   *ɓ   *ʔb   *(ʔ)b   *ɓ
(b)   *ɗ   *ɗ   *ʔd   *(ʔ)d   *ɗ
(c)   *ts   *ts   *c   *ɟ   *tɕ
(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' 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 plain voiced stops *b, *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

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

(a)   ***ɓ**   (b)   ***ɗ**

飛   fly   *ɓin   沸騰   boil   *ɗa:n

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

ɗa:n¹ ɗa:n¹ ɗa:n¹ ɗa:n¹ ɗa:n¹ ɗa:n¹
tsɔn¹ ɗan¹ ɗa:ŋ¹ ɗa:ŋ¹ ɗa:ŋ¹ ɗuan¹

賊   thief   *ɓuy   剝   to skin   *ɗa:ŋʔ

ɓuy¹ ɓuy¹ ɓuy¹ ɓuy¹ ɓuy¹ ɓuy¹
ɓɔy¹ ɓoy¹ ɓuy¹ ɓuy¹ ɓoy¹ ɓow¹

ɗa:ŋ³ ɗe:ŋ³ ɗe:ŋ³ ɗe:ŋ³ ɗe:ŋ³ ɗe:ŋ³
ɗɛŋ³ ɗeŋ³ ɗe:ŋ³ ɗe:ŋ³ ɗiaŋ³ ɗiaŋ³

寬   wide   *ɓa:ŋ   淡   insipid   *ɗəc

ɓe:ŋ¹ ɓe:ŋ¹ ɓe:ŋ¹ ɓe:ŋ¹ ɓe:ŋ¹ ɓe:ŋ¹
ɓɛŋ¹ ɓɛŋ¹ ɓe:ŋ¹ ɓe:ŋ¹ ɓiaŋ¹ ɓiaŋ¹

ɗat⁹ ɗat⁷ ɗac⁷ ɗat⁷ ɗat⁷ ɗat⁷
tsiat² ɗaʔ⁴ ɗat⁷ ɗat⁷ ɗat⁸ ɗat⁷

(c)   ***tɕ**   (e)   ***k**

錢   money   *tɕi:n   臭蟲   stinkbug   *kɯp

tsi:n¹ tsi:n¹ tsi:n¹ tsi:n¹ tsi:n¹ tsi:n¹
(tθin¹) tsin¹ tsiŋ¹ tsiŋ¹ tsiŋ¹ tin¹

kɯp⁷ kɯp⁷ kɯp⁷ kɯp⁷ kup⁷ kɯp⁷
kup² kɛʔ⁴ kɯp⁷ kep⁷ kop⁸ kop⁷

潛水   dive   *tɕom   早   early   *ka:wʔ

tsom¹ tsom¹ tsom¹ tsom¹ tsom¹ tsum¹
tsom¹ ---- tsom¹ tsom¹ tsom¹ tom¹

ka:w³ ka:w³ ka:w³ ka:w³ ka:w³ ka:w³
ka:w³ kaw³ ka:w³ ka:w³ ka:w³ ka:w³

睡   sleep   *tɕə:n   白藤   white vine   *kəc

tso:n¹ tso:n¹ tso:n¹ tso:n¹ tsɔ:n¹ tsɔ:n¹
tsan¹ tsɔn¹ tso:ŋ¹ tso:ŋ¹ tsuaŋ¹ tu:n¹

kat⁹ kat⁷ kac⁷ kat⁷ kat⁷ kat⁷
kiat² kaʔ⁴ kat⁷ kat⁷ kat⁸ kat⁷

2.3.1.4 Fricatives

The reflexes of the PHl fricatives are the following:

(50) Reflexes of PHl fricatives

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
p^h	f	f	f	f	f	f	f	f	f	f	pf^h
p^h	f	f	f	f	f	s	f	s	s	f	pf^h
p	f	f	f	f	f	f	f	kw	ɣ	f	f
t	t	t	t	t	t	tθ	f	s	s	ts^h	ts^h

S. Hlai (Savina)	C. Hlai (Savina)	Baisha (Wang & Qian)
p^h	f	f
p^h	----	f
p	f	f
t	----	tʃ^h

I propose the following reconstructions, where *C- indicates the initial in the first syllable of a sesquisyllabic form:

(51)   *f
         *fj
         *C-β
         *s

PHl *f is reflected as such in all of the daughter languages except Yuanmen[15] and Bouhin. Regarding affrication at this place of articulation, there is a typological parallel in Hainanese (Norman 1969: 40), in which former Proto-Min aspirated stops have lenited to affricates:

(52)   Proto-Min   Hainanese

         *p^h f~pf~pf^h~ɸ~pɸ
         *t^h h
         *ts^h s
         *k^h x

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

(53)   Bouhin   *f   >   pf^h >   p^h
         Yuanmen   *f   >   pf^h >   pf^h
         Other Hlai   *f   >   f   >   f

---

[15] The Yuanmen reflex, which is listed in Ouyang & Zheng (1983) as f$^{(h)}$, is actually described as an affricate pf$^{(h)}$

Palatalized *fj 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 *fj was the following:

(54) NWCHl, Meifu *fj > f̪j > ç > ʃ > s
      Other Hlai *fj > f

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

(55) Bouhin *f > pf^h > p^h
              *β > ɸ > p

      Yuanmen *f > pf^h > pf^h
               *β > ɸ > pf

The single exception to the development of *C-β into a labiodental fricative is in Meifu, where there was a change instead to *C-w through a stage of lenition; 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):

(56) Meifu *C-β > *C-w > *ʔw > kw (CJ)/ɣ (MF)

      Other Hlai *C-β > *β > *ɸ > f

Although there is no direct evidence (i.e. low register) for the voiced status of medial *β, it is in line with the principle of Economy since the change to Proto-Meifu *ʔw requires a single lenition of

fricative to glide, and the change to ϕ in other languages requires the loss of the presyllable (with

concomitant devoicing).

There was a shift of PHl *s to *t* throughout all of Hlai except NCHl. It most likely did so through

an intermediate stage of *ts, as in the Vietnamese example above. *s underwent affrication to $t\int^h$ in the

Run branch (where it has merged with the reflex of *tɕ^h). It remains *s* in the Meifu branch, but shifted to θ

in NWCHl with affrication to $t\theta$ in Cunhua and a subsequent shift to *f* in Nadouhua. These developments

are illustrated below:

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

A comparison of reconstructions is given below:

(58)

	Matisoff	Thurgood	Peiros	Ostapirat	PHl
(a)	*f	*p	*f	*-p-	*f
(b)	---	---	---	*-ip-	*fj
(c)	*fr	*pr	*hw	*-up-	*C-β
(d)	*s	*s	*s	*s	*s

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), and the change of *p > *f* violates Directionality. Neither of

them reconstruct anything for what is reconstructed here as *fj (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.

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 (γ), which is the regular reflex of either *r or *r-clusters in many parts of Kra-Dai, including Hlai (see below). However, the Changjiang reflex *kw* (which neither Matisoff nor Thurgood were aware of), when presented next to Moyfaw γ, indicates that the Meifu reflex was an original *ʔw. The principle of Economy can therefore be invoked, since less change is involved between *C-β and the reflexes of the daughter languages than between *fr or *pr and the same reflexes. 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. Ostapirat does also not explain the important distinction between aspirated and unaspirated reflexes in Bouhin and Yuanmen.

There is complete agreement about the reconstruction of the second series as *s.

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

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

(59)   Examples of PHl fricatives

(a) ***f**   (b) ***s**

雨   rain   *fun   成熟   ripe   *suɯ:k

| (pun¹) | fun¹ | fun¹ | fun¹ | fun¹ | fun¹ | tɯ:ʔ⁷ | tɯ:ʔ⁷ | tɯ:k⁷ | tɯ:ʔ⁷ | tɯaʔ⁷ | tɯ:ʔ⁷ |
| fən¹ | fɛn¹ | foŋ¹ | foŋ¹ | foŋ¹ | pfʰən¹ | tθɯək² | feʔ⁴ | sũʔ⁷ | suɯk⁷ | tsʰɯk⁸ | tsʰɯʔ⁷ |

天   sky   *fa:ʔ   水牛   water buffalo   *suyʔ

| (pa:³) | fa:³ | fa:³ | fa:³ | fa:³ | fa:³ | tuy³ | tuy³ | tuy³ | tuy³ | tuy³ | tuy³ |
| fɔ:³ | fa:³ | fa:³ | fa:³ | fa:³ | pfʰa:³ | tθɔy³ | foy³ | suy³ | suy³ | tsʰoy³ | tsʰow³ |

皮   skin (of fruit)   *fa:k   洗   wash   *sə:k

| pʰa:ʔ⁷ | fe:ʔ⁷ | fe:k⁷ | fe:ʔ⁷ | fe:ʔ⁷ | fe:ʔ⁷ | tak⁷ | to:ʔ⁷ | to:k⁷ | to:ʔ⁷ | tɔ:ʔ⁷ | tɔ:ʔ⁷ |
| fɛk² | fɛʔ⁴ | fe:ʔ⁷ | fɯ:² | feʔ⁸ | (pfiaʔ⁷) | tθak² | fɔʔ⁴ | so:k⁷ | so:k⁷ | tsʰɔʔ⁸ | tsʰɔʔ⁷ |

(b)			***fj**			(c)			***C-β**		
牙齒	tooth		*fjən			熟	ripe, mature		*C-βuy		
pʰen^1	fan^1	fan^1	fan^1	fan^1	fan^1	puy^1	fuy^1	fuy^1	fuy^1	fuy^1	fuy^1
sen^1	fen^1	sen^1	sen^1	faŋ^1	pfʰan^1	fɔy^1	fɔy^1	kuy^1	ɣuy^1	foy^1	fow^1
						九	nine		*C-βɯ: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-βa: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

2.3.1.5 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:

(60)   *pʰ   *tʰ   *tʃʰ(w) *tɕʰ   *kʰ
        *ɓ   *ɗ   *tɕ   *k
        *f(j) *s
        *C-β

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).

The third is that there is only one medial oral fricative which can be reconstructed, at the most anterior (bilabial) place of articulation. This is a very particular property of the inventory, and it is difficult to assess how regular it may be in a typological sense. It is argued in chapter four that this phoneme is the sporadic result of intervocalic lenition of Pre-Hlai *C-b, with no such lenition having occurred at other places of articulation.

Finally, coarticulations are very restricted, with palatal coarticulation being limited to *f, and labiovelar coarticulation limited to *tʃʰ. 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 of 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):

(61)   Reflexes of PHl preaspirated nasals

BHin	Ha Em	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Meifu	Baisha	Ymen
m	p	p	**p**	**pʰ**	**p**	**ɓ**	**p**	**p**	p	p	**p**
n	t	t	**t**	**tʰ**	**t**	ts	**t**	**t**	t	t	**t**
ɲ	ts	ts	**ts**	**tsʰ**	**ts**	ts	**ts**	**ts**	ts	ts	**ts**
ŋ	k	k	**k**	**kʰ**	**k**	k	**k**	**k**	k	k	**k**
v	v	hw	**v**	**v**	v	**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:

(62)   *hm
         *hn
         *hɲ
         *hŋ
         *hŋw

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

examples illustrate:

(63)   Split reflexes of PHl *hŋw in Nadouhua

Gloss	PHl	Nadouhua	Gloss	PHl	Nadouhua
yam	*hŋwə:y	ŋɔyʔ[4]	day	*hŋwən	vanʔ[4]
carry (water)	*hŋwə:yʔ	ŋɔy[3]	sparse	*hŋwa:nʔ	van[3]
ghost	*hŋwə:t	ŋɔʔ[4]			

    My hypothesis 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):

(64)　　　　　　　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 that in Cunhua: instead of plain stops in low register, there are implosives in low register at the bilabial and alveolar places of articulation. This seems to be due to the fact that the Cunhua labial and alveolar reflexes participated in a late wave of implosivation, 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 during their time as voiced stops. 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:

(65)　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:

(66) NWCHl   *hŋw   >   ɦ (Cun)/ŋw (Nadou)   >   **h** (Cun)/**ŋ**/**v** (Nadou)

       Other Hlai   *hŋw   >   hw   >   hw/**v**

A comparison of reconstructions is given below:

(67)   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 (1994) 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

(68)　　Examples of PHl preaspirated nasals

(a)			***hm**			(b)			***hn**		

蟻蟻 ant ... *hmuc　　老鼠 rat ... *hniw

| mut^7 | put^7 | puc^7 | put^8 | p^{h}ut^8 | put^8 | niw^1 | tiw^1 | tiw^1 | tiw^4 | t^{h}iw^4 | tiw^4 |
| ɓət^4 | puɛʔ^4 | pət^7 | pot^7 | pot^8 | pət^8 | tsɔy^4 | tiwʔ^4 | tiw^4 | tiw^1 | tew^1 | ti:w^4 |

五 five ... *hma:　　六 six ... *hnom

| ma:^{1} | pa:^{1} | pa:^{1} | pa:^{4} | p^{h}a:^{4} | pa:^{4} | nom^1 | tom^1 | tom^1 | tom^4 | t^{h}om^4 | tum^4 |
| ɓɔ:^{4} | paʔ^4 | pa:^{4} | pa:^{1} | pa:^{1} | pa:^{4} | tsem^4 | tonʔ^4 | tom^4 | tom^1 | tom^1 | tom^4 |

濕 wet ... *hmənʔ　　長 long ... *hna:wʔ

| men^3 | pan^3 | pan^3 | pan^6 | p^{h}an^6 | pan^6 | na:w^3 | ta:w^3 | ta:w^3 | ta:w^6 | t^{h}a:w^6 | ta:w^6 |
| ɓan^4 | pan^3 | pan^3 | paŋ^3 | paŋ^3 | pan^6 | tsa:w^4 | taw^3 | ta:w^3 | ta:w^3 | ta:w^3 | ta:w^6 |

(c)			***hɲ**			(d)			***hŋ**		

粽子 dumpling ... *hɲi:t　　針 needle ... *hŋuc

| ---- | ---- | tsi:t^7 | tsi:t^8 | ts^{h}i:t^8 | tsi:t^8 | ŋut^7 | kut^7 | kuc^7 | kut^8 | k^{h}ut^8 | kut^8 |
| tsit^4 | tsiʔ^4 | ---- | tsit^7 | tsit^8 | tsit^8 | kət^4 | kɛʔ^4 | kət^7 | kot^7 | kot^8 | kət^8 |

射 shoot ... *hɲɯ:　　睡 sleep (lie) ... *hŋu:h

| ɲəɰ^1 | tsəɰ^1 | tsəɰ^1 | tsəɰ^4 | ts^{h}əɰ^4 | tsəɰ^4 | ŋow^2 | kaw^2 | kaw^2 | kaw^2 | k^{h}o:^{2} | kɔ:^{2} |
| ---- | ---- | tsəɰ^4 | tsəɰ^1 | tsəɰ^1 | tsəɰ^4 | ka:^{5} | kaw^2 | kaw^2 | kaw^2 | kaw^2 | kaw^2 |

自己 self ... *hɲɯ:ʔ　　草 grass ... *hŋənʔ

| ---- | tsaɰ^3 | tsaɰ^3 | tsaɰ^6 | ts^{h}aɰ^6 | tsaɰ^6 | ŋen^3 | kan^3 | kan^3 | kan^6 | k^{h}an^6 | kan^6 |
| tsɔ:^{4} | ---- | ---- | tsəɰ^3 | tsaɰ^3 | tsaɰ^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 van?^{4} van^4 vaŋ^1 vaŋ^1 van^4

搬運 carry water[16] *hŋwə:yʔ

va:y^3 vo:y^3 hwo:y^3 va:y^6 va:y^6 va:y^3
---- ŋɔy^3 po:y^3 vo:y^3 vuay^3 vu:y^6

2.3.2.2 Medial Nasals

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

(69) Reflexes of PHl medial nasals

BHin	Ha Em	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Meifu	Baisha	Ymen
m	m	m	m	**m**	m	m	m	m	m	m	**m**
n	n	n	n	**n**	n	n	n	n	n	n	**n**
ɲ	ɲ	ɲ	ɲ	**n**	ɲ	ɲ	ŋj	ɲ	ɲ	ɲ	**ɲ**
ŋ	ŋ	ŋ	ŋ	**ŋ**	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	**ŋ**
ŋ	ŋ	ŋw	ŋw	**ŋ**	ŋ(w)	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	----	----

---

[16] The initial in the Changjiang form for this word is irregular. It reflects an earlier *m, which was the result of a mistransmission of *ŋw, providing unexpected confirmation of this reconstruction.

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

(70)   *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 were either still medial in some or all cases, or 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 having experienced early deglottalization of these sonorants prior to registrogenesis. This explanation gains further weight when it is noticed 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 erode in the face of language contact. This is illustrated below in (71):

(71)	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:

(72)   *hm   >   mb   >   **b**   >   **p**
         *C-m   >   ʔm   >   ʔm   >   m

During the development of *Cuŋ, vocalic transfer occurred at the stage of Central Hlai:

(73)   *Cuŋ

                *Cuŋ   *Cuŋ
                 |
                *Cuŋ   *Cuŋ   *Cuŋw
                 | | |
                *ʔŋ   *ʔŋ   *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, most likely as a result of language contact. The CHl labiovelar nasal *ʔŋw has merged (or is in

the process of merging) with the reflexes of *ʔŋ several languages; it became labiodentalized in Yuanmen[17].

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

(74)   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 (1988), Thurgood (1994), and Ostapirat (2004) 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

---

[17] Yuanmen ɱ recorded by Ouyang and Zheng has merged completely with *m* in the speech of my
Yuanmen consultants.

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

(75)   Examples of PHl medial nasals

(a)   ***C-m**   (b)   ***C-n**

掐   pinch   *C-mi:t   竹箏   bamboo shoot   *C-nɯ:ŋ

mi:t^7	mi:t^7	mi:t^7	mi:t^7	mi:t^8	mit^7	nɯ:ŋ^1	nɯ:ŋ^1	nɯ:ŋ^1	nɯ:ŋ^1	nɯaŋ^4	nɯ:ŋ^1
mit^2	mi?^{4}	mit^7	mit^7	(mit^7)	mit^8	nɯəŋ^1	neŋ^1	nɯŋ^1	nɯŋ^1	nɯŋ^1	nɯŋ^4

手   hand   *C-mɯ: 皮膚   skin   *C-nə:ŋ

məɯ^1	məɯ^1	məɯ^1	məɯ^1	məɯ^4	məɯ^1	naŋ^1	no:ŋ^1	no:ŋ^1	no:ŋ^1	nɔ:ŋ^4	nɔ:ŋ^1
mow^1	mɛw^1	----	məɯ^1	məɯ^1	məɯ^4	naŋ^1	nɔŋ^1	no:ŋ^1	no:ŋ^1	nuaŋ^1	nuaŋ^4

官   official   *C-mun   水   water   *C-nəm?

mun^1	mun^1	mun^1	mun^1	mun^4	mun^1	nom^3	nam^3	nom^3	nam^3	nam^6	nam^3
mən^1	muɛn^1	mon^1	moŋ^1	moŋ^1	m↔n^4	nam^3	nan^3	nam^3	nam^3	nam^3	nam^6

(c)   ***C-ɲ**   (d)   ***C-ŋ**

蚊子   mosquito   *C-ɲuːŋ

ɲuːŋ^1	ɲuːŋ^1	ɲuːŋ^1	ɲuːŋ^1	nuaŋ^4	ɲuːŋ^1
ɲoŋ^1	ɲiw^1	ɲuŋ^1	ɲuŋ^1	ɲuŋ^1	ɲuŋ^4

鹽   salt   *C-ɲaːwʔ

ɲaːw^3	ɲaːw^3	ɲaːw^3	ɲaːw^3	naːw^6	ɲaːw^3
ɲaːw^3	ŋjaː^3	ɲaːw^3	ɲaːw^3	ɲaːw^3	ɲaːw^6

月(亮)   month/moon   *C-ɲaːn

ɲaːn^1	ɲaːn^1	ɲaːn^1	ɲaːn^1	naːn^4	ɲaːn^1
ɲɔn^1	ŋjan^1	ɲeːn^1	ɲaːŋ^1	ɲaːŋ^1	ɲuan^4

哭   cry   *C-ŋiːʔ

ŋey^3	ŋay^3	ŋay^3	ŋay^3	ŋay^6	ŋay^3
ŋay^3	ŋay^3	ŋay^3	ŋay^3	ŋay^3	ŋay^6

肝   liver   *C-ŋaːn

ŋaːn^1	ŋaːn^1	ŋaːn^1	ŋaːn^1	ŋaːn^4	ŋaːn^1
ŋɔn^1	ŋan^1	ŋaːŋ^1	ŋaːŋ^1	ŋaːŋ^1	ŋuan^4

鰓   gill   *C-ŋaːk

ŋaːʔ^7	ŋeːʔ^7	ŋeːk^7	ŋeːʔ^7	ŋeːʔ^8	ŋeːʔ^7
ŋɛk^2	ŋeʔ^4	ŋeːʔ^7	ŋɯː^2	ŋeʔ^8	ŋiaʔ^8

(e)   ***Cuŋ**

稻草   rice straw   *Cuɲiŋʔ

ŋiŋ^3	ŋiŋ^3	ŋwiŋ^3	----	----	----
ŋeŋ^3	ŋwɛn^3	ŋen^3	ŋen^3	ŋen^3	m̩en^6

戴 (帽子)wear   *Cuŋəwʔ

ŋaw^3	ŋaw^3	ŋwow^3	----	ŋɔː^6	ŋɔː^3
ŋaw^3	ŋɔː^3	ŋoː^3	ŋwoː^3	ŋoː^3	m̩oː^6

枕   rest head   *Cuŋaːn

ŋaːn^1	ŋaːn^1	ŋaːn^1	ŋwaːn^1	ŋuan^4	ŋaːn^1
----	----	ŋaːn^1	ŋaːn^1	ŋaːn^1	muan^4

2.3.2.3 Laterals

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

(76)   Reflexes of PHl laterals

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
ɗ	ɬ	ɬ	ɬ	ɬ	ɬ	tθ	l	ɬ	ɬ	ɬ	ɬ
l	l	l	l	**l**	l	l	l	l	l	l	**l**
z	z	z	**ɬ**	**ɬ**	**ɬ**	**l**	z	z	z	z	**ts**
l	l	pl	pl	p	pl	**ɓ~l**	**pj**	**p**	pl	pl	pl

S. Hlai (Savina)	C. Hlai (Savina)	Baisha (Wang & Qian)
d	tl	ɬ
l	l	l
j	tʰ	3
l	pl	pl

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

(77)   *hl
         *C-l
         *lj
         *p-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 *s. 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:

(78)   *hl
                    ┌─────────┴──────┐
                 *d   *hl
                  │   ┌────┴─────┐
                 *ɗ   *ɬ   *ɬ

                 BH   HE   Central Hl

That is, Bouhin *hl* hardened to *d*, after which it merged with *d́* (whether it first devoiced to *t* as an intermediate stage is difficult to tell).

　　　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:

(79)　　　　　　　*hl　　>　　ɬ　　　>　　　ɬ
　　　　　　　　　*C-l　　>　　ʔl　　　>　　　l

　　　In the case of *lj, the majority of languages have lost all traces of the original lateral, and simplified the cluster to a palatal glide (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 *lj merged with one of the two reflexes of *ɾj which were apparently in free variation in Run. The fact that this did not occur in Baisha indicates that after the split of Run into Baisha and Yuanmen, *lj quickly developed into *j in Baisha, so that the *lj which developed in turn from *ɾj filled a gap. In Yuanmen on the other hand, *lj was maintained, and merged with one of the reflexes of *ɾj before ultimately hardening to *dʑ*. This is shown below:

(80)　Baisha　　　*lj　>　lj　　>　j　　>　ʑ　　>　z
　　　　　　　　　　*ɾj　>　r~ɾj　>　d~lj　>　t~dʑ　>　t~ts

　　　Yuanmen　　*lj　>　lj　　>　lj　　>　**dʑ**　>　**ts**
　　　　　　　　　　*ɾj　>　r~ɾj　>　d~lj　>　**t~dʑ**　>　**t~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 *lj developed narrower stricture in its palatal glide, becoming *lʑ. This was in turn reinterpreted as a voiced lateral fricative *ɮ, which conditioned low register before participating in the third devoicing, merging with ɬ in high register:

(81)   Qi   *lj   >   lʐ   >   ɭʐ   >   ɬ

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

The only 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. I propose that this represents an areal innovation amongst these three languages, and that when original *p-l became a 'tight' cluster due to temporal compression, that the bilabial stop became voiced under the influence of the abutting lateral. This proposed evolution of *p-l is shown below:

(82)   Cunhua   *p-l   >   bl   >   **bl** >   **ɓ~l**
        Nadouhua   *p-l   >   bl   >   **bj** >   **pj**
        Changjiang   *p-l   >   bl   >   **b**   >   **p**
        Other CHl   *p-l   >   pl   >   pl   >   pl~l~p

As with other sesquisyllabic forms, it was normal for the sesquisyllable to merely be dropped in Bouhin and Ha Em, whereas the two consonants merged into a cluster in Central Hlai due to temporal compression:

(83)   *p-l

                *p-l   *p-l
                 |
                *l   *l   *pl

                BH   HE   Central Hl

A comparison of reconstructions is given below:

(84)   Comparison of reconstructions

	Matisoff	Thurgood	Peiros	Ostapirat	PHl
(a)	*ɬ	*ɬʔ	*hl	*-l-	*hl
(b)	*l	*l	*C-l	*l	*C-l
(c)	*z	*ljʔ	*z	*-il-	*lj
(d)	*pl	*pl	*pl	*p-l	*p-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 *d*. Ostapirat reconstructs medial *-l-, which underwent intervocalic fortition as a result of its medial position on analogy with his intervocalic nasal series.

Matisoff, Thurgood, and Ostapirat reconstruct *l for the second 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 and Peiros reconstruct *z for the third 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 Peiros all reconstruct *pl for the final series, and Ostapirat reconstructs *p-l, indicating an original sesquisyllable. These are all in basic agreement with the reconstruction

proposed here, although I agree with Ostapirat that the PHl form specifically represents a sesquisyllable, not a tight cluster[18].

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

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

(85)   Examples of PHl laterals

(a)   ***hl**   (b)   ***C-l**

深   deep   *hlə:k   (長)大 big   *C-luŋ

ɗak^7 ɬo:ʔ^7 ɬo:k^7 ɬo:ʔ^7 ɬɔ:ʔ^7 ɬɔ:ʔ^7 luŋ^1 luŋ^1 loŋ^1 loŋ^1 luŋ^4 luŋ^1
tθak^2 lɔʔ^4 ɬo:k^7 ɬo:k^7 ɬoʔ^8 ɬoʔ^7 loŋ^1 loŋ^1 luŋ^1 loŋ^1 luŋ^1 luŋ^4

二   two   *hlu:ʔ   鱗   fish scale   *C-lə:p

ɗow^3 ɬaw^3 ɬaw^3 ɬaw^3 ɬaw^3 ɬaw^3 lap^7 lo:p^7 lo:p^7 lo:p^7 lɔ:p^8 lɔ:p^7
tθa:(y)^3 law^3 ɬaw^3 ɬaw^3 ɬaw^3 ɬaw^3 lap^2 lɔʔ^4 lo:p^7 lo:p^7 luap^8 luap^8

血   blood   *hla:c   遠   far   *C-ləy

ɗa:t^7 ɬa:t^7 ɬa:c^7 ɬa:t^7 ɬa:t^7 ɬa:t^7 lay^1 lay^1 lay^1 lay^1 lay^4 lay^1
tθɔt^2 laʔ^4 ɬo:t^7 ɬo:t^7 ɬa:t^8 ɬuat^7 lay^1 lay^1 lay^1 lay^1 lay^1 lay^4

---

[18] Pittayawat Pittayaporn suggests the alternative reconstruction *ʔbl (pc, 12/14/06). While I do not adopt this reconstruction here, it is one explanation for the voicing in Cunhua, Nadouhua, and Changjiang; extra-Hlai comparison will eventually be necessary in order to choose between these two options.

(c)   ***lj**   (d)   ***p-l**

蟎蟥 water leech   *ljiŋ   嫩 tender   *p-lɯːk

zin^1	zin^1	zin^1	ɬiŋ^4	ɬiŋ^4	ɬiŋ^4	lɯːʔ^7	lɯːʔ^7	plɯːk^7	plɯːʔ^7	----	plɯːʔ^7
lin^4	zeŋʔ^4	----	zen^1	zen^1	tsen^4	lɯək^4	pjuʔ^4	pɯʔ^7	plɯk^7	----	plɯʔ^8

脖子 neck   *ljoŋʔ   房子 house   *p-loŋʔ

zoŋ^3	zuŋ^3	zoŋ^3	ɬoŋ^6	ɬoŋ^6	ɬɔŋ^6	luŋ^3	luŋ^3	ploŋ^3	ploŋ^3	poŋ^3	plɔŋ^3
lɔŋ^4	zaŋ^3	juaŋ^3	zɔŋ^3	zɔŋ^3	tsɔŋ^6	----	pjaŋ^3	poŋ^3	plɔŋ^3	plɔŋ^3	plɔŋ^3

耳朵 ear[19]   *ljəy   瞎 blind   *p-laːw

zay^1	zay^1	zay^1	ɬay^4	ɬay^4	ɬay^4	laːw^1	laːw^1	plaːw^1	plaːw^1	paːw^1	plaːw^1
lay^4	nayʔ^4	zay^4	zay^1	zay^1	tsay^4	ɓaːw^4	pjawʔ^4	paːw^4	plaːw^1	plaːw^1	plaːw^1

2.3.2.4 Approximants

The set of combined approximants (including the rhotic) 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 labiovelar 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 in chapter four. For now, an initial consonant is automatically reconstructed in all instances.

The reflexes of the PHl approximants are given below:

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[19] The Nadouhua initial is irregular, having assimilated under the influence of the initial syllable of this word, the full form being nu^{2}nayʔ^4

(86)   Reflexes of the PHl approximants

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
v	v	v	**f**	v	v	v	v	**v**	v	v	**v**
r	r	r	**r**	l	l	l	l	**l**	r	r	**r**
z	z	r	**t**	tʰ	t	z	l	**t**	t	t~ts	t~**ts**
r	r	v	**f**	f	f	v	v	kw	ɣ	f	**f**
r	g	g	**g**	h	h	h	ŋ	**g**	x	x	kʰ
r	g	gw	**gw**	v	hw	v	ŋ/v	kw	ɣ	v	v

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

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

(87)   *ʋ
        *ɾ
        *ɾj
        *Cuɾ
        *r
        *Cur

The palatalized approximant *ɾj and the sesquisyllabic *Cuɾ and *Cur 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

Excepting Cunhua, Lauhut and Tongzha, the reflexes of *ʋ have merged almost completely with those for *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*

from *hw). The parallel changes in these three languages which show a distinction between *ʋ and *hw

are shown below:

(88)   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 a 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),

*ɾj was a tap with a palatal coarticulation in PHl itself. The same was not true of *Cuɾ, which was the

initial of sesquisyllabic words, and did not undergo vocalic transfer until the divergence of Central Hlai:

(89)   *Cuɾ

                *Cuɾ   *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:

(90)   Evolution of *ɾj and *Cuɾ: no fortition of approximant

| Lauhut | *ɾj | > | ɾ | > | r |
| | *Cuɾw | > | w | > | v |

| Nadouhua | *ɾj | > | ɾ | > | **l** |
| | *Cuɾw | > | w | > | **v** |

| Cunhua | *ɾj | > | j | > | **z** |
| | *Cuɾw | > | w | > | **v** |

In all instances, the presyllable of *Cuɾw was lost. In Nadouhua and Lauhut, *ɾj lost its palatal

coarticulation (it was retained and the tap was lost in Cunhua), 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:

(91)   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~lj	>	d~lj	>	t~dʑ	>	t~**ts**
	*Cuɾw	>	ɾw	>	ɾw	>	(d)v	>	**f**

Qi	*ɾ	>	r	>	r	>	r	>	r
	*ɾj	>	ɾ	>	ɾ	>	d	>	**t⁽ʰ⁾**
	*Cuɾw	>	ɾw	>	ɾw	>	(d)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. There is variation in Run between the reflexes *t* (high register) and *ts* (low register) for which

there seems to be no discernible conditioning environment. What is evident is that based on the Yuanmen

reflex of *lj, the earlier form of variation was between *ɾ (in which case the palatal glide was lost) and *lj

(in which case it was maintained).

The identical development of *Cuɾw in both Run and Qi, where there was a change to an

intermediate stage of *v before finally devoicing to *f* in low register, perhaps occurred through an initial

change to *dv if there was any parallel with the development of *ɾ to *d. In Meifu, however, there was a

development directly to *ʔw, paralleling the case of *Curw 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 (as detailed in chapter 1), with the Bouhin reflex of *r
being an alveolar tap, but I hypothesize that *r shifted to a retroflex *ɻ in Greater Hlai, which later
underwent a change in the daughter languages to a voiced velar fricative ɣ:

(92)   *r
                          ╱   ╲
                   *ɾ   *ɻ

                   BH   Greater Hlai

Vocalic transfer in *Cur did not occur outside of Central Hlai, however, so that the timing of the

changes in *r itself and vocalic transfer occurred in the following way, with the presyllable leaving no trace

in Bouhin and Ha Em, allowing the merger of original *r and *Cur in these two languages:

(93)

```
                        *Cur
                ┌─────────┴────┐
             *Cuɾ           *Cuɹ
               │         ┌────┴──────┐
              *ɾ    *ɹ          *Cuɹw

              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:

(94)

Gloss	PHl	Nadouhua	Gloss	PHl	Nadouhua
with	*Curu:	ŋɛw?^{4}	to plant	*Cura:	va?^{4}
run	*Curu:ɦ	ŋɛw^2			
head	*Curəw?	ŋɔ:^{3}			

The timing of the change from *ɹ to *ɣ seems to have varied in its relationship to registrogenesis. The change from *Cuɹw to *?w occurred in all NCHl languages except for Nadouhua. The various paths of change are given below:

(95)

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

A comparison of reconstructions is given below:

(96)   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)	*ʐ/*ɣ	*ʐʔ/*ɣ	*rw/*ɣ	*-ʀ-/*–g-	*r
(f)	*ɣw	*ɣw	*ɣw	*-uʀ-/*-ug-	*Cur

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 mine, except that it is positionally more properly attributed to a stage of Pre-Hlai (see chapter four).

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 *r based on the series of correspondences in (86). 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 series, although Matisoff notes a couple of examples and states that a cluster must be reconstructed; Ostapirat proposes medial *-ir- for this. I prefer to reconstruct a palatalized tap for this series, which allows a more direct explanation for how it can fill the gap left by former *ɾ in the languages where this occurs, it is a better candidate for fortition to *d (satisfying Directionality), and it is more compatible with palatalization than *r.

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 set up *r-clusters here as well, based on a combination of labiodental reflexes and Moyfaw ɣ; reconstruction of an *r-cluster here 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 ɾ 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 ultimately shouldn't

be considered in the reconstruction.   The reconstruction of a lateral *ɮ cannot account as elegantly for the

split in reflexes between Bouhin (the change *ɮ to ɾ violates Directionality) and Greater Hlai (the

reconstruction *ɣ fits into Matisoff's and Peiros' system of voiced fricatives (along with *v and *z)).

Ostapirat's reconstruction of a uvular trill seems awkward, given that there are no other uvulars in his

system (a violation of Commonality). Peiros' *rw is closer to my reconstruction, although the

reconstruction of a labiovelar coarticulation for *this* series (as opposed to the one below) seems

unmotivated; Peiros' 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

(97)　　　Examples of PHl approximants

(a)　　　　　　　　　　　　***ʋ**　　　　　　　　(b)　　　　　　　　***ɾj**

上衣　　clothes　　　　*ʋa:ŋʔ　　　　　笑　　laugh　　　*ɾja:w

ve:ŋ³	ve:ŋ³	ve:ŋ³	fe:ŋ⁶	ve:ŋ⁶	ve:ŋ³	za:w¹	za:w¹	ra:w¹	ta:w⁴	tʰa:w⁴	ta:w⁴
vɛŋ⁴	vɛŋ³	ve:ŋ³	ve:ŋ³	viaŋ³	viaŋ⁶	za:w⁴	laʔ⁴	ta:w¹	ta:w¹	tsa:w¹	tsa:w⁴

肩膀　　shoulder　　　*ʋa:ɦ　　　　　玩　　play　　　*ɾjɯ:k

va:²	va:²	va:²	fa:²	va:²	va:⁵	zɯ:ʔ⁷	zɯ:ʔ⁷	rɯ:k⁷	tɯ:ʔ⁸	tʰɯaʔ⁸	tɯ:ʔ⁸
vɔ:⁵	va:²	va:²	va:²	va:⁵	va:²	zɯək⁴	leʔ⁴	tɯk⁷	tɯk⁷	(tɯk⁷)	----

弓　　bow　　　　　　*ʋəc　　　　　　壞　　bad　　　*ɾja:k

vat⁹	vat⁷	vac⁷	fat⁸	vat⁸	vat⁷	za:ʔ⁷	ze:ʔ⁷	re:k⁷	te:ʔ⁸	tʰe:ʔ⁸	te:ʔ⁸
viat⁴	vaʔ⁴	vat⁷	vat⁷	vat⁸	vat⁸	lɛk⁴	leʔ⁴	te:ʔ⁷	tɯ:²	teʔ⁸	(tiaʔ⁷)

(c)　　　　　　　　　　　***ɾ**　　　　　　　　(e)　　　　　　　　***Cuɾ**

窩　　nest　　　　　　*ɾu:k　　　　　　生　　raw　　　*Cuɾi:p

ru:ʔ⁷	ru:ʔ⁷	ru:k⁷	ru:ʔ⁸	luaʔ⁸	lu:ʔ⁸	ri:p⁷	ri:p⁷	vi:p⁷	fi:p⁸	fi:p⁸	fi:p⁸
lok⁴	luʔ⁴	luʔ⁷	ruk⁷	ruk⁸	ruʔ⁸	vip⁴	----	kip⁷	ɣip⁷	fip⁸	fip⁸

腸　　intestine　　　　*ɾa:yʔ　　　　　骨頭　　bone　　　*Cuɾɯ:k

ra:y³	ra:y³	ra:y³	ra:y⁶	la:y⁶	la:y⁶	rɯ:ʔ⁷	rɯ:ʔ⁷	vɯ:k⁷	fɯ:ʔ⁸	fɯaʔ⁸	fɯ:ʔ⁸
la:(y)⁴	lay³	la:y³	ra:y³	ra:y³	ruay⁶	vɯək⁴	vuʔ⁴	kɯʔ⁷	ɣɯk⁷	fuk⁸	fɯʔ⁸

星星　　star　　　　　*ɾa:w　　　　　地　　earth　　　*Cuɾən

ra:w¹	ra:w¹	ra:w¹	ra:w⁴	la:w⁴	la:w⁴	ren¹	ran¹	van¹	fan⁴	fan⁴	fan⁴
la:w⁴	laʔ⁴	la:w⁴	ra:w¹	ra:w¹	ra:w⁴	----	vanʔ⁴	kwaŋ¹	ɣaŋ¹	faŋ¹	fan⁴

(d)			***r**			(f)			***Cur**		

辣 spicy *rit 跑 run *Curu:ɦ

| rit[7] | git[7] | gec[7] | get[8] | het[8] | hit[8] | row[2] | gow[2] | gow[2] | gow[2] | ---- | how[2] |
| het[4] | (zeʔ[5]) | (git[7]) | xet[7] | xet[8] | kʰet[7] | vaw[5] | ŋɛw[2] | kow[2] | ɣow[2] | vow[2] | vow[5] |

網 net *rə:yʔ 頭 head *Curəwʔ

| ra:y[3] | go:y[3] | go:y[3] | ga:y[6] | ha:y[6] | ha:y[6] | raw[3] | gaw[3] | gwow[3] | go:[6] | ho:[6] | hɔ:[6] |
| hɔ:(y)[4] | ŋɔy[3] | go:y[3] | xo:y[3] | xuay[3] | kʰu:y[3] | vaw[3] | ŋɔ:[3] | ko:[3] | ɣo:[3] | vo:[3] | vo:[3] |

咱們 we (incl) *rəw 種 to plant[20] *Cura:

| ru:[1] | gaw[1] | ga:[1] | gaw[4] | haw[4] | how[4] | ra:[1] | (ra:[1]) | gwa:[1] | go:[6] | va:[4] | hwa:[4] |
| ha:[5] | ŋaw ʔ[4] | gaw[4] | xaw[1] | xə:[1] | kʰoʔ[7] | vɔ:[4] | vaʔ[4] | kɔ:[1] | ɣa:[1] | va:[1] | va:[1] |

2.3.2.5 Glides

The PHl glides were originally preaspirated, and their reflexes are for the most part entirely straightforward.

(98)   Reflexes of PHl glides

BHin	Ha Em	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Meifu	Baisha	Ymen
z	z	z	**z**	**z**	z	z	**z**	**z**	z	z	**z**
v	v	hw	**v**	**v**	v	v	**v**	**v**	v	v	**v**

S. Hlai (Savina)			C. Hlai (Savina)			Baisha (Wang & Qian)
j			----			ʒ
v			**v**			v

The following are reconstructed for the two series above:

(99)   *hj
        *hw

---

[20] The initials in the Nadouhua, Ha Em, and Zandui forms are all irregular, the reason probably being that they are the results of loans from other Hlai languages (in which they would be regular).

As a general rule, the primary change which has occurred in the 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:

(100)   Registrogenesis

| Cunhua & | *hj | > | hj | > | z |
| Baoting | *hw | > | hw | > | v |

| Lauhut | *hj | > | hj | > | z |
| | *hw | > | hw | > | hw |

| Other Hlai | *hj | > | ʐ | > | z |
| | *hw | > | v | > | v |

A Comparison of reconstructions is given below:

(101)	Matisoff	Thurgood	Peiros	Ostapirat	PHl
(a)	*j	*j	*j	*-j-	*hj
(b)	*w	*w	*w	*-w-	*hw

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.

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

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

(102)   Examples of PHl glides

(a)   ***hj**   (b)   ***hw**

蛋/卵   egg   *hjɯ:m   彎   crooked   *hwə:ŋh

Bhin Cun	Ha Em Nadou	Lhut Cjiang	Tzha Mfaw	Zdui Baisha	Bting Ymen
zɯ:m^1	zɯ:m^1	zɯ:m^1	zɯ:m^4	zu:m^4	zɯ:m^1
zum^1	zun?^{4}	zum^1	zum^1	zum^1	zum^4

crooked (*hw):

Tzha Mfaw	Zdui Baisha	Bting Ymen			
----	----	hwo:ŋ^2	vo:ŋ^2	vɔ:ŋ^2	vɔ:ŋ^5
vɔŋ^3	vaŋ^2	vɔŋ^2	vɔŋ^2	vɔŋ^8	vɔŋ^4

老   old   *hja: 贊揚   praise   *hwəy

Bhin Cun	Ha Em Nadou	Lhut Cjiang	Tzha Mfaw	Zdui Baisha	Bting Ymen
za:^{1}	za:^{1}	za:^{1}	za:^{4}	za:^{4}	za:^{1}
zɔ:^{1}	za?^{4}	za:^{4}	za:^{1}	za:^{1}	za:^{4}

vay^1	vay^1	hway^1	vay^4	vay^4	vay^1
vay^1	vay?^{4}	vay^4	vay^1	vay^1	vay^4

羊   sheep   *hja:ŋ   芭蕉   plantain[21]   *hwa:k

Bhin Cun	Ha Em Nadou	Lhut Cjiang	Tzha Mfaw	Zdui Baisha	Bting Ymen
za:ŋ^1	ze:ŋ^1	ze:ŋ^1	ze:ŋ^4	ze:ŋ^4	ze:ŋ^1
zɛŋ^1	zɛŋ?^{4}	----	ze:ŋ^1	ziaŋ^1	ziaŋ^4

va:?^{7}	ve:?^{7}	hwe:k^7	ve:?^{8}	ve:?^{8}	ve:?^{7}
zɛk^2	----	ve:?^{7}	vɯ:^{2}	ve?^{8}	via?^{8}

2.3.2.6 Interim Summary

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

---

[21] The Cunhua initial is irregular, the original *w apparently having been replaced by *j*, under the influence of the rime.

(103) *hm   *hn   *hɲ   *hŋ(w)
       *C-m   *C-n   *C-ɲ   *C(u)ŋ
              *hl
       *p-l   *C-l
              *lj
       *ʋ   *(Cu)ɾ *(Cu)r
              *ɾj
       *hw   *hj

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 (in *p-l) is the most anterior, at the bilabial place of articulation. It may be hypothesized that this occurred because the articulation of [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 PHl 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:

(104)   Reflexes of PHl glottal initials

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ	ʔ
ʔ	ʔ	ʔj	z	z	ʔj	z	ʔj	z	z	z	z
ʔ	ʔ	ʔw	gw	v	ʔw	v	ʔw	kw	ɣ	v	v
h	h	h	h	h	h	h	h	h	h	h	h
h	h	hj	z	z	hj	ɲ	ŋj	ɲ	ɲ	ɲ	ɲ̥
h	h	hw	gw	v	hw	ŋ	ŋ(w)	ŋ	ŋ	ŋ	ŋ̥

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*:

(105)   *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:

(106)　　*Ciʔ

```
*Ciʔ            *Ciʔ
 |         ╱         ╲
*ʔ      *ʔ            *Ciʔj

BH      HE            CHl
```

　　　　　　　　　　　　　　　　*Cuʔ

```
              *Cuʔ            *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[22]. In the majority of languages, when deglottalization has occurred, the glides have undergone an additional fortition to voiced 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:

(107)　　　　　　　　　　*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-β, *Cuɾ, and (with Run and Cunhua) *Cur 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

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[22] Note that deglottalization must have happened after registrogenesis in all languages in which it occurred, since none of the tonal reflexes indicate voiced 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, changing *ɦ to *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.

I believe that 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 in

essence the solution adopted here, where PHl *Ciɦ and *Cuɦ (after the application of PCHl 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:

(108) *Ciɦ

*Ciɦ   *Ciɦ

                    *Ciɦj

*ɦ   *ɦ   *Ciɦj   *C-ɲ

BH   HE   ECHl   NCHl

*Ciɦ

*Cuɦ   *Cuɦ

                    *Cuɦw

*ɦ   *ɦ   *Cuɦw   *C-ŋw

BH   HE   ECHl   NCHl

In ECHl, *Cifij and *Cufiw generally followed roughly the same trajectory as *fi, losing the presyllable stop and devoicing to *hj* and *hw*. There is variation in the reflexes for *Cifij and *Cufiw in Qi; in Tongzha and Zandui, *Cifij and *Cufiw merged with *Ciʔj and *Cuʔw, yielding *ʔj* and *ʔw* respectively; in Baoting, on the other hand, *Cifij and *Cufiw merely lost the presyllable and devoiced to *hj* and *hw*[23]:

(109)

```
            *Cifij                                    *Cufiw
    ┌─────────┼─────────┐                    ┌─────────┼─────────┐
  *ʔj       *ʔj       *fij                  *ʔw       *ʔw       *fiw
    │         │         │                     │         │         │
    z         z         hj                    gw        v         hw

   TZ        ZD        BT                    TZ        ZD        BT
```

A comparison of reconstructions is given below:

(110)

	Matisoff	Thurgood	Peiros	Ostapirat	PHl
(a)	*ʔ	*ʔ	*ʔ	*ʔ	*ʔ
(b)	*xj	---	*ʔj	*-iʔ-	*Ciʔ
(c)	*xw	*xw	*ʔw	*-uʔ-	*Cuʔ
(a)	*x	*x	*h	*-k-	*fi
(b)	*hj	*hɲʔ	*hɲ	*-ik-	*Cifi
(c)	*hw	*hŋwʔ	*hŋw	*-uk-	*Cufi

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' 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.

---

[23] In my own fieldwork, the initials produced by my Baoting consultant were still voiced *fi*.

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, severely 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 rhinoglotophilia, a phenomenon which he relies upon to explain the NCHl reflexes (as is done here). Thurgood and Peiros' 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 glides are given below, in the following order:

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

(111)   Examples of PHl glottals

 (a)   *ʔ   (b)   *ɦ

烤火   light up   *ʔɯmɦ   苦   bitter   *ɦəːm

ʔɯm² ʔɯm² ʔɯm² ʔɯm⁵ ʔum⁵ ʔum⁵   ham¹ hoːm¹ hoːm¹ hoːm¹ hɔːm¹ hɔːm¹
ʔom⁵ ʔun² ʔom² ʔom² ʔom² ʔom⁵   ham¹ hɔn¹ hoːm¹ hoːm¹ huam¹ huam¹

吹   blow   *ʔuːɦ   屎   excrement   *ɦaːyʔ

ʔow² ʔow² ʔow² ʔow⁵ ʔow⁵ ʔow⁵   haːy³ haːy³ haːy³ haːy³ haːy³ haːy³
ʔow⁵ ʔɛw² ʔow² ʔow² ʔow² ʔow⁵   haː(y)³ hay³ haːy³ haːy³ haːy³ huay³

下飯   go with (food)   *ʔuːɲ   下巴   chin   *ɦaːŋ

ʔuːn¹ ʔuːn¹ ʔweɲ¹ ʔuːn¹ ʔuːn¹ ʔuːn¹   haːŋ¹ heːŋ¹ heːŋ¹ heːŋ¹ heːŋ¹ heːŋ¹
ʔuən¹ ʔun¹ ʔon¹ ʔun¹ ʔun¹ ʔun¹   heŋ¹ heŋ¹ heːŋ¹ heːŋ¹ hiaŋ¹ hiaŋ¹

(c)   *Ciʔ   (d)   *Ciɦ

木瓜/椰子 papaya/coconut *Ciʔunɦ   田埂   field ridge   *Ciɦəːn

ʔun² ʔun² ʔjun² zun⁵ zun⁵ ʔjɯn⁵   han¹ hoːn¹ hjoːn¹ zoːn¹ zɔːn¹ hjɔːn¹
---- ʔjɛn² ---- ---- (zoŋ⁵) zən⁵   ɲan¹ ɲɔn¹ ɲoːŋ¹ ɲoːŋ¹ ɲuaŋ¹ ɲuːn⁴

吞   swallow   *Ciʔəːmɦ   茅草   thatch grass   *Ciɦaː

ʔoːm² ʔoːm² ʔjoːm² zoːm⁵ zɔːm⁵ ʔjɔːm⁵   haː¹ haː¹ hjaː¹ zaː¹ zaː¹ hjaː¹
zam⁵ ʔjon² zoːm² zoːm² zuam² zuam⁵   ɲɔː¹ ŋjaː¹ ɲɛː¹ ɲaː¹ ɲaː¹ ɲaː⁴

打滾   roll   *Ciʔɔŋʔ   虫   bug   *Ciɦənɦ

ʔuŋ³ ʔuŋ³ ʔjoŋ³ zoŋ³ zoŋ³ ʔjɔŋ³   hen² han² hjan² zan⁵ zan⁵ hjan⁵
zɔŋ³ ---- zɔŋ³ zɔŋ³ zɔŋ³ zɔŋ³   ɲan⁵ ŋjen² ɲan² ɲaŋ² ɲaŋ² ɲan²

(e)			***Cuʔ**			(f)			***Cuɦ**		
起來	get up		*Cuʔɯːɦ			搾	handlength		*Cuɦɯp		
ʔəɯ²	ʔaɯ²	ʔwaɯ²	gwaɯ⁵	vaɯ⁵	ʔwaɯ⁵	hɯp⁷	hɯp⁷	hwɯp⁷	hɯp⁷	vup⁷	hɯp⁷
----	----	----	ɣəɯ²	vaɯ²	vaɯ⁵	ŋup²	ŋɛʔ⁴	ŋap⁷	ŋop⁷	ŋop⁸	mop⁸
碗	bowl/basin		*Cuʔaːw			身體	body		*Cuɦuːn		
ʔaːw¹	ʔaːw¹	ʔwaːw¹	gwaːw¹	vaːw¹	ʔwaːw¹	huːn¹	huːn¹	huːn¹	huːn¹	huːn¹	huːn¹
vaːw¹	ʔwa¹	----	ɣaːw¹	vaːw¹	vaːw¹	ŋuən¹	ŋun¹	ŋuŋ¹	ŋuŋ¹——ŋuŋ¹		mun⁴
汗	sweat		*Cuʔən			毛	fur		*Cuɦun		
ʔen¹	ʔan¹	ʔwom³	(ʔwan¹)	van¹	ʔwan¹	hun¹	hun¹	hun¹	hun¹	hun¹	hun¹
von¹	ʔwan¹	van¹	ɣaŋ¹	vaŋ¹	van¹	ŋən¹	ŋɛn¹	ŋoŋ¹	ŋoŋ¹	ŋoŋ¹	mən⁴

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:

(112) ʔ   ɦ
       Ciʔ   Ciɦ
       Cuʔ   Cuɦ

Unlike the other classes of initials discusses 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 PHl 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 PHl inventory of initials is given below:

(113)   PHl Initial Inventory

*ɓ	*ɗ		*tɕ	*k	*(Ci/u)ʔ
*pʰ	*tʰ	*tʃʰ(w)	*tɕʰ	*kʰ
*f(j)	*s			
*C-β					*(Ci/u)ɦ
*hm	*hn		*hɲ	*hŋ(w)
*C-m	*C-n		*C-ɲ	*C(u)ŋ
	*hl			
*p-l	*C-l			
	*lj			
*ʋ	*(Cu)ɾ	*(Cu)r		
	*ɾj			
*hw			*hj	

In terms of place, this inventory is rather normal typologically, with initial series represented at the bilabial, alveolar, postalveolar, palatal, velar, and glottal places of articulation. There are several gaps in the postalveolar 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 five coarticulated initials reconstructed for PHl. The two coarticulated obstruents include *tʃʰ, which has a counterpart *tʃʰw, and *f, which had a counterpart *fj. Neither *tʃʰw or *fj were very common, with only six examples of the former and one (and possibly two more, based on the Jiamao evidence given in chapter five) of the latter. Amongst the sonorants, *hŋ had a counterpart *hŋw, and the tap *ɾ had a palatalized counterpart, *ɾj. There was also a palatalized lateral *lj, although it was not strictly the counterpart of *hl since there is no evidence that it was preaspirated. The only one of these initials which is clearly rare in a typological sense is *tʃʰw.

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 *p-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 spread 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:

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

p	t	ts	tɕ	k	q	ʔ
pʰ	tʰ	tsʰ	tɕʰ	kʰ	qʰ	
mb	nd			g	ɢ	
ʔb	ʔd			ʔg		
m	n		ɲ	ŋ		
hm	hn		hɲ	hŋ		
ʔm	ʔn		ʔɲ	ʔŋ		
f		s	ɕ	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 initials 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 (116) below for reference, so that the

similarities and differences between them may be easily compared (category labels are taken from the

present reconstruction).

(115)   <u>Summary of Reconstructed Systems</u>

(a)   Aspirated Stops

<u>Matisoff</u>	<u>Thurgood</u>	<u>Peiros</u>	<u>Ostapirat</u>	<u>PHl</u>
*pʰ	*pʰ	*pʰ	*(ʔ)p	*pʰ
*tʰ	*tʰ	*tʰ	*(ʔ)t	*tʰ
*kʰ	*kʰ	*kʰ	*k	*kʰ

(b)   Affricates

Matisoff	Thurgood	Peiros	Ostapirat	PHl
---	---	---	*-t-	*tʃʰ
*sr	*sr	*sw	*-ut-	*tʃʰw
*tsʰ	*tsʰ	*cʰ	*c	*tɕʰ

(c)   Fricatives

Matisoff	Thurgood	Peiros	Ostapirat	PHl
*f	*p	*f	*-p-	*f
---	---	---	*-ip-	*fj
*fr	*pr	*hw	*-up-	*C-β
*s	*s	*s	*s	*s

(d)   Implosives and Plain Stop and Affricate

Matisoff	Thurgood	Peiros	Ostapirat	PHl
*ɓ	*ɓ	*ʔb	*(ʔ)b	*ɓ
*ɗ	*ɗ	*ʔd	*(ʔ)d	*ɗ
*ts	*ts	*c	*ɟ	*tɕ
*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
*pl	*pl	*pl	*p-l	*p-l
*z	*ljʔ	*z	*-il-	*lj

(h)   Approximants

Matisoff	Thurgood	Peiros	Ostapirat	PHl
*v	*wʔ	*v	*-ʋ-	*ʋ
*r	*rʔ	*r	*-r-	*ɾ
---	---	---	*-ir-	*ɾj
*vr	*prʔ	*zw	*-ur-	*Cuɾ
*ʐ/*ɣ	*ʐʔ/*ɣ	*rw/*ɣ	*-ʀ-/*−g-	*r
*ɣw	*ɣw	*ɣw	*-uʀ-/*-ug-	*Cur

(i)   Glides

Matisoff	Thurgood	Peiros	Ostapirat	PHl
*j	*j	*j	*-j-	*hj
*w	*w	*w	*-w-	*hw

(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 one instance 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:

(116)   Matisoff's PHl inventory

*ɓ	*ɗ	*ts	*k	*ʔ
*pʰ	*tʰ	*tsʰ	*kʰ	
*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 clusers which begin with stops. As in my own system, labiovelar coarticulations are optional throughout much of the velar series; however, there is only a single palatal coarticulation (*xj), which seems strange.   Finally, it is noticeable that the plain stop *p* occurs in the cluster *pl, but there is no plain counterpart *p.

(117)   Thurgood's PHl inventory

*p(l/r)		*ts	*k	*ʔ
*prʔ				
*pʰ	*tʰ	*tsʰ	*kʰ	
*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.

(118)   Peiros's PHl inventory

*ɓ	*ɗ	*c	*k	*ʔ(j/w)
*pl				
*pʰ	*tʰ	*cʰ	*kʰ	
*m	*n	*ɲ	*ŋ	
		*hɲ		*hŋw
*C-m	*C-n	*C-ɲ	*C-ŋ	*C-ŋw
	*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' 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).

(119)   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			
	*-(i)l-			
	*p-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 post-alveolar 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 (113) 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 manner changes, 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 THREE: 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), Ostapirat (1993), 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 of rimes 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 next 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 and reconstruction 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.

(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.

The rime is qualitatively different from the initial within the syllable, 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 nonbreathy *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)
              *vɦ̥   >   v̀ɦ̥ (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 actually 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, a favored syllable type which disfavors high nuclei. Diphthongization is one way to

maximize this distinction, so that a syllable like *key* with a mid nucleus and high coda is preferable to *ki:*,

with a high nucleus and no coda.

The most likely class of rimes to 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   <u>Source</u>

      (a)   u: >   ow   Several
              o: >   aw   Cunhua

      (b)   i:ŋ   >   iəŋ   Qi
              u:k   >   uək   Zandui

      (c)   ɛ:ŋ   >   iaŋ   Run
              ɔ:y   >   uay   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   <u>Source</u>

    (a)   aːŋ   >   ɛːŋ   Several
           aːt   >   ɔːt   Yuanmen

    (b)   eːw   >   iːw   Yuanmen
           əːy   >   aːy   Bouhin, Qi

It is not always clear why this change happens. It could be argued to maximize 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   <u>Source</u>
    (a)   ew   >   eːw   Yuanmen
           ik   >   iːk   Tongzha, Zandui

    (b)   eːw   >   ew   Cunhua
           aːm   >   am   Yuanmen

Lengthening may fill a gap in some instances, such as the example above involving Tongzha and Zandui where *ik lengthened to *iːk* after original *iːk 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 *aːm 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   <u>Source</u>

    (a)   əm   >   om   Lauhut
              ə:y   >   o:y   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 dubuccalization of final stops is more common, with that of final *k* (7c) being particularly common, but debuccalization of all final stops occurring in one language (7d):

(7)   Examples of coda deletion   <u>Source</u>

    (a)   iw   >   i: Nadouhua
           u:y   >   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 alignment 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   <u>Source</u>

    (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 I do not consider these changes 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 and so on.

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[24] (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,

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[24] It will be shown below that the situation in category D is more complex.

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 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 contrasts (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   Vy   Vw

(b)   Vʰ   Vmʰ   Vnʰ   ---   Vŋʰ   Vlʰ   Vrʰ   Vyʰ   Vwʰ

(c)   Vʔ   Vmʔ   Vnʔ   Viŋʔ   Vŋʔ   Vlʔ   Vrʔ   Vyʔ   Vwʔ

(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 [-ʰ]

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 which remained pure (although they diphthongized at a

later point in time):

(11)   PHl   GHl

(a)   *iː   >   iː
       *iːɦ   >   əyɦ
       *iːʔ   >   əyʔ

(b)   *ɯː   >   ɯː
       *ɯːɦ   >   əɰɦ
       *ɯːʔ   >   əɰʔ

(c)   *uː   >   uː
       *uːɦ   >   əwɦ
       *uːʔ   >   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	>	ə̣wɦ	>	ə:^{B} > a̠:^{B}
*u:ʔ	>	əwʔ	>	əɰʔ̰	>	ay^C

(b)

*u:	>	u:	>	u:	>	ow
*u:ɦ	>	əwɦ	>	ə̣wɦ	>	o:^{B}
*u:ʔ	>	əwʔ	>	əwʔ	>	aw^C

(c)

*u:	>	u:	>	u:	>	ow
*u:ɦ	>	əwɦ	>	ə̣wɦ	>	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
dream	*fən	fon^1
hungry	*rən	lon^4
silver	*hŋən	kon^4

(b)

Gloss	PHl	Cun
long clsfr	*ɗənɦ	ɗan^5
insect	*Cifiənɦ	ɲan^5
waterwheel	*ʋənɦ	van^5
yesterday	*pʰənʔ	pʰan^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 tonal 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, with the standard East Asian pitch system used where the lowest pitch is 1 and the highest is 5[25]:

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[25] Using the pitch values 1, 3, and 5, examples of pitch contours in this system are as follows: 11˩ (low level), 33˧ (mid level), 55˥ (high level), 13˥ (low rising), 35¬ (high rising), 31˥ (low falling) 53˥ (high falling), and so on.

(15)

Tone	Register	Bhin Cun	HaEm Nadou	Tzha Cjiang	Zdui Mfaw	Bting Baisha	Lhut Ymen
A	High	454	53	33	33	44	53
		35	11	53	53	11	42
	Low	----	----	11	11	22	----
		13	21?	15?	----	----	11
B	High	24	55	51	42	53	55
		21	25	44	55	31	51
	Low	----	----	121	21	31	----
		----	----	----	----	----	131
C	High	11	11	55	35	35	11
		42	42	22	24	33	44
	Low	----	----	14	213	213	----
		13	----	----	----	----	13
D	High	45	55	55	42	53/44	55
		33	21?	15?	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 either have high targets or otherwise have 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, including Bouhin, Ha Em, Lauhut, and Meifu; Group 2, including Qi and Run, and Group 3, comprising 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: *V̰ʔC^{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 raise 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$^{4\text{-}54}$
B   *Vh^{55} >   V^{44} >   V$^{2\text{-}4}$
C   *V̰^{11} >   V^{11} >   V^{11}
D   *V̰ʔC^{55} >   VC^{55} >   VC$^{4\text{-}5}$

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)   <u>Moyfaw</u>

C $\underset{\sim}{\text{V}}^{11}$ > $\underset{\sim}{\text{V}}?^{13}$ > 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 <i>ɦ</i> in the examples in low register represents the voicing of the original onset):

(22)   <u>Changjiang</u>

<u>High Register</u>   <u>Low Register</u>

A1	V^{53}	>	V^{53}	>	V^{53}	A2	V^{53}	>	$\text{ɦ}\underset{\sim}{\text{V}}^{53}$	>	$\text{V}?^{15}$
B1	Vh^{55}	>	V^{44}	>	V^{44}	B2	Vh^{55}	>	ɦVh^{55}	>	V^{44}
C1	$\underset{\sim}{\text{V}}^{11}$	>	V^{22}	>	V^{22}	C2	$\underset{\sim}{\text{V}}^{11}$	>	$\text{ɦ}\underset{\sim}{\text{V}}^{11}$	>	V^{22}
D1	$\text{V}\widehat{?\text{C}}^{55}$	>	$\text{V}\widehat{?\text{C}}^{15}$	>	$\text{V}\widehat{?\text{C}}^{15}$	D2	$\text{V}\widehat{?\text{C}}^{55}$	>	$\text{ɦV}\widehat{?\text{C}}^{55}$	>	$\text{V}\widehat{?\text{C}}^{15}$

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 (*-ʔ). 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: *V̰ʔ^{55}
D: *V̰ʔ͡C^{55}

With this original configuration as a hypothesis, it is possible to move on and treat 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 'down-stepped', 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: *V̰ʔ^{55} >   V̰ʔ^{55} >   V^{33}
D: *V̰ʔ͡C^{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

<u>High register</u>   <u>Low register</u>

A1	$*V^{33}$	>	V^{33}	>	V^{42}	A2	$*V^{33}$	>	$ɦV^{11}$	>	V^{11}
B1	$*Vɦ^{51}$	>	$Vɦ^{51}$	>	V^{51}	B2	$*Vɦ^{51}$	>	$ɦVɦ^{1\text{-}31}$	>	V^{131}
C1	$*V̰ʔ^{55}$	>	$V̰ʔ^{55}$	>	V^{44}	C2	$*V̰ʔ^{55}$	>	$ɦV̰ʔ^{13}$	>	V^{13}
D1	$*V̰ʔ͡C^{55}$	>	$V̰ʔ͡C^{55}$	>	VC^{55}	D2	$*V̰ʔ͡C^{55}$	>	$ɦV̰ʔ͡C^{13}$	>	VC^{13}

The Tongzha situation is very similar to the Yuanmen one, indicating that they were in close interaction during the phase of tongogenesis. 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

<u>High register</u>   <u>Low register</u>

A1	$*V^{33}$	>	V^{33}	>	V^{33}	A2	$*V^{33}$	>	$ɦV^{11}$	>	V^{11}
B1	$*Vɦ^{51}$	>	$Vɦ^{51}$	>	V^{51}	B2	$*Vɦ^{51}$	>	$ɦVɦ^{1\text{-}31}$	>	V^{121}
C1	$*V̰ʔ^{55}$	>	$V̰ʔ^{55}$	>	V^{55}	C2	$*V̰ʔ^{55}$	>	$ɦV̰ʔ^{13}$	>	V^{14}
D1	$*V̰ʔ͡C^{55}$	>	$V̰ʔ͡C^{55}$	>	VC^{55}	D2	$*V̰ʔ͡C^{55}$	>	$ɦV̰ʔ͡C^{13}$	>	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[26], 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

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

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

<u>High register</u>   <u>Low register</u>

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	$*Vʔ^{55}$	>	$Vʔ^{35}$	>	V^{35}	C2	$*Vʔ^{55}$	>	$ɦVʔ^{13}$	>	$V^{2\text{-}13}$
D1	$*V\widehat{ʔC}^{55}$	>	$V\widehat{ʔC}^{53}$	>	VC^{42}	D2	$*V\widehat{ʔC}^{55}$	>	$ɦV\widehat{ʔC}^{31}$	>	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 developing a level tone as a result of their short duration and merging with category A. These two tones (A and short rimes in D) then raised in pitch:

(31)   Evolution of Baoting tone categories

<u>High register</u>   <u>Low register</u>

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	$*Vʔ^{55}$	>	$Vʔ^{35}$	>	V^{35}	C2	$*Vʔ^{55}$	>	$ɦVʔ^{13}$	>	$V^{2\text{-}13}$
D1L	$*V\widehat{ʔC}^{55}$	>	$V{:}\widehat{ʔC}^{53}$	>	$V{:}C^{53}$	D2	$*V\widehat{ʔC}^{55}$	>	$ɦV\widehat{ʔC}^{31}$	>	VC^{31}
D1S		>	$V\widehat{ʔC}^{33}$	>	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:

(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	(42)
D	High	33	21ʔ
	Low	13	(21ʔ)

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 $*Vʔ^{42}$
D1 $*V\widehat{ʔC}^{55}$

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, possible 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 disctinctions in all categories except B, which was not affected (probably because it was still breathy):

(34)   Evolution of Cunhua tone categories

High register

A1	$*V^{33}$ >	V^{35} >	V^{35}
B1	$*V̤ɦ^{21}$ >	$V̤ɦ^{21}$ >	V^{21}
C1	$*Vʔ̰^{42}$ >	V^{42} >	V^{42}
D1	$*V\widehat{ʔC}^{55}$ >	VC^{33} >	VC^{33}

Low register

A2	$*V^{33}$ >	$ɦV^{13}$ >	V^{13}
B2	$*V̤ɦ^{21}$ >	$ɦV̤ɦ^{21}$ >	V^{21}
C2	$*Vʔ̰^{42}$ >	$ɦV^{13}$ >	V^{13}
D2	$*V\widehat{ʔC}^{55}$ >	$ɦVC^{13}$ >	VC^{13}

There were significant changes in Nadouhua. In high register, there seems to have been a drop in pitch in category A until it reached 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

A1	$*V^{33}$ >	V^{33} >	V^{11}
B1	$*V̤ɦ^{21}$ >	Vh^{25} >	V^{25}
C1	$*Vʔ̰^{42}$ >	$Vʔ̰^{42}$ >	V^{42}
D1	$*V\widehat{ʔC}^{55}$ >	$V\widehat{ʔC}^{21}$ >	$Vʔ^{21}$

Low register

A2	$*V^{33}$ >	$ɦV̰^{11}$ >	$Vʔ̰^{21}$
B2	$*V̤ɦ^{21}$ >	$ɦVh^{25}$ >	V^{25}
C2	$*Vʔ̰^{42}$ >	$ɦVʔ̰^{42}$ >	V^{42}
D2	$*V\widehat{ʔC}^{55}$ >	$ɦV\widehat{ʔC}^{21}$ >	$Vʔ^{21}$

3.2.4 Proto Hlai

Moving finally to a reconstruction of 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}	*V̰ɦ^{21}
C	*Vʔ	*V̰^{11}	*V̰ʔ^{55}	*V̰ʔ^{42}
D	*Vʔ͡C	*Vʔ͡C^{55}	*V̰ʔ͡C^{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 category 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	>	*V̰ʔ	>	*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	>	*V̠ʔ^{55}
D	*Vʔ͡C	>	*V̠ʔC^{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	>	*V̠ɦ	>	*V̠ɦ^{21}
C	*Vʔ	>	*Vʔ̠	>	*Vʔ̠^{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 breathy glottal fricative (category B), final glottal stop (category C), and final glottalized oral stop (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 *e: is quite rare, and likely occurred in PHl as the result of loans into the proto-language from one or more outside sources (although this is speculation). 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*

BHi:n	Ha Em	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Mfaw	Cjiang	Baisha	Ymen
ey	ey	ey	ey	ey	ey	ɛy	ɛy	ey	ey	ey	ey
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
e:	e:	e:	e:	e:	e:	----	----	e:	e:	e:	e:
a:	a:	a:	a:	a:	a:	ɔ:	a:	a:	a:	a:	a:

S. Hlai (Savina)		C. Hlai (Savina)		Baisha (Wang & Qian)
ey		ey		ɛy
ɤɰ		ɤɰ		əɣ
ɐw		aw		ow
ɛ:		----		----
a:		a:		a:

The reconstructions for these vowels proposed here are given below:

(41)   *i:
        *ɯ:
        *u:
        *e:
        *a:

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:

(41)   Gloss   PHl   Bouhin

         aunt   *hmi: mi:[1]
         you   *C-mɯ: mɯ:[1]
         seven   *tʰu: tʰu:[1]
         eight   *ru: ru:[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:

(42)   *Reflexes of the PHl open rimes*

BHi:n	Ha Em	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Mfaw	Cjiang	Baisha	Ymen
ey$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$	ay$^{B/C}$
əɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	aɰ$^{B/C}$	ɔ:$^{B/C}$	aw$^{B/C}$	əɰ$^{B/C}$	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}	a:^{B}/ay^{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)
ey$^{B/C}$	ay$^{B/C}$	a:y$^{B/C}$
ɣɰ$^{B/C}$	ɣɰ$^{B/C}$	a:l$^{B/C}$
ɐw$^{B/C}$	o:^{B}/aw^{C}	ɐw$^{B/C}$

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

(43)   *iːɦ/ʔ
              *ɯːɦ/ʔ
              *uːɦ/ 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 (44) and Greater Hlai (45) are shown below:

(44)   Bouhin[27]

(a)   *iː   >   iː   (b)   *iːɦ   >   iːɦ   (c)   *iːʔ   >   iːʔ
       *ɯː   >   ɯː   *ɯːɦ   >   ɯːɦ   *ɯːʔ   >   ɯːʔ
       *uː   >   uː   *uːɦ   >   uːɦ   *uːʔ   >   uːʔ

(45)   Greater Hlai

(a)   *iː   >   iː   (b)   *iːɦ   >   əyɦ   (c)   *iːʔ   >   əyʔ
       *ɯː   >   ɯː   *ɯːɦ   >   əɰɦ   *ɯːʔ   >   əɰʔ
       *uː   >   uː   *uːɦ   >   əwɦ   *uːʔ   >   əwʔ

This is the central reason for the reconstruction of pure high vowels at the Proto-Hlai stage. If the dipthongs *ey, *əɰ, and *ow were reconstructed, the change to Greater Hlai *əy, *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:

---

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

(46)   Table 4:   Greater Hlai Distribution of Pure Vowels vs. Short Diphthongs

Rime	Tone A	Tone B	Tone C
*iː	X		
*ɯː	X		
*uː	X		
*əy	X	X	X
*əɥ		X	X
*əw	X	X	X
Final	-Ø	-ɦ	-ʔ

If this hypothesis is correct, then the first implication is that short mid central diphthongs 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 (and ultimately losing their final laryngeal segments at the end of the process of tonogenesis described above, completely merging with their counterparts in category A). Since *əɥ does not occur in category A, the second implication is that there was no original Pre-Hlai *əɥ category; all members in this category are derived from an original *ɯːɦ/ʔ. The original inventory of pure high vowels and short diphthongs in PHl was therefore the following:

(47)   *iː   *ɯː   *uː
        *əy   *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 (48a) and compared with the simultaneous evolution of the short diphthongs in Greater Hlai (48b):

(48)   (a)   *iː   >   ey   (b)   *əy   >   ay
               *ɯː   >   əɥ   *əɥ   >   aɥ
               *uː   >   ow   *əw   >   aw

The only exceptions to the development shown in (48) occurred in Cunhua and Nadouhua, subsequent to diphthongization. In the case of Cunhua, *ɯ: rounded and merged with *u::

(49)   Cunhua: *ɯ: >   u: >   əw   >   ow

In the case of Nadouhua, a partial merger occurred, with *ɯ: falling into variation between *ɯ:* and *u:*; 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 *ɛ::*

(50)   Nadouhua: *i: >   i: >   əy   >   ɛy   >   ɛy
                         *ɯ: >   ɯ:~u: >   əɰ~əw >   ɛɰ~ɛw >   ɛ:~ɛw
                         *u: >   u: >   əw   >   ɛw   >   ɛw

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

This kind of stress-correlated 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)):

(51)   High vowel diphthongization in Proto Chamic

Gloss   PMP   Pre-Chamic   Proto-Chamic

thorn   *duRi   >   *durí: >   *durəy
dig   *kali   >   *kalǐ: >   *kaləy
man   *laki   >   *lakí: >   *lakəy

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:

(52)   *uːɦ   >   əwɦ   >   oːɦ

The three different developments of *uː in Cunhua were also very striking:

(53)   *uː   >   uː   >   əw   >   ow
        *uːɦ   >   əwɦ   >   awɦ   >   aː^B
        *uːʔ   >   əwʔ   >   aɰʔ   >   ay^C

After *uːɦ/ʔ merged with *əw, the latter developed in Lauhut in two ways depending on the initial

it followed, with the nucleus either lowering (54a) or backing under the influence of a preceding labial

(54b):

(54)   Examples of PHl *əwɦ/ʔ in Lauhut

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

Gloss	PHl	Lauhut	Gloss	PHl	Lauhut
few	*ɾjəwɦ	raw²	pile	*pʰəwʔ	pʰow³
banyan	*tʰəwʔ	tʰaw³	hot	*tʃʰwəwʔ	fow³
male inlaw	*hjəwʔ	zaw³	handle	*Cuɦəwɦ	hwow²

This was also true of Baoting in *uːʔ rimes in category C (55a-b):

(55)   Examples of PHl *uːʔ in Baoting

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

Gloss	PHl	Baoting	Gloss	PHl	Baoting
ash	*suːʔ	taw³	stab	*pʰuːʔ	pʰow³
two	*hluːʔ	ɬaw³	taboo	*C-muːʔ	mow³
kill	*C-ɦuːʔ	haw³	boil	*ɓuːʔ	ɓow³

The only major exceptions to Greater Hlai diphthongization in categories B and C are the

following:

(56) Gloss   PHl   Gloss   PHl

this   *C-ni:ɦ   tadpole   *hnu:ɦ
thin   *C-li:ʔ   run   *Curu:ɦ
point   *suɯ: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:

(57) Gloss   PHl   Gloss   PHl

older sister *ʔi:ɦ   non-gltns. rice *C-muɯ:ʔ
trip clsfr   *ɓuɯ:ɦ   one   *tɕʰuɯ:ʔ
shadow   *[hw/ʋ]uɯ:ɦ

There is also one unique example of a high vowel which failed to diphthongize at all (58a),

another example in which the high vowel failed to diphthongize in the majority of languages (58b), and one

in which it failed to diphthongize in Qi (58c):

(58) (a)   三   three   *tʃʰwu:ʔ

fu:³   tsʰu:³   tsʰu:³   tsʰu:³   tsʰu:³   tsʰu:³
fu:³   fo:³   fu:³   fu:³   fu:³   fʰu:³

(b)   乳房   breast   *tɕi:ɦ

tsi:²   tsi:²   (tsey¹) tsi:⁵   tsi:⁵   tsi:⁵
tsɛy¹   tsɛy¹   tsey¹   tsey¹   tsi:³   ti:³

(c)   母親   mother   *hmi:ʔ

mey³   (mey³)   pay³   pi:⁶   pʰi:⁶   pi:⁶
ɓay⁴   may¹   ----   pay³   (me:¹)   (mey⁶)

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. 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:

(59)	Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
(a)	*ei	*əy	*iː	*iː
(b)	*əɯ	*əɥ	*ɨː	*ɯː
(c)	*ou	*əw	*uː	*uː
(d)	*ay	*ɐy	*ay	*iːɦ/ʔ
(e)	*aɯ	*ɐɥ	*al	*ɯːɦ/ʔ
(f)	---/*aw	*-j-aw/*ɐw	*ɨw/*aw	*uːɦ/ ʔ
(g)	---	---	---	*eː
(h)	*a	*a	*aː	*aː

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. The recontruction in Ostapirat (1993) is what I consider to be an intermediate stage, where the vowels have already diphthongized but before the nucleus has been colored under the influence of the following glide. This seems a reasonable reconstruction at first glance given the reflexes in the daughter languages; however, it fails to account for the Bouhin data, which strongly indicate that pure vowels must be reconstructed at the PHl stage. Ostapirat (2004) reconstructs a system similar to the one presented here, the only difference (*ɨː vs. *ɯː) 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 Qian & Wang (1951), in which they transcribe what I assume to have been Baisha *aɥ 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 *ɥ*. 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:

(60)	Saek	Laha	PHl
body louse	mlɛl⁴	mdal^(A2)	*tʰən
to fly	bɯl¹	----	*ɓin
field dike	ɣal⁴	----	*Cifiə:n
be slippery	mlɯl⁵	----	*C-ɲɯ:nɦ
stone	ri:l²	----	*tɕʰi:n
to teach	sɔ:l²	----	*sun
wasp	tʰi:l⁴	----	*tʰin
cast, sow	va:l⁶	----	*fə:nɦ
(hard, solid, firm	ke:l⁶	----	*tɕʰə:nʔ)

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 (1993) reconstructs a diphthong preceded by a palatal glide for this series, with the understanding that the glide has 'colored' the diphthongs in Zandui and Baoting. 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 generally 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 glides are given below, in the following order:

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

(61)   *Examples of PHl open rimes*

(a)   ***i:**   (b)   ***i:h/ʔ**

榕樹   banyan   *ri: 被子   comforter   fi:ʔ

rey^1 gey^1 gey^1 gey^4 hey^4 hey^4 pey^3 fay^3 fay^3 fay^3 fay^3 fay^3
(huy^4) ŋɛyʔ^4 gey^4 xey^1 xey^1 (tsey^4)   tθay^3 fay^3 fay^3 fay^3 fay^3 (fuy^3)

火   fire   *fi: 疖瘩   small sore   C-ni:ʔ

(pey^1) fey^1 fey^1 fey^1 fey^1 fey^1 ney^3 nay^3 nay^3 nay^3 nay^6 nay^3
---- fɛy^1 fey^1 fey^1 fey^1 fʰey^1 --- --- nay^3 nay^3 nay^3 nay^6

瘦   thin   *C-li:ʔ   哭   cry   C-ŋi:ʔ

ley^3 ley^3 ley^3 ley^3 ley^6 ley^3 ŋey^3 ŋay^3 ŋay^3 ŋay^3 ŋay^6 ŋay^3
lɛy^3 lɛy^3 ley^3 ley^3 ley^3 ley^6 ŋay^3 ŋay^3 ŋay^3 ŋay^3 ŋay^3 ŋay^6

(c)   ***ɯ:**   (d)   ***ɯ:h/ʔ**

葉子   leaf   *ɓɯ: 乾涸   dry   *kʰɯ:ɦ

ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 kʰəɰ^2 kʰaɰ^2 kʰaɰ^2 kʰaɰ^5 kʰaɰ^5 kʰaɰ^5
ɓow^1 ɓɛw^1 ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 ɓəɰ^1 kʰɔ:^{5} kʰaw^2 kʰaɰ^2 kʰəɰ^2 kʰaɰ^2 kʰaɰ^5

要   want   *ɗɯ: 矮   short   *tʰɯ:ʔ

ɗəɰ^1 ɗəɰ^1 ɗəɰ^1 ɗəɰ^1 ɗəɰ^1 ----   tʰəɰ^3 tʰaɰ^3 tʰaɰ^3 tʰaɰ^3 tʰaɰ^3 tʰaɰ^3
tsow^1 ɗɛ:^{1} ɗəɰ^1 ɗəɰ^1 ɗəɰ^1 ɗəɰ^1 tʰɔ:^{3} tʰaw^3 tʰaɰ^3 tʰəɰ^3 tʰaɰ^3 tʰaɰ^3

女婿   son-in-law   *hlɯ: 輕   light   *kʰɯ:ʔ

ɗəɰ^1 ɬəɰ^1 ɬəɰ^1 ɬəɰ^1 ɬəɰ^1 ɬəɰ^1 kʰəɰ^3 kʰaɰ^3 kʰaɰ^3 kʰaɰ^3 kʰaɰ^3 kʰaɰ^3
tθow^1 ---- ɬəɰ^1 ɬəɰ^1 ɬəɰ^1 ɬəɰ^1 kʰɔ:^{3} kʰaw^3 kʰaɰ^3 kʰəɰ^3 kʰaɰ^3 kʰaɰ^3

(e) ***u:**

斑鳩 dove, pigeon *kʰu:

kʰow¹	kʰow¹	kʰow¹	kʰow¹	kʰow¹	kʰow¹
(kʰow⁵)	kʰɛw¹	kʰow¹	kʰow¹	kʰow¹	kʰow¹

跟 with *Cuɾu:

row¹	row¹	vow¹	fow⁴	----	(vow¹)
vow⁴	(ŋɛwʔ⁴)	gow⁴	ɣow¹	(fow⁴)	fow¹

黃蜂 wasp *p-lu:

low¹	low¹	plow¹	plow¹	pow¹	plow¹
low⁴	---	pow¹	plow¹	plow¹	plow¹

(g) ***u:ʔ**

刺 prick (finger) *pʰu:ʔ

(pʰaw³)	pʰaw³	pʰow³	pʰaw³	pʰaw³	pʰow³
pʰay³	pʰaw³	pʰaw³	pʰaw³	pʰaw³	pʰaw³

殺 kill *ɦu:ʔ

how³	haw³	haw³	haw³	haw³	haw³
hay³	haw³	haw³	haw³	haw³	haw³

二 two *hlu:ʔ

ɗow³	ɬaw³	ɬaw³	ɬaw³	ɬaw³	ɬaw³
tθa:(y)³	law³	ɬaw³	ɬaw³	ɬaw³	ɬaw³

(f) ***u:ɦ**

沙 sand *pʰu:ɦ

(pʰaw²)	pʰaw²	pʰow²	pʰaw⁵	pʰo:⁵	pʰɔ:⁵
pʰa:⁵	pʰaw²	pʰaw²	pʰaw²	pʰaw²	pʰaw⁵

年 year *hmu:ɦ

mow²	paw²	pow²	paw²	pʰo:²	pɔ:²
ɓa:⁵	paw²	paw²	paw²	paw²	paw²

睡 sleep (lie) *hŋu:ɦ

ŋow²	kaw²	kaw²	kaw²	kʰo:²	kɔ:²
ka:⁵	kaw²	kaw²	kaw²	kaw²	kaw²

(h) ***e:**

鵝 goose *C-ŋe:

ŋe:¹	ŋe:¹	ŋe:¹	----	----	----
----	----	ŋe:¹	ŋe:¹	----	----

背着手 hands in back *p-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   *tʃʰa:

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   *Cura:

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, with the front mid vowel *e: being marginal:

(62)   *i: *ɯ: *u:
      (*e:)
           *a:

     The high vowels have undergone parallel developments in category A, with the original high 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 Vowels

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 4.5. In addition, those rimes in this section will be divided between high front nuclei (4.4.1), high back unrounded nuclei (4.4.2), and high back rounded nuclei (4.4.3).

There are two series of closed rimes with high nuclei. The general pattern which exists is an opposition between short high versus short mid vowels in NCHl, as opposed to short versus long high vowels in other Hlai:

(63)   (a)   <u>NCHl</u>:   (b)   <u>Other Hlai</u>:

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 undergone considerably more contact 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 (63a) 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 Qian & Wang (1951) strongly suggest that the change in (63a) above was the result of a chain shift, as the patterns in high vowel rimes they record follow the following pattern:

(64)   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 PHl Rimes with High Front Nuclei

There are altogether fourteen series of correspondences which I reconstruct with high front nuclei, seven long and seven short; their correspondences are given below:

(65)   Reflexes of rimes with high front nuclei

BHi:n	HaE:m	LHu:t	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	ɔy	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	----	iːm
ien	ien	iːŋ
ieŋ	eŋ	iːŋ
iep	iep	iːp
iet	iɛt	iːt
iː	eɐk	iːt
iw	iw	ew
----	----	
in	en	en
----	----	----
----	----	(iːp)
it	ɛt	et
ek	----	----

The reconstructions I propose here are therefore the following:

(66)   *iːw   *iw
        *iːm   *im
        *iːn   *in
        *iːŋ   *iŋ
        *iːp   *ip
        *iːt   *it
        *iːk   *ik

The reconstruction of these rimes is readily constrained by the principle of Symmetry, as is true

for all of the other classes of closed rimes.

3.4.1.1 Long Rimes with High Front Vowels

As discussed above, long rimes in NCHl languages shortened:

(67)   *iːC   >   iC

There is some evidence that the diphthongs in NCHl were exempted from this otherwise pervasive

pattern. The Nadouhua reflex of PHl *iːw 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:

(68) Cunhua: i:w > i:w > iw
      iw > uy > oy

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:

(69) 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:

(70) *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:

(71) *i:ŋ > iəŋ
      *i:k > iək

In Nadouhua, there was an across-the-board merger of labial codas with alveolar codas; in

addition, all final stops debuccalized to a glottal stop:

(72)　　*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:

(73)　　*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:

(74)　　*in　　>　　iŋ
　　　　　*ik　　>　　it

3.4.1.2　Short Rimes with High Front Vowels

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:

(75)　　*iC　　>　　eC

A similar but more restricted change occurred in Lauhut, where alveolar-final rimes became palatalized as the vowel itself lowered to *e*:

(76)　　*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 (shown in (77) for comparison):

(77)   *in   >   en
         *it   >   et

         *ik   >   i:k   >   i:ʔ
         *i:k   >   iək   >   iaʔ

There appears to have been raising of the vowel in Moyfaw before the velar 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 a Lauhut:

(78)   ek   >   ik

A merger of velar final rimes with alveolar final rimes occurred in NECHl:

(79)   eŋ   >   en

This was mirrored by the same merger of the stops in Yuanmen:

(80)   ek   >   et

Finally, the Yuanmen diphthong lengthened, creating an environment in which raising occurred (see section 4.5.1):

(81)   ew   >   e:w   >   i:w

A comparison of reconstructions is given below:

(82)	Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
(a)	*i:w	*iw	*i:w	*i:w
(b)	*i:m	*im	*i:m	*i:m
(c)	*i:n	*in	*i:n	*i:n
(d)	*iaŋ	*iŋ	*i:ŋ	*i:ŋ
(e)	*i:p	*ip	*i:p	*i:p
(f)	*i:t	*it	*i:t	*i:t
(g)	*i:k	*ik	*i:k	*i:k
(h)	*iw	*ew	*iw	*iw
(i)	---	*em	*im	*im
(j)	*iɲ	*en	*in	*in
(k)	*iŋ	*eŋ	*iŋ	*iŋ
(l)	*ip	*ep	*ip	*ip
(m)	*ic	*et	*it	*it
(n)	*ik	*ek	*ik	*ik

In general, Thurgood's reconstruction agrees with the present one in positing a length distinction. There are three differences between Thurgood's reconstruction and the present one. The first is that he reconstructs *iaŋ in (82d), 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 (82i). Finally, he reconstructs *iɲ and *ic in (82j) and (82m), 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, whereas Ostapirat (1993) reconstructed a distinction between high and mid nuclei. Given their individual assumptions, Ostapirat's two reconstructions are both 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

(83)   *Examples of PHl closed rimes with high front nuclei*

(a)   ***i:w**   (b)   ***iw**

藍色   blue   *kʰi:w   兒媳/妻子 dtr in law/wife *C-liw

| kʰi:w¹ | kʰi:w¹ | kʰi:w¹ | kʰi:w¹ | kʰiw¹ | kʰi:w¹ | liw¹ | liw¹ | liw¹ | liw¹ | liw⁴ | liw¹ |
| kʰiw¹ | kʰi:¹ | kʰiw¹ | kʰiw¹ | kʰiw¹ | kʰiw¹ | lɔy¹ | liw¹ | liw¹ | liw¹ | lew¹ | li:w⁴ |

貓   cat   *C-mi:wh   老鼠   mouse   *hniw

| mi:w² | mi:w² | mi:w² | mi:w⁵ | miw² | mi:w⁵ | niw¹ | tiw¹ | tiw¹ | tiw⁴ | tʰiw⁴ | tiw⁴ |
| miw⁵ | mi:² | miw² | miw² | (miw¹) | miw² | tsɔy⁴ | tiwʔ⁴ | tiw⁴ | tiw¹ | tew¹ | ti:w⁴ |

賣   sell   *ri:wʔ   尖刀   *ljiwʔ

| ri:w³ | gi:w³ | ---- | gi:w⁶ | hiw⁶ | gi:w⁶ | ziw³ | ziw³ | ziw³ | ɬiw⁶ | ɬiw⁶ | ɬiw⁶ |
| hiw⁴ | zi:³ | giw⁴ | xiw³ | xiw³ | kʰiw³ | ---- | (zɛw³) | liw³ | ziw³ | zew³ | tsi:w⁶ |

(c)   ***i:m**   (d)   ***im**

塞   plug up   *tɕʰi:m   嘗   taste   *tɕʰim

| ---- | ---- | tsʰi:m¹ | tsʰi:m¹ | tsʰi:m¹ | tsʰi:m¹ | tsʰim¹ | tsʰim¹ | tsʰim¹ | (tsʰem¹) | tsʰim¹ | tsʰim¹ |
| ---- | sin¹ | (tsʰim²) | tsʰi:m¹ | tsʰim¹ | tsʰim¹ | ---- | ---- | ---- | tsʰem¹ | tsʰem¹ | tsʰem¹ |

舔   lick   *lji:mh   項圈   necklet   *kʰim

| zi:m² | zi:m² | zi:m² | ɬi:m² | ---- | ɬi:m² | kʰim¹ | kʰim¹ | kʰim¹ | kʰim¹ | ---- | ---- |
| (lɛm⁵) | (lin²) | lim² | ɲim² | ɲim² | ---- | ---- | ---- | ---- | ---- | kʰem¹ | ---- |

分贈   give as gift   *ri:mʔ   禁母/放蠱 witch/poison   *kimʔ

| (gi:m³) | gi:m³ | gi:m³ | gi:m⁶ | hi:m⁶ | gi:m⁶ | kim³ | kim³ | kim³ | kim³ | kim³ | kim³ |
| ---- | ---- | ---- | xim³ | xim³ | kʰim³ | kem³ | ---- | kem³ | kem³ | kem³ | kem³ |

(e)   ***i:n**

錢　money　*tɕi:n

tsi:n¹	tsi:n¹	tsi:n¹	tsi:n¹	tsi:n¹	tsi:n¹
tθin¹	tsin¹	tsiŋ¹	tsiŋ¹	tsiŋ¹	tin¹

石頭　stone　*tɕʰi:n

tsʰi:n¹	tsʰi:n¹	tsʰi:n¹	tsʰi:n¹	tsʰi:n¹	tsʰi:n¹
sin¹	sin¹	tsʰiŋ¹	tsʰiŋ¹	(tsʰiŋ⁴)	tsʰin¹

舌頭　tongue　*hli:nʔ

ɗi:n³	ɬi:n³	ɬi:n³	ɬi:n³	ɬi:n³	ɬi:n³
tθin³	lin³	ɬiŋ³	ɬiŋ³	ɬiŋ³	ɬin³

(f)   ***in**

飛　fly　*ɓin

ɓin¹	ɓin¹	ɓeŋ¹	ɓen¹	ɓen¹	ɓin¹
ɓen¹	ɓen¹	ɓen¹	ɓen¹	ɓen¹	ɓen¹

答應　agree　*tʰin

tʰin¹	tʰin¹	tʰeŋ¹	tʰen¹	tʰen¹	tʰin¹
tʰen¹	tʰen¹	tʰen¹	tʰen¹	tʰen¹	tʰen¹

好　good　*hlin

ɗin¹	ɬin¹	ɬeŋ¹	ɬen¹	ɬen¹	ɬin¹
tθen¹	len¹	ɬen¹	ɬen¹	ɬen¹	ɬen¹

(g)   ***i:ŋ**

手指　finger　*lji:ŋh

zi:ŋ²	zi:ŋ²	zi:ŋ²	ɬiaŋ²	ɬiaŋ²	ɬiaŋ²
----	ziŋ²	ziŋ²	ziŋ²	(ziŋ⁵)	tsiŋ²

吊　hang　*ɾi:ŋʔ

ri:ŋ³	ri:ŋ³	ri:ŋ³	riaŋ⁶	liaŋ⁶	liaŋ⁶
liəŋ⁴	liŋ³	----	riŋ³	riŋ³	riŋ⁶

裂開/縫　*tʰi:ŋʔ

tʰi:ŋ³	tʰi:ŋ³	tʰi:ŋ³	tʰiaŋ³	tʰiaŋ³	tʰiaŋ³
tsʰiəŋ³	----	tʰiŋ³	tʰiŋ³	tʰiŋ³	tʰiŋ³

(h)   ***iŋ**

童山　bare hills　*kiŋ

kiŋ¹	kiŋ¹	kiŋ¹	kiŋ¹	kiŋ¹	kiŋ¹
----	----	ken¹	ken¹	ken¹	ken¹

螞蟥　leech　*ljiŋ

ziŋ¹	ziŋ¹	ziŋ¹	ɬiŋ⁴	ɬiŋ⁴	ɬiŋ⁴
(liŋ⁴)	zeŋʔ⁴	----	zen¹	zen¹	tsen⁴

稻草　straw　*Cuŋiŋʔ

ŋiŋ³	ŋiŋ³	ŋwiŋ³	ŋiŋ³	ŋiŋ⁶	ŋiŋ³
ɲeŋ³	ŋwɛn³	ŋen³	ŋen³	ŋen³	ɱen⁶

(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	$li\textʔ^4$	lip^7	lip^7	lip^8	l/rip^8

吳蚣　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　husk w/out rice　*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　　　*tɕʰip

ts^hip^7	ts^hip^7	ts^hip^7	ts^hip^7	ts^hip^7	ts^hip^7
----	----	----	ts^hep^7	ts^hep^8	ts^hep^7

閃電　lightning　*ljip

zip^7	zip^7	----	$ɬip^7$	$ɬip^7$	$ɬip^7$
lep^4	$(fiʔ^5)$	zep^7	zep^7	----	----

打獵　go hunting　*rip

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	$mi\textʔ^4$	mit^7	mit^7	mit^7	mit^8

粽子　dumpling　*hɲi:t

----	----	$tsi{:}t^7$	$tsi{:}t^8$	$ts^hi{:}t^8$	$tsi{:}t^8$
$tsit^4$	$tsi\textʔ^4$	----	$tsit^7$	$tsit^8$	$tsit^8$

戽水　bail water　*hwi:t

$vi{:}t^7$	$vi{:}t^7$	$hwi{:}t^7$	$vi{:}t^8$	$(vi{:}ʔ^8)$	$vi{:}t^7$
----	$vi\textʔ^4$	----	vet^7	vit^8	vet^8

(l) ***it**

皺紋　wrinkle　*C-ɲit

$(ɲit^9)$	$ɲit^7$	$ɲec^7$	$ɲet^7$	net^8	$ɲet^7$
$ɲet^2$	$ɲɛ\textʔ^4$	$ɲet^7$	$ɲet^7$	$ɲet^8$	$ɲet^8$

端　hold　*kʰit

k^hit^7	k^hit^7	k^hec^7	k^het^7	k^het^7	k^hit^7
----	----	----	k^het^7	k^het^7	k^het^7

辣　spicy　*rit

rit^7	git^7	gec^7	get^8	het^8	h/git^8
het^4	$(zeʔ^5)$	(git^7)	xet^7	xet^8	k^het^7

(m)			***i:k**			(n)			***ik**		
魚籠	fish basket		*C-li:k			耙/掃	rake/sweep		*ɾjik		

li:ʔ^7	li:ʔ^7	li:k^7	liaʔ^7	liaʔ^8	liak^7	zik^7	zik^7	rik^7	ti:ʔ^8	tʰi:ʔ^8	tik^8
liək^2	liʔ^4	liʔ^7	lik^7	lit^8	liʔ^8	----	----	----	----	----	tset^8

翅膀	wing		*pʰi:k			肅靜	solemn silence		*ʔik		
pʰi:ʔ^7	pʰi:ʔ^7	pʰi:k^7	pʰiaʔ^7	pʰiaʔ^7	pʰiak^7	----	ʔik^7	ʔik^7	ʔi:ʔ^7	ʔi:ʔ^7	(ʔi:k^7)
pʰiək^2	pʰiʔ^4	pʰiʔ^7	pʰik^7	pʰit^8	pʰiʔ^7	----	----	----	(ʔik^7)	----	----

滿	full		*tʰi:k			小孩	child		*C-lik		
tʰi:ʔ^7	tʰi:ʔ^7	tʰi:k^7	tʰiaʔ^7	tʰiaʔ^7	tʰiak^7	lik^7	lik^7	lik^7	li:ʔ^7	li:ʔ^8	lik^7
tʰiək^2	tʰiʔ^4	tʰiʔ^7	tʰik^7	(tʰiʔ^8)	tʰiʔ^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:

(84)   Correspondences of closed rimes with high back unrounded nuclei

HaE:m	BHi:n	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
ɯ:y	----	ɯ:y	ɯ:y	u:y	ɯ:y	----	----	----	(uy)	----	----
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	ɯ:ʔ
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)
----	----	----
ɯɣm	ɯɣm	u:m~ɯm
ɯɣn	ɯɣn	ɯŋ
ɯɣŋ	ɯɣŋ	ɯŋ
ɯɣp	----	u:p
ɯɣt	----	----
ɯ:	ɯɣk	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:

(85)   *ɯ:y
         *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 Vowels*

There have been very few changes in the long rimes of the non-NCHl languages, with the exception of Zandui. The three changes which have occurred in Zandui are that the vowel in the diphthong rounded, probably through dissimilation; the vowels in the rimes closed with labial stops became rounded under their influence; and the vowels in the 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:

(86) *ɯːy > uːy

    *ɯːm > uːm
    *ɯːp > uːp

    *ɯːŋ > ɯəŋ > ɯaŋ
    *ɯːk > ɯək > ɯaʔ

In NCHl, the regular shortening of long rimes occurred:

(87) *ɯːC > *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:

(88) ɯy > uy

The most common place of variation in NCHl is in the labial-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:

(89) ɯm > um
    ɯp > up

Nadouhua also experienced rounding of vowel in NCHl *ɯk* rimes, under the influence of a
preceding labial or labiovelar:

(90) | Gloss | Proto Hlai | | NCHl | | Nadouhua |
| --- | --- | --- | --- | --- | --- |
| weave | *tʃʰwɯːk | > | *ʃw̥ɯk | > | fuʔ⁴ |
| bone | *Cuɾɯːk | > | *ɾwɯk | > | vuʔ⁴ |
| tender | *p-lɯːk | > | *plɯk | > | 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 εC (there are no examples of original *ɯp or *ɯt in Nadouhua):

(91)   ɯm   >   ɤn   >   ən   >   εn
       ɯn   >   ɤn   >   ən   >   εn
       ɯŋ   >   ɤŋ   >   əŋ   >   εŋ
       ɯk   >   ɤk   >   ək   >   εʔ

In Yuanmen, the labial-closed rimes which didn't round and 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):

(92)   ɯm   >   ɤm   >   om
       ɯp   >   ɤp   >   op
       ɯn   >   ɤn   >   ən

3.4.2.2 Short Rimes with High Back Unrounded Vowels

The only change in this category which occurred in a non-NCHl language was again in Zandui,

where the vowel became rounded under the influence of a following labial coda:

(93)   *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):

(94)   *ɯC   >   ɤC   >   əC
       *əC   >   aC

No NCHl language maintained an inventory of short ɣC rimes. These rimes often fronted to əC

rimes as shown above; they were sometimes influenced further by preceding initials or rounded by

following labials, and in some cases underwent idiosyncratic changes which seem to have been

unmotivated. Complicating matters is the fact that some categories have few examples, so that the

establishment of potential conditioning environments is problematic.

In Cunhua, the following variation occurs in *ɣm:

(95)   ɣm   >   om/əm >   om/am

There is only one example of original Northern Hlai *ɣm in Nadouhua, the reflex of which is *um*.

In all other cases, the following shift occurred:

(96)   ɣp   >   əp   >   ɛʔ
         ɣn   >   ən   >   ɛn
         ɣt   >   ət   >   ɛʔ

The following changes occurred in the Meifu branch:

(97)   ɣm   >   əm   >   om/em
         ɣp   >   əp   >   ap/ep (Changjiang), op/ep (Moyfaw)

         ɣn   >   ən   >   əŋ
         ɣt   >   ət   >   ək   (in Moyfaw)

Finally, the following occurred in the Run branch:

(98)   ɣm   >   əm   >   om
         ɣp   >   əp   >   op

         ɣn   >   ən   >   əŋ   (in Baisha)
         ɣt   >   ət   >   ək   (in Baisha)

         ɣŋ   >   əŋ

A comparison of reconstructions is given below:

(99)	Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
(a)	---	---	(*ɨːy)	*ɯːy
(b)	*uam (b)	*ɯm	*ɨːm	*ɯːm
(c)	*uːn (b)	*ɯn	*ɨːn	*ɯːn
(d)	*uːŋ (b)	*ɯŋ	*ɨːŋ	*ɯːŋ
(e)	*uap (b)	*ɯp	*ɨːp	*ɯːp
(f)	---	---	---	*ɯːt
(g)	*uak (b)	*ɯk	*ɨːk	*ɯːk
(h)	---	*ɤm	*ɨm	*ɯm
(i)	---	*ɤn	*ɨn	*ɯn
(j)	---	---	---	*ɯŋ
(k)	---	*ɤp	*ɨp	*ɯp
(l)	---	*ɤt	*ɨt	*ɯt

Thurgood doesn't reconstruct anything in the (99h-l). For the first six series (excluding first and

the sixth, for which there is only one clear example 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 to me why there is an asymmetry between the rimes

with velar codas, with a pure vowel being reconstructed for the third series (*uːŋ), but a diphthong for the

sixth series (*uak), another violation of Symmetry.

As in the last section, Ostapirat's (1993) reconstruction is straightforward, positing a high vowel

and mid vowel series based on the NCHl data. His (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

(100)   *Examples of closed rimes with high back unrounded vowels*

(a)   ***ɯ:y**

竹子   bamboo   *p-lɯ:yɦ

plɯ:y⁵ pu:y⁵   plɯ:y⁵ plɯ:y² ------ lɯ:y²
----   ----   ----   (puy²)   ----   ----

(b)   ***ɯ:m**   (c)   ***ɯm**

飽   full   *kʰɯ:m   烤火   warm by fire   *ʔɯmɦ

kʰɯ:m¹ kʰɯ:m¹ kʰɯ:m¹ kʰɯ:m¹ kʰu:m¹ kʰɯ:m¹   ʔɯm²   ʔɯm²   ʔɯm²   ʔɯm⁵   ʔum⁵   (ʔum⁵)
kʰum¹   kʰɛn¹   kʰɯm¹   kʰɯm¹   kʰɯm¹   kʰom¹   ʔom⁵   ʔun²   ʔom²   ʔom²   ʔom²   ʔom⁵

蛋/卵   egg   *hjɯ:m   不知道 not know   *hlɯmʔ

zɯ:m¹   zɯ:m¹   zɯ:m¹   zɯ:m⁴   zu:m⁴   zɯ:m¹   ɗum³   ɬɯm³   ɬɯm³   ɬɯm³   ɬum³   ɬum³
zum¹   zunʔ⁴   zum¹   zum¹   zum¹   zum⁴   tθam³ ----   ɬem³   ɬem³   ɬom³   ɬom³

爬   crawl   *Cuɦɯ:m   烘   warm by fire   *Curɯmʔ

hɯ:m¹   hɯ:m¹   hwɯ:m¹ hɯ:m¹   vu:m¹   hɯ:m¹   rɯm³   gɯm³   gɯm³   gɯm⁶   ----   hɯm⁶
ŋum¹   ----   ŋɯm¹   ŋɯm¹   ŋɯm¹   ɱom⁴   ----   ----   kum¹   ɣum³   ----   ----

(d)   ***ɯ:p**   (e)   ***ɯp**

鱉   pt nosed turtle   *tʰɯ:p   臭蟲   stinkbug   *kɯp

tʰɯ:p⁷ tʰɯ:p⁷ tʰɯ:p⁷ tʰɯ:p⁷ tʰu:p⁷ tʰɯ:p⁷   kɯp⁷   kɯp⁷   kɯp⁷   kɯp⁷   kup⁷   kɯp⁷
---   ----   ----   tʰup⁷   tʰup⁸   tʰup⁷   kup²   kɛʔ⁴   (kɯp⁷) kep⁷   kop⁸   kop⁷

搓洗   scrub   *fjɯ:p   呷   sip   *tɕʰɯp

(pɯ:p⁷) fɯ:p⁷   fɯ:p⁷   fɯ:p⁷   fu:p⁷   fɯ:p⁷   tsʰɯp⁷ tsʰɯp⁷ tsʰɯp⁷ tsʰɯp⁷ tsʰɯp⁷ tsʰɯp⁷
----   ----   fup⁷   fup⁷   fup⁸   fup⁷   tsʰip² seʔ⁴   ----   tsʰop⁷ ----   ----

稻剪   rice knife   *kʰɯ:p   搾   handlength   *Cuɦɯp

----   kʰɯ:p⁷ kʰɯ:p⁷ ----   ----   ----   hɯp⁷   hɯp⁷   hwɯp⁷   hɯp⁷   vup⁷   hɯp⁷
----   ----   kʰup⁷   kʰup⁷   kʰup⁸   kʰup⁷   ŋup²   ŋɛʔ⁴   ŋap⁷   ŋop⁷   ŋop⁸   mop⁸

(f)   ***ɯ:n**   (g)   ***ɯn**

閹 castrate   *ɗɯ:n   重 heavy   *kʰɯn

ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	kʰɯn^1	kʰun^1	kʰɯn^1	kʰɯn^1	kʰɯn^1	kʰɯn^1
ɗɯn^1	----	ɗɯŋ^1	ɗɯŋ^1	ɗɯŋ^1	ɗən^1	kʰon^1	kʰɛn^1	kʰəŋ^1	kʰəŋ^1	kʰəŋ^1	kʰən^1

騙子 pheasant   *ɗɯ:n   淺 shallow   *tʰɯ[:]nʔ

ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	ɗɯ:n^1	tʰɯ:n^3	tʰɯn^3	tʰɯn^3	tʰɯn^3	tʰɯn^3	tʰɯn^3
ɗɯn^1	----	ɗɯm^3	ɗɯŋ^1	ɗɯŋ^1	ɗən^1	fɯn^3	tʰɛn^3	tʰəŋ^3	tʰəŋ^3	tʰəŋ^3	tʰən^3

出/開 exit/ open up   *tʰɯ:n   刺 thorn   *Cuɦɯnʔ

tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	tʰɯ:n^1	hɯn^3	hɯn^3	hwɯn^3	hɯn^3	hun^3	hɯn^3
tsʰɯn^1	tʰɛn^1	tʰɯn^1	tʰɯŋ^1	tʰɯŋ^1	tʰən^1	ŋɯn^3	ŋɛn^3	ŋəŋ^3	ŋəŋ^3	ŋəŋ^3	mən^6

(h)   ***ɯ:t**   (i)   ***ɯt**

扒拉/撓 scratch   *ɦɯ:t   曾祖母 pat. grt grndma   *tɕɯt

hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7	hɯ:t^7
----	----	----	----	hɯk^8	----

tsɯt^7	tsɯt^7	tsɯt^7	tsɯt^7	tsɯt^7	----
----	----	----	tsək^7	(tsɯk^7)	tət^7

斷 break (pull)   *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**   (k)   ***ɯŋ**

竹箏   bamboo shoot   *C-nɯ:ŋ   緊   pull tight   *kɯŋ

nɯ:ŋ^1 nɯ:ŋ^1 nɯ:ŋ^1 nɯ:ŋ^1 nɯaN^4 nɯ:ŋ^1 kɯŋ^1 kɯŋ^1 kɯŋ^1 kɯŋ^1 kɯŋ^1 kɯŋ^1
nɯəŋ^1 neŋ^1 nɯŋ^1 nɯŋ^1 nɯŋ^1 nɯŋ^4 ----   ----   (kəŋ^2)   kəŋ^1 (kəŋ^2)   ----

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   let go   *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

(l)   ***ɯ:k**

成熟   ripe   *sɯ: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 tsʰɯ:ʔ^7

織   weave (fabric)   *tʃʰwɯ: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 Vowels

The correspondences for the closed rimes with high back rounded vowels are given below:

(101)   Reflexes of closed rimes with high back vowels in the Hlai languages

HaE:m	BHi:n	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
u:y	u:y	u:y	u:y	u:y	u:y	uy	uy	uy	uy	uy	uy
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	u:ʔ
uy	uy	uy	uy	uy	uy	ɔy	oy	uy	uy	oy	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)
uoy	uy	uy
uon	uon	u:ŋ
----	----	----
uoŋ	uoŋ	u:ŋ
uot	uot	u:k
----	----	----
u:	uok	u:k
uy	uy	oy
un	un	oŋ
ʊn	----	----
uŋ	----	u:ŋ
ut	----	ok
ʊt	----	ot

There are no examples of rimes with labial 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:

(102)   *u:y   *uy
          *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 Vowels

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:

(103)   *u:ɲ   >   u:n
          *u:c   >   u:t

Besides this, the only other change which occurred outside of NCHl was the by now familiar

diphthongization of the velar-final rimes in Zandui:

(104)   *Diphthongization before velars in Zandui*

          *u:ŋ   >   uəŋ   >   uaŋ
          *u:k   >   uək   >   uak

In NCHl, the regular high vowel shortening occurred:

(105)   *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:

(106)   *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:

(107) *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:

(108) *un   >   un
       *uɲ   >   un
       *uŋ   >   uŋ

       *ut   >   uʔ
       *uc   >   uʔ
       *uk   >   uʔ

3.4.3.2 Short Closed Rimes with High Back Rounded Vowels

In Bouhin, Ha Em and Qi, the same merger of alveolar and palatal codas occurred which was

illustrated for the long rimes:

(109) *uɲ   >   un
       *uc   >   ut

However, the following reflexes are extant in Baoting; the causes underlying the variation are unclear:

(110) *un   >   un~ɯn
       *uɲ   >   ɯn
       *ut   >   ut~ɯt
       *uc   >   ut

In Lauhut and Tongzha, *u lowered to *o* before the velar coda:

(111) *uŋ > oŋ

The regular NCHl vowel lowering occurred in this series:

(112) *uC > oC

The distinction between the PHl *uŋ/*uk series and the PHl *oŋ/ok series was maintained in NCHl in the following way:

(113) *uŋ/uk > oŋ/ok
       *oŋ/ok > ɔŋ/ɔk

The diphthong *uy never lowered in the Meifu branch, in parallel with *iw:

(114) *uy > uy

The same diphthong lengthened in Yuanmen (in parallel with *ew*), raising but in this case losing the final glide:

(115) *uy > oy > o:y > u:y > 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:

(116) *un > oŋ
       *ut > ok

       *uɲ > on
       *uc > ot

In NWCHl and Yuanmen, the final alveolars and palatals underwent the following mergers:

(117) (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:

(118)		Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
(a)	*u:y	*uy	*u:y	*u:y
(b)	*u:n (a)	*un	*u:n	*u:n
(c)	---	---	---	*u:ɲ
(d)	*u:ŋ (a)	*uŋ	*u:ŋ	*u:ŋ
(e)	*u:t	*ut	*u:t	*u:t
(f)	*u:c	---	*u:c	*u:c
(g)	*uak (a)	*uk	*u:k	*u:k
(h)	*uy	*oy	*uy	*uy
(i)	*un	*on	*un	*un
(j)	---	---	---	*uɲ
(k)	*oŋ	---	*uŋ	*uŋ
(l)	*ut	---	*ut	*ut
(m)	*uc	*ot	*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 (118c) and the reconstruction of a diphthong in (118g). 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 (118j) (mirroring the lack of one in

(118c)), 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 (1993) reconstruction remains balanced under his guiding assumptions, but he misses

several correspondences sets, failing to reconstruct anything for three out of four series where I reconstruct

final palatals, as well as the tenth through twelfth series of correspondences. He amends this to a large

degree in his (2004) reconstruction, which 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

(119) *Examples of closed rimes with high back rounded vowels*

(a)   ***u:y**   (b)   ***uy**

鞭子   whip   *tɕu:yʔ   賊   thief   *ɓuy

| tsu:y^3 | tsu:y^3 | tsu:y^3 | tsu:y^3 | tsu:y^3 | tsu:y^3 | ɓuy^1 | ɓuy^1 | ɓuy^1 | ɓuy^1 | ɓuy^1 | ɓuy^1 |
| ---- | tsuy^3 | ---- | tsuy^3 | tsuy^3 | tuy^3 | ɓɔy^1 | ɓoy^1 | ɓuy^1 | ɓuy^1 | ɓoy^1 | ɓow^1 |

棉花   cotton   *ɓu:yʔ   腐爛   rotten   *tʰuy

| ɓu:y^3 | ɓu:y^3 | ɓu:y^3 | ɓu:y^3 | ɓu:y^3 | ɓu:y^3 | tʰuy^1 | tʰuy^1 | tʰuy^1 | tʰuy^1 | tʰuy^1 | tʰuy^1 |
| (ɓu:(y)^3) | ɓuy^3 | ɓuy^3 | ɓuy^3 | ɓuy^3 | ɓuy^3 | tʰoy^1 | tʰoy^1 | tʰuy^1 | tʰuy^1 | tʰoy^1 | tʰow^1 |

肥胖   fat   *ru:yʔ   醉   drunk   *hmuy

| ru:y^3 | gu:y^3 | gwey^3 | gu:y^6 | hu:y^6 | hu:y^6 | muy^1 | puy^1 | puy^1 | puy^4 | pʰuy^4 | puy^4 |
| huy^4 | vuy^3 | guy^3 | xuy^3 | xuy^3 | kʰuy^3 | ɓɔy^4 | poyʔ^4 | puy^1 | puy^1 | poy^1 | pow^4 |

(c)   ***u:n**   (d)   ***un**

野   wild   *su:n   官   official   *C-mun

| tu:n^1 | tu:n^1 | tu:n^1 | tu:n^1 | tu:n^1 | ---- | mun^1 | mun^1 | mun^1 | mun^1 | mun^4 | mun^1 |
| tθuən^1 | fun^1 | suŋ^1 | suŋ^1 | tsʰuŋ^1 | tsʰun^1 | mən^1 | muɛn^1 | mon^1 | moŋ^1 | moŋ^1 | mən^4 |

身體   body   *Cuɦu:n   語言   language   *tʰun

| hu:n^1 | hu:n^1 | hu:n^1 | hu:n^1 | hu:n^1 | hu:n^1 | tʰun^1 | tʰun^1 | tʰun^1 | tʰun^1 | tʰun^1 | tʰun^1 |
| ŋuən^1 | ŋun^1 | ŋuŋ^1 | ŋuŋ^1 | ŋuŋ^1 | ɱun^4 | tsʰən^1 | tʰɛn^1 | tʰoŋ^1 | tʰoŋ^1 | tʰoŋ^1 | tʰən^1 |

先/從前   first/in front   *kʰu:nɦ   毛   fur   *Cuɦun

| kʰu:n^2 | kʰu:n^2 | kʰu:n^2 | kʰu:n^5 | kʰu:n^5 | kʰu:n^5 | hun^1 | hun^1 | hun^1 | hun^1 | hun^1 | hun^1 |
| kʰuan^5 | kʰun^2 | ---- | kʰuŋ^2 | kʰuŋ^2 | kʰun^5 | ŋən^1 | ŋɛn^1 | ŋoŋ^1 | ŋoŋ^1 | ŋoŋ^1 | ɱən^4 |

(e)   ***u:t**   (f)   ***ut**

發芽   to sprout   ʔu:t   消除   eliminate   fut

| ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | pʰut^7 | fut^7 | fut^7 | fut^7 | fut^7 | fut^7 |
| ʔuət^2 | ---- | ʔuʔ^7 | ʔuk^7 | ---- | ---- | ---- | ---- | ---- | ---- | fot^7 | fət^7 |

織   weave (net)   *kʰu:t   曾祖父   pat. grt grndpa   *pʰut

| kʰu:t^7 | kʰu:t^7 | kʰu:t^7 | kʰu:t^7 | kʰu:t^7 | kʰu:t^7 | pʰut^7 | pʰut^7 | pʰut^7 | pʰut^7 | pʰut^7 | pʰut^7 |
| kʰuat^2 | ---- | kʰuʔ^7 | kʰuk^7 | kʰuk^8 | kʰut^7 | ---- | ---- | ---- | pʰok^7 | pʰok^7 | pʰət^7 |

細   thin   ʔu:t   釘   to nail   *tʰut

| (ʔu:t^9) | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | ʔu:t^7 | tʰut^7 | tʰut^7 | tʰut^7 | tʰut^7 | ---- | tʰut^7 |
| ---- | ʔuʔ^4 | ʔuʔ^7 | ʔuk^7 | ʔuk^8 | ʔut^7 | ---- | ---- | ---- | tʰok^7 | (tʰok^7) | tʰət^7 |

(g)   ***u:ɲ**   (h)   ***uɲ**

脫   take off   *ku:ɲ   逃脫   get away   *C-luɲʔ

脫 take off			*ku:ɲ			逃脫 get away			*C-luɲʔ		
ku:n^1	ku:n^1	ku:ɲ^1	ku:n^1	ku:n^1	ku:n^1	lun^3	lun^3	luɲ^3	lun^3	(lun^3)	lɯn^3
----	----	----	kun^1	kun^1	kun^1	----	----	lun^3	lon^3	lon^3	lən^6

穿插   *su:ɲ   背脊   spine   *tɕʰuɲʔ

穿插			*su:ɲ			背脊 spine			*tɕʰuɲʔ		
tu:n^1	tu:n^1	tu:ɲ^1	tu:n^1	tu:n^1	tu:n^1	tsʰun^3	tsʰun^3	tsʰuɲ^3	tsʰun^3	tsʰun^3	tsʰɯn^3
----	----	sun^1	sun^1	tsʰun^1	tsʰun^1	----	sɛn^3	----	tsʰon^3	tsʰun^3	tsʰun^3

下飯   go with   *ʔu:ɲ   噗   *ɾjuɲʔ

下飯 go with			*ʔu:ɲ			噗			*ɾjuɲʔ		
ʔu:n^1	ʔu:n^1	ʔweɲ^1	ʔu:n^1	ʔu:n^1	ʔu:n^1	zun^3	zun^3	----	tun^6	tʰun^6	tɯun^6
ʔuən^1	ʔun^1	ʔon^1	ʔun^1	ʔun^1	ʔun^1	----	----	(ɗun^3)	(tan^1)	ton^3	tən^3

(i)   ***u:c**   (j)   ***uc**

螢火蟲 firefly *ku:c   尾巴   tail   *tɕʰuc

螢火蟲 firefly			*ku:c			尾巴 tail			*tɕʰuc		
----	----	kuc^7	ku:t^7	----	----	tsʰut^7	tsʰut^7	tsʰuc^7	tsʰut^7	tsʰut^7	tsʰɯt^7
kuat^5	kuʔ^5	----	kut^7	----	kut^7	tsʰət^2	sɛʔ^4	tsʰət^7	tsʰot^7	tsʰot^8	tsʰət^7

猴子   wart   *su:c   螞蟻   ant   *hmuc

猴子 wart			*su:c			螞蟻 ant			*hmuc		
tu:t^7	tu:t^7	tu:c^7	tu:t^7	----	tu:t^7	mut^7	put^7	puc^7	put^8	pʰut^8	put^8
tsʰuət^2	----	----	sut^7	tsʰut^8	tsʰut^7	ɓət^4	puɛʔ^4	pət^7	pot^7	pot^8	pət^8

吻   kiss   *ɾju:c   針   needle   *hŋuc

吻 kiss			*ɾju:c			針 needle			*hŋuc		
zu:t^7	zu:t^7	ru:c^7	tu:t^8	(tu:t^8)	tu:t^8	ŋut^7	kut^7	kuc^7	kut^8	kʰut^8	kut^8
lu:t^2	----	tut^7	----	----	(tut^7)	kət^4	kɛʔ^4	kət^7	kot^7	kot^8	kət^8

(k) ***u:ŋ**   (l) ***uŋ**

劈 split ***ɓu:ŋ** (長)大 big ***C-luŋ**

ɓu:ŋ¹ ɓu:ŋ¹ ɓu:ŋ¹ ɓu:ŋ¹ ɓuaŋ¹ ɓu:ŋ¹   luŋ¹ luŋ¹ loŋ¹ loŋ¹ luŋ⁴ luŋ¹
ɓoŋ¹ ɓuŋ¹ ɓuŋ¹ ɓuŋ¹ ɓuŋ¹ ɓuŋ¹   loŋ¹ loŋ¹ (luŋ¹) loŋ¹ luŋ¹ luŋ⁴

蚊子 mosquito ***C-ɲu:ŋ** 搖 shake ***C-ɲuŋɦ**

ɲu:ŋ¹ ɲu:ŋ¹ ɲu:ŋ¹ ɲu:ŋ¹ nuaŋ⁴ ɲu:ŋ¹   ɲoŋ² ɲuŋ² ɲoŋ² ɲoŋ⁵ nuŋ² ɲuŋ⁵
ɲoŋ¹ ɲiw¹ ɲuŋ¹ ɲuŋ¹ ɲuŋ¹ ɲuŋ⁴   ---- ---- ɲoŋ² ɲoŋ² ɲɔŋ² ɲɔŋ²

洞 hole ***tɕʰu:ŋʔ** 圈 animal pen ***C-luŋɦ**

tsʰu:ŋ³ tsʰu:ŋ³ tsʰu:ŋ³ tsʰu:ŋ³ tsʰuaŋ³ tsʰu:ŋ³   luŋ² luŋ² loŋ² loŋ⁵ luŋ² luŋ⁵
tsʰoŋ³ suŋ³ tsʰuŋ³ tsʰuŋ³ tsʰuŋ³ tsʰuŋ³   ---- loŋ² loŋ² loŋ² loŋ² lɔŋ²

(m) ***u:k**

窩 nest ***ɽu:k**

ru:ʔ⁷ ru:ʔ⁷ ru:k⁷ ru:ʔ⁸ luaʔ⁸ lu:ʔ⁸
lok⁴ luʔ⁴ luʔ⁷ ruk⁷ ruk⁸ ruʔ⁸

包 wrap ***tʰu:k**

tʰu:ʔ⁷ tʰu:ʔ⁷ tʰu:k⁷ tʰu:ʔ⁷ tʰuaʔ⁷ tʰu:ʔ⁷
tsʰok² tʰuʔ⁴ tʰuʔ⁷ tʰuk⁷ tʰuk⁸ tʰuʔ⁷

腦 brain[28] ***hlu:k**

ɗu:ʔ⁷ ɬu:ʔ⁷ ɬu:k⁷ ɬu:ʔ⁷ ɬuaʔ⁷ ɬu:ʔ⁷
tθok² nuʔ⁴ ɬuʔ⁷ ɬuk⁷ ɬuk⁸ ɬuʔ⁷

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

---

[28] 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 nuʔ⁴ (literally 'head-brain').

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:

(120)   *ɯ:y   *u:y
        *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

                                    *uy
        *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:y, which has
only one example). In other words, there are natural co-occurrence restrictions 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 Vowels

This section is subdivided into the following four subsections: closed rimes with front mid vowels (4.5.1), closed rimes with central mid vowels (4.5.2), closed rimes with back mid vowels (4.5.3), and finally, closed rimes with low vowels (4.5.4).

3.5.1 Closed Rimes with Front Mid Vowels

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 4.5.4). 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.

(121)   Reflexes of closed rimes with mid front vowels

BHi:n	HaE:m	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
e:w	e:w	e:w	e:w	e:w	e:w	ew	εw	e:w	e:w	iaw	i:w
e:m	e:m	e:m	e:m	e:m	e:m	----	----	----	e:m	em	em
e:p	e:p	e:p	e:p	e:p	e:p	εp	----	e:p	e:p	iap	----
e:n	e:n	e:n	e:n	e:n	e:n	εn	en	e:n	e:n	ian	i:n
----	----	----	----	----	----	et	e?	----	----	et	i:t
(e:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	e:ŋ	εŋ	εŋ	e:ŋ	e:ŋ	iaŋ	iaŋ)
(e:?	e:?	e:k	e:?	e:?	e:?	εk	ε?	e:?	ɯ:	e?	ia?)

S. Hlai (Savina)	C. Hlai (Savina)	Baisha (Wang & Qian)
----	----	----
εm	----	----
εp	----	----
----	----	----
----	----	----
(εŋ	εŋ	iaŋ)
(ε:	εk	eʔ)

The reconstructions proposed for these correspondence series are given below:

(122) *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 for all rimes:

(123)   *e:C   >   eC/εC

In Baisha, the following asymmetrical development occurred:

(124)   *e:w   >   ε:w   >   iaw
       *e:m   >   em   >   em
       *e:p   >   ε:p   >   iap
       *e:n   >   ε:n   >   ian
       *e:t   >   et   >   et
       (*e:ŋ   >   ε:ŋ   >   iaŋ)
       (*e:k   >   ek   >   eʔ)

In Yuanmen, the bilabial-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:

(125) *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 these 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

(126) Examples of closed rimes with mid front vowels

(a)   ***e:w**

鐵鏟 iron shovel $*t^he:w$

----	----	----	----	$t^he{:}w^1$	----
----	----	$t^he{:}w^1$	$t^he{:}w^1$	----	----

刀鈎 knifehook *ɗe:wɦ

----	$ɗe{:}w^2$	$ɗe{:}w^2$	----	----	----
----	----	----	$ɗe{:}w^2$	----	----

鸚鵡 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:m²	le:m²	le:m⁵	le:m⁵

撮   pinch   *tɕe:mʔ

| tse:m³ | tse:m³ | tse:m³ | tse:m⁶ | ---- | ---- |
| ---- | ---- | ---- | tse:m³ | tem³ | tem³ |

(c)   ***e:p**

瘪   sunken   *ɓe:p

ɓe:p⁷	----	ɓe:p⁷	ɓep⁷	ɓe:p⁷	ɓe:p⁷

夾   press   *ɦe:p

| he:p⁷ | he:p⁷ | he:p⁷ | he:p⁷ | ---- | he:p⁷ |
| ---- | ---- | ---- | he:p⁷ | ---- | ---- |

疊   pile (clfr)   *C-le:p

| le:p⁷ | le:p⁷ | le:p⁷ | le:p⁷ | ---- | le:p⁷ |
| ---- | ---- | ---- | ---- | liap⁷ | ---- |

(d)   ***e:n**

扁   flat   *ɓe:nɦ

| ɓe:n² | ɓe:n² | ɓe:n² | ɓe:n⁵ | ---- | ---- |
| ɓEn² | ɓen² | ---- | ---- | ɓian² | ɓi:n⁵ |

木板   board   *ɓe:nɦ

| ɓe:n² | ɓe:n² | ɓe:n² | ɓe:n⁵ | ɓe:n⁵ | ɓe:n⁵ |
| ---- | ɓen² | ɓe:n² | ɓe:n² | ---- | ---- |

(e)   ***e:t**

擦/塗抹 wipe/erase   *ʔe:t

| ---- | ---- | ---- | ---- | ---- | ---- |
| ʔet² | ʔeʔ⁴ | ---- | ---- | ʔet⁸ | ʔi:t⁷ |

(f)   ***[e]:ŋ**

寬   wide   *ɓ[e]:ŋ

| ɓe:ŋ¹ | ɓe:ŋ¹ | ɓe:ŋ¹ | ɓe:ŋ¹ | ɓe:ŋ¹ | ɓe:ŋ¹ |
| ɓɛŋ¹ | ɓɛŋ¹ | ɓe:ŋ¹ | ɓe:ŋ¹ | ɓiaŋ¹ | ɓiaŋ¹ |

甜   sweet   *ɗ[e]:ŋ

| ɗe:ŋ¹ | ɗe:ŋ¹ | ɗe:ŋ¹ | ɗe:ŋ¹ | ɗe:ŋ¹ | ɗe:ŋ¹ |
| tseŋ¹ | ɗɛŋ¹ | ɗe:ŋ¹ | ɗe:ŋ¹ | ɗiaŋ¹ | ɗiaŋ¹ |

上衣   clothes   *ʋ[e]:ŋʔ

| ve:ŋ³ | ve:ŋ³ | ve:ŋ³ | fe:ŋ⁶ | ve:ŋ⁶ | ve:ŋ³ |
| vɛŋ⁴ | vɛŋ³ | ve:ŋ³ | ve:ŋ³ | viaŋ³ | viaŋ⁶ |

(g)   ***[e]:k**

得到   get   *C-m[e]:k

| me:ʔ⁷ | me:ʔ⁷ | me:k⁷ | me:ʔ⁷ | ---- | me:ʔ⁷ |
| ---- | ---- | ---- | mɯ:² | ---- | ---- |

干飯   dry rice   *C-m[e]:k

| me:ʔ⁷ | me:ʔ⁷ | me:k⁷ | me:ʔ⁷ | me:ʔ⁸ | me:ʔ⁷ |
| ---- | mɛʔ⁴ | ---- | ---- | me:ʔ⁸ | ---- |

尋找   search   *k[e]:k

ke:ʔ⁷	ke:ʔ⁷	ke:k⁷	ke:ʔ⁷	ke:ʔ⁷	ke:ʔ⁷

3.5.2 Closed Rimes with Mid Central Vowels

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:

(127)   Reflexes of closed rimes with mid central vowels

BHin	HaEm	LHut	Tzha	Zdui	Bting	Cun[29]	Nadou	Cjiang	Mfaw	Baisha	Ymen
aːy	oːy	oːy	aːy	aːy	aːy	ɔː(y)	ɔy	oːy	oːy	uay	uːy
am	oːm	oːm	oːm	ɔːm	ɔːm	am	ɔn	oːm	oːm	uam	uam
an	oːn	oːn	oːn	ɔːn	ɔːn	an	ɔn	oːŋ	oːŋ	uaŋ	uːn
aŋ	oːŋ	oːŋ	oːŋ	ɔːŋ	ɔːŋ	aŋ	ɔŋ	oːŋ	oːŋ	uaŋ	uaŋ
ap	oːp	oːp	oːp	ɔːp	ɔːp	ap	ɔʔ	oːp	oːp	uap	uap
at	oːt	oːt	oːt	ɔːt	ɔːt	at	ɔʔ	oːʔ	oːk	oʔ	uːt(~ət)
ak	oːʔ	oːk	oːʔ	ɔːʔ	ɔːʔ	ak	ɔʔ	oːʔ	oːk	oʔ~ɔʔ	oʔ~ɔʔ
ay	ay	ay	ay	ay	ay	ay	ay	ay	ay	ay	ay
aw	aw	aw	aw	aw	aw	aw	aw	aw	aw	aw	aw
aw$^{B/C}$	aw$^{B/C}$	ow/aw$^{B/C}$	oː$^{B/C}$	oː$^{B/C}$	ɔː$^{B/C}$	aw$^{B/C}$	ɔː$^{B/C}$	oː$^{B/C}$	oː$^{B/C}$	oː$^{B/C}$	oː$^{B/C}$
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~aːk	ak	ak

---

[29] 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).

S. Hlai (Savina)	C. Hlai (Savina)	Baisha (Wang & Qian)
ay	ay	uay
am	ɔm	(om)
ɐn	ɔn	----
aŋ	ɔŋ	uaŋ
ap	----	uap
ɐt	ɔt	----
ɐk	ɔː	uːʔ
ay	ay	ay
aw	aw	ɐw
aw	oː	oː
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:

(128) *əːy   *əy
                        *əw
                        *əwɦ/ʔ
        *əːm   *əm
        *əːn   *ən
                        *əɲ
        *əːŋ   *əŋ
        *əːp   *əp
        *əːt   *ət
                        *əc
        *əːk   *ək

3.5.2.1 Long Rimes with Mid Central Vowels

In the case of the one long diphthong, the nucleus either lowered, backed and rounded, or in a few cases did both. In Cunhua, *əːy would have been expected to lower to *a:y*; however, the failure of original

PHl *a:y to back to *ɔ:y* apparently prevented this, forcing a shift instead of *ə:y to *ɔ:y*. Both diphthongs

lost their glide in isolation, retaining it only in connected speech as the first member of a compound word:

(129)   *ə:y   >   ɔ:y   >   ɔ:(y)
        *a:y   >   a:y   >   a:(y)

The most common change in the stop-closed rimes was backing/rounding to long *o:*; this failed to

occur only in Cunhua and Bouhin:

(130)   *ə:C   >   o:C

The nucleus in Zandui, Baoting, and Nadouhua lowered to ɔ::

(131)   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 labial-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*:

(132)   *Evolution of *ə:C in Run*

(a)   Baisha

*ə:y	>	ɔ:y	>	uay
*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:y	>	o:y	>	u:y
*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 (133a), *ə:C lowered to a:C, and then shortened. In Bouhin (133b), *ə:C first shortened to əC, and then lowered:

(133)   *Shortening and lowering of *ə:C in Cunhua and Bouhin*

(a) | *ə:C | > | a:C | > | aC |
       |---|---|---|---|---|
       | *əC | > | aC | > | aC |

(b) | *ə:C | > | əC | > | aC |
       |---|---|---|---|---|
       | *əC | > | aC | > | aC |

3.5.5.2 Short *Rimes with Mid Central Vowels*

The normal trajectory for the short diphthongs in tone category A was for the nucleus to lower to *a*:

(134) *əy   >   ay
       *əw   >   aw

There are no reconstructible PHl rimes of the type *əyh or *əyʔ (see the next chapter for a possible explanation involving changes in Pre-Hlai). The development of *əwh/ʔ was rather different, in that monophthongization occurred in Qi as well as in NCHl:

(135) *əwɦ   >   o:ɦ
       *əwʔ   >   o:ʔ

The tone category-conditioned split in reflexes in Cunhua *ən was treated in section 4.2 above. Yet another unique development in Cunhua was that rimes with final velar nasals fronted and lengthened:

(136) *əŋ   >   e:ŋ

There was an interesting transfer in Cunhua of palatal features from the coda to the nucleus in rimes with palatal codas:

(137) *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:

(138) *Idiosyncratic backing and rounding*

Yuanmen: *əŋ   >   *ɔŋ

Moyfaw: *ək   >   *ɔk

Tongzha: *əp   >   op

Lauhut rimes backed and rounded when closed by a labial stop:

(139) *əm > om
       *əp > op

Finally, the development of the nucleus in Bouhin was dependent upon the place of the final stop,

as shown below:

(140) *əm > om
       *əp > op

       *ən > en
       *ət > et

       *əɲ > an
       *əc > at

       *əŋ > oŋ
       *ək > ok

A comparison of reconstructions is given below:

(141) | | Thurgood | Ostapirat (1993) | Ostapirat (2004) | PHl |
|---|---|---|---|---|
| (a) | *o:y | *-w-ay | *ə:y | *ə:y |
| (b) | *uam (a) | *-w-ɐm | *əm | *ə:m |
| (c) | *o:n | *-w-ɐn | *ən | *ə:n |
| (d) | *uaŋ | *-w-ɐŋ | *əŋ | *ə:ŋ |
| (e) | *uap (a) | *-w-ɐp | *əp | *ə:p |
| (f) | *o:t | *-w-ɐt | *ət | *ə:t |
| (g) | *o:k | *-w-ɐk | *ək | *ə:k |
| | | | | |
| (h) | *ay | *ɐy | *ay | *əy |
| (i) | *aw | *ɐw | *aw | *əw |
| (j) | *o: | *-w-ɐw | *əw | *əwɦ/ʔ |
| (k) | *am | *ɐm | *am | *əm |
| (l) | *an | --- | *an | *ən |
| (m) | *aɲ | *ɐn | *aɲ | *əɲ |
| (n) | *aŋ | *ɐŋ | *aŋ | *əŋ |
| (o) | *ap | *ɐp | *ap | *əp |
| (p) | *at | --- | *at | *ət |
| (q) | *ac | *ɐt | *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 4.4.2.3. 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 (1993) reconstructs the 'long' series with a short ɐ preceded by a labiovelar glide, which presumably colored the reflexes of the daughter languages with back, rounded nuclei; this does not explain the length of the rimes, however, and is a violation of Directionality, as this kind of lengthening is without strong precedent. He reconstructs rimes with short *ɐ*, in order to distinguish this series from the one below which he reconstructs with *a*, in order to account for the difference in length in the modern languages. He adopts the same strategy in the tenth series of reconstructing a preceding labiovelar glide in order to explain the *o:* reflexes in Qi and NCHl.

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 (142j) (*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

(142)   Examples of closed rimes with mid central nuclei

(a)   ***ə:y**   (b)   ***əy**

繩子   rope   *ɗə:y   雞   chicken   *kʰəy

| ɗa:y¹ | ɗo:y¹ | ɗo:y¹ | ɗa:y¹ | ɗa:y¹ | ɗa:y¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ |
| ɗɔ:(y)¹ | ɗɔy¹ | ɗo:y¹ | ɗo:y¹ | ɗuay¹ | ɗu:y¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ | kʰay¹ |

多   many   *hlə:y   黎族   Hlai   *hləy

| ɗa:y¹ | ło:y¹ | ło:y¹ | ła:y¹ | ła:y¹ | ła:y¹ | ɗay¹ | łay¹ | łay¹ | łay¹ | łay¹ | łay¹ |
| tθɔ:(y)¹ | lɔy¹ | ło:y¹ | ło:y¹ | łuay¹ | łu:y¹ | tθay¹ | lay¹ | łay¹ | łay¹ | łay¹ | łay¹ |

網   net   *rə:yʔ   耳朵   ear   *ljəy

| ra:y³ | go:y³ | go:y³ | ga:y⁶ | ha:y⁶ | ha:y⁶ | zay¹ | zay¹ | zay¹ | łay⁴ | łay⁴ | łay⁴ |
| hɔ:(y)⁴ | ŋɔy³ | go:y³ | xo:y³ | xuay³ | kʰu:y³ | lay⁴ | nayʔ⁴ | zay⁴ | zay¹ | zay¹ | tsay⁴ |

(d)   ***əw**   (f)   ***əwh/ʔ**

臼   mortar   *rəw   明年/天 next year/tmrw   *ɦəwɦ

| raw¹ | raw¹ | raw¹ | raw⁴ | law⁴ | law⁴ | haw² | haw² | haw² | ho:⁵ | ho:⁵ | hɔ:⁵ |
| law⁴ | lawʔ⁴ | law⁴ | raw¹ | raw¹ | raw⁴ | hiaw⁵ | ho:² | ho:² | ho:² | ho:² | ho:⁵ |

鍋   pot   *tʰəw   山   mountain   *Cuɦəwʔ

| tʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | haw³ | haw³ | hwow³ | go:³ | vo:³ | hɔ:³ |
| tsʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | tʰaw¹ | ŋaw³ | ŋɔy³ | ŋo:³ | ŋo:³ | ŋo:³ | ɱo:⁶ |

角   horn   *ɦəw   頭   head   *Curəwʔ

| haw¹ | haw¹ | haw¹ | haw¹ | haw¹ | haw¹ | raw³ | gaw³ | gwow³ | go:⁶ | ho:⁶ | hɔ:⁶ |
| haw¹ | haw¹ | haw¹ | haw¹ | haw¹ | haw¹ | vaw³ | ŋɔ:³ | go:³ | ɣo:³ | vo:³ | vo:³ |

(e)   ***ə:m**   (f)   ***əm**

鋒利   sharp   tɕʰə:m   黑色   black   *ɗəmʔ

tsʰam^1 tsʰo:m^1 tsʰo:m^1 tsʰo:m^1 tsʰɔ:m^1 tsʰɔ:m^1 ɗom^3 ɗam^3 ɗom^3 ɗam^3 ɗam^3 (ɗəm^3)
tsʰam^1 sɔn^1 tsʰo:m^1 tsʰo:m^1 tsʰuam^1 tsʰuam^1 ----   ɗan^3 ɗam^3 ɗam^3 ɗam^3 ɗam^3

果子   fruit   *tʃʰə:m   水   water   *C-nəmʔ

tsʰam^1 tsʰo:m^1 tsʰo:m^1 tsʰo:m^1 tsʰɔ:m^1 tsʰɔ:m^1 nom^3 nam^3 nom^3 nam^3 nam^6 nam^3
ham^1 hɔn^1 (ham^1)   tsʰo:m^1 tsʰuam^1 tsʰuam^1 nam^3 nan^3 nam^3 nam^3 nam^3 nam^6

苦   bitter   *ɦə:m   嘴巴   mouth   *hm[ə/o]mʔ

ham^1 ho:m^1 ho:m^1 ho:m^1 hɔ:m^1 hɔ:m^1 mom^3 pam^3 pom^3 pam^6 pʰam^6 pam^6
ham^1 hɔn^1 ho:m^1 ho:m^1 huam^1 huam^1 ɓoŋ^4 puɛn^3 pɔm^3 pɔm^3 pom^3 pɔm^6

(g)   ***ə:p**   (h)   ***əp**

摔   throw   *sə:p   熄滅   die out   *tɕəp

tap^7 to:p^7 to:p^7 to:p^7 tɔ:p^7 tɔ:p^7 ----   tsap^7 tsop^7 tsop^7 tsap^7 tsep^7
----   ----   so:p^7 so:p^7 tsʰuap^8 tsʰuap^8 ----   tsaʔ^4 tsap^7 tsap^7 tsap^8 tap^7

鱗   fish scale   *C-lə:p   縫   sew   *C-ɲəp

lap^7 lo:p^7 lo:p^7 lo:p^7 lɔ:p^8 lɔ:p^7 ɲop^7 ɲap^7 ɲop^7 ɲop^7 nap^8 ɲap^7
lap^2 lɔʔ^4 lo:p^7 lo:p^7 luap^8 luap^8 ɲap^2 ----   ɲap^7 ɲap^7 ɲap^8 ɲap^8

堆砌   pile up   *rə:p   晚   late   *tɕʰəp

(go:p^7)   go:p^7 go:p^7 go:p^8 hɔ:p^8 hɔ:p^8 tsʰop^7 tsʰap^7 tsʰop^7 tsʰop^7 tsʰap^7 tsʰap^7
----   ŋɔʔ^4 go:p^7 xo:p^7 xuap^8 kʰuap^7 ----   saʔ^4 tsʰap^7 tsʰap^7 tsʰap^7 tsʰap^7

(i)		***ə:n**			(j)		***ən**		

睡　　sleep　　　　*tɕə: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 ridge　　*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] |

秧/種　　seed　　*f[j]ən

| 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**			(l)		***ət**		

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] | kʰɔ:t[8] | kɔ:t[8] |
| kat[4] | kɔʔ[4] | ko:ʔ[7] | ko:k[7] | kɔt[8] | ku:t[8] |

穿　　wear　　*tɕʰət

| tsʰet[7] | tsʰat[7] | tsʰat[7] | tsʰat[7] | tsʰat[7] | tsʰat[7] |
| tsʰat[2] | saʔ[4] | tsʰaʔ[7] | tsʰak[7] | tsʰak[8] | tsʰat[7] |

鼻子　　nose　　*kʰət

| kʰet[7] | kʰat[7] | kʰat[7] | kʰat[7] | kʰat[7] | kʰat[7] |
| kʰat[2] | kʰaʔ[4] | kʰaʔ[7] | kʰak[7] | kʰak[7] | kʰat[7] |

取/娶　　take/marry　　*hmət

| ---- | pat[7] | pat[7] | pat[8] | pʰat[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 light — *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 vine (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) *ə:ŋ

樹漿 sap — *tʰə:ŋ

tʰaŋ^1	tʰo:ŋ^1	tʰo:ŋ^1	tʰo:ŋ^1	tʰɔ:ŋ^1	tʰɔ:ŋ^1
tsʰaŋ^1	tʰɔŋ^1	tʰo:ŋ^1	tʰo:ŋ^1	tʰuaŋ^1	tʰuaŋ^1

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

相同 same — *tʰə:ŋʔ

tʰaŋ^3	tʰo:ŋ^3	tʰo:ŋ^3	tʰo:ŋ^3	tʰɔ:ŋ^3	tʰɔ:ŋ^3
tsʰaŋ^3	tʰɔn^3	----	tʰo:ŋ^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
tse:ŋ^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

po*田(野)field — *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		(r)				*ək	

捉 catch *hmə:k

| mak^7 | po:ʔ^7 | po:k^7 | po:ʔ^8 | pʰɔ:ʔ^8 | pɔ:ʔ^8 |
| ɓa:k^4 | pɔʔ^4 | po:ʔ^7 | po:k^7 | pɔʔ^8 | pɔʔ^8 |

剁 chop *hnək

| (tak^7) | tak^7 | tak^7 | ---- | tʰak^8 | tak^8 |
| ɗak^2 | toʔ^5 | ---- | ---- | ---- | tak^8 |

洗 wash *sə: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 | tsʰɔʔ^8 | tsʰɔʔ^7 |

食指 index finger *tɕ[ə/o]k

| (tsak^9) | tsak^7 | tsak^7 | tsak^7 | tsoʔ^8 | tsok^7 |
| tsak^4 | ---- | ---- | tsɔk^7 | tsɔʔ^8 | ---- |

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 |

貼 stick to[30] *pʰək

| pʰak^7 | pʰak^7 | pʰa:k^7 | pʰak^7 | pʰak^7 | pʰak^7 |
| ---- | ---- | ---- | pʰa:k^7 | pʰak^7 | pʰak^7 |

3.5.3 Short Rimes with Mid Back Rounded Vowels

The correspondences for short rimes with mid back round vowels are given below:

(143)   Examples of short rimes with mid back round vowels

BHi:n	HaE:m	LHu:t	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:

---

[30] The Lauhut and Moyfaw rimes in this example are irregularly long.

(144)   *om
         *op
         *oŋ
         *ok

This class of rimes is defective in that it has no members with alveolar or palatal codas. I propose

that if these additional rimes ever existed, they most likely merged with the class of short rimes with mid

central vowels, in the following scenario:

(145)   <u>Pre-Hlai</u>   <u>Proto-Hlai</u>

         *on   >   *ən
         *ot   >   *ət
         *oɲ   >   *əɲ
         *oc   >   *əc

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:

(146)   *oŋ   >   ɔŋ
         *ok   >   ɔk

There was sporadic dissimilation of the nucleus in Cunhua before labial codas:

(147)   *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:

(148)   <u>Gloss</u>   <u>PHl</u>   <u>Cunhua</u>

         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:

(149) *ɔŋ > ɔŋ~ɔːŋ > ɔŋ~uaŋ

Raising before velar codas occurred in Ha Em:

(150) *oŋ > uŋ
       *ok > uk

Finally, the Baoting rimes ending in *-m raised to *u*, whereas the other three rimes lowered to *ɔ*:

(151) *om > um
       *op > ɔp
       *oŋ > ɔŋ
       *ok > ɔk

A comparison of reconstructions is given below:

(152)	Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
(a)	*om	*əm	*um	*om
(b)	*oŋ	*əŋ	*uŋ	*oŋ
(c)	*op	---	---	*op
(d)	*ok	*ək	*uk	*ok

Thurgood's reconstructions are in agreement with the ones proposed here. Ostapirat (1993) reconstructed rimes with a mid central vowel, which became colored under the influence of the coda; these stand in contrast to the rimes he reconstructs in the last section with *ɐ*. He does not reconstruct anything for the third series. In his (2004) reconstruction, he instead 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 glides are given below, in the following order:

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

(153) Examples of rimes with short mid rounded vowels

(a) ***om** (b) ***op**

竹子 bamboo (big) *ɗom

ɗom^1 ɗom^1 ɗom^1 ɗom^1 ɗom^1 ɗum^1
tsem^1 ---- ɗom^1 ɗom^1 ɗom^1 ɗom^1

抱/背 carry *ʔop

---- ʔop^7 ʔop^7 ʔop^7 ---- ʔɔp^7
ʔop^2 ʔoʔ^4 ʔop^7 ʔop^7 ʔop^8 ʔop^7

瘍 itch *kʰom

(kʰɯm^1) kʰɯm^1 kʰom^1 kʰom^1 kʰom^1 kʰum^1
kʰom^1 kʰon^1 kʰom^1 kʰom^1 kʰom^1 kʰom^1

拳頭 fist *Curop

---- gop^7 gop^7 gop^8 ---- gop^8
---- ---- kap^7 ɣap^7 vop^8 vop^7

六 six *hnom

nom^1 tom^1 tom^1 tom^4 tʰom^4 tum^4
tsem^4 tonʔ^4 tom^4 tom^1 tom^1 tom^4

捧 handful *kʰop

---- kʰəp^7 kʰop^7 kʰop^7 kʰap^7 kʰɔp^7
---- ---- kʰop^7 kʰop^7 kʰop^7 kʰop^7

(c) ***oŋ** (d) ***ok**

簸箕/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

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

房子 house *p-loŋʔ

(luŋ^3) luŋ^3 ploŋ^3 ploŋ^3 poŋ^3 ploŋ^3
---- pjaŋ^3 poŋ^3 ploŋ^3 ploŋ^3 ploŋ^3

病 sick *tɕʰok

tsʰok^7 tsʰuk^7 tsʰok^7 tsʰok^7 tsʰoʔ^7 tsʰɔk^7
sɔk^2 saʔ^4 tsʰɔʔ^7 tsʰɔk^7 tsʰɔk^7 tsʰɔk^7

脖子 neck *ljoŋʔ

zoŋ^3 zuŋ^3 zoŋ^3 ɬoŋ^6 ɬoŋ^6 ɬoŋ^6
loŋ^4 zaŋ^3 juaŋ^3 zoŋ^3 zoŋ^3 tsoŋ^6

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 Vowels

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:

(154)   Reflexes of PHl rimes with low vowels

BHi:n	HaE:m	LHu:t	Tzha	Zdui	Bting	Cun	Nadou	Cjiang	Mfaw	Baisha	Ymen
a:y$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	a:(y)$^{B/C}$	ay$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	a:y$^{B/C}$	uay$^{B/C}$
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)
ay$^{B/C}$	ay$^{B/C}$	a:y$^{B/C}$
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 I propose for these are the following:

(155)   *a:y$^{B/C}$
             *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 the rest of Hlai. Bouhin remained conservative, maintaining a low central nucleus, whereas the nucleus in the rest of post-PHl fronted to the front low vowel:

(156)   Development of PHl *a:K in Bouhin and in other Hlai

Bouhin: *a:ŋ   >   a:ŋ
                 *a:k   >   a:k   (>   a:ʔ)

Other 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 (157a); the second, with the mid front nucleus, always have a direct correspondent in

Ha Em, and generally reflect loanwords (157b) (although a few may be legitimate cases of PHl *e:K rimes,

as discussed in section 4.5.1):

(157)   Examples of Bouhin inherited *a:K versus borrowed *a:K

(a) | Gloss | PHl | Bouhin | Gloss | PHl | Bouhin |
      |-------|-----|--------|-------|-----|--------|
      | name | *pʰa:ŋ | pʰa:ŋ[1] | flesh (of fruit) | *C-ma:k | ma:ʔ[7] |
      | bamboo hat | *hla:ŋʔ | da:ŋ[3] | banana | *hwa:k | va:ʔ[7] |
      | chin | *ɦa:ŋ | ha:ŋ[1] | bad | *rja:k | za:ʔ[7] |

(b) | Gloss | PHl | Bouhin | Ha Em |
      |-------|-----|--------|-------|
      | wide | *ɓ[e]:ŋ | ɓe:ŋ[1] | ɓe:ŋ[1] |
      | comb | *s[e]:ŋ | te:ŋ[1] | te:ŋ[1] |
      | stir-fry | *k[e]:ŋ | ke:ŋ[1] | ke:ŋ[1] |
      | get | *C-m[e]:k | me:ʔ[7] | me:ʔ[7] |
      | phlegm | *ɦ[e]:k | he:ʔ[9] | he:ʔ[7] |
      | pacify | *r[e]:k | ge:ʔ[7] | ge:ʔ[7] |

Note that there are other indications of loans in the examples above, including tone 9 in *phlegm*, as well as

the initial *g* in *pacify*, 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:

(158)   *aːy   >   aːy   >   aː(y)
         *aːC   >   ɔːC   >   ɔC
         *aːK   >   ɛːK   >   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:

(159)   *aːC   >   aːC   >   aC
         *aːɲ   >   ɔːɲ   >   ɔn
         *aːc   >   aːʔ   >   aʔ
         *aːK   >   ɛːK   >   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 *aːŋ and *aːk. 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 *aːk in Moyfaw was highly irregular, ending in present-day $ɯː^B$. A transition through a final glottal stop, subsequently lost, presumably conditioned its merger with the Tone B category:

(160)   *aːn   >   aːŋ   >   aːŋ
         *aːɲ   >   aːɲ   >   aːn
         *aːŋ   >   ɛːŋ   >   eːŋ

         *aːt   >   aːk   >   aːʔ (CJ)/aːk (MF)
         *aːc   >   ɔːt   >   oːt
         *aːk   >   ɛːk   >   eːʔ (CJ)/ iaʔ > $ɯː^B$ (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:

(161) *aːn   >   aːŋ   >   aːŋ
       *aːɲ   >   aːn   >   aːn
       *aːŋ   >   ɛːŋ   >   iaŋ

       *aːt   >   aːk   >   aːʔ
       *aːc   >   aːt   >   aːt
       *aːk   >   ɛːk   >   eʔ

Yuanmen *aːc merged with *aːt, and rimes before alveolar codas were backed and raised to *oːT*.

*aːɲ merged with *aːn subsequent to this change, filling the gap left by original *aːn (similar to the Meifu

branch above). All low non-central vowels then underwent diphthongization, while rimes with pure *a:*

were shortened:

(162) *aːy   >   ɔːy   >   uay
       *aːw   >   aːw   >   aːw

       *aːm   >   aːm   >   am
       *aːn   >   ɔːn   >   uan
       *aːɲ   >   aːɲ   >   an
       *aːŋ   >   ɛːŋ   >   iaŋ

       *aːp   >   aːp   >   ap
       *aːt   >   ɔːt   >   uat
       *aːc   >   ɔːt   >   uat
       *aːk   >   ɛːk   >   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 movement of these nuclei can be compared. In particular,

it can be seen that the shift *aːT > *ɔːT* blocked the lowering of *oːC (from *əːT) > *ɔːC*:

(163)   *Development of *əːC versus *aːC in Yuanmen*

(a)   *əːy   >   oːy   >   uːy   (b)   *aːy   >   ɔːy   >   uay
      *əːm   >   ɔːm   >   uam   *aːm   >   aːm   >   am
      *əːn   >   oːn   >   uːn   *aːn   >   ɔːn   >   uan
      *əːŋ   >   ɔːŋ   >   uaŋ   *aːŋ   >   ɛːŋ   >   iaŋ
      *əːp   >   ɔːp   >   uap   *aːp   >   aːp   >   ap
      *əːt   >   oːt (~ot) >   uːt (~ət)   *aːt   >   ɔːt   >   uat
      *əːk   >   ɔːk~oːk   >   ɔʔ~oʔ   *aːk   >   ɛːk   >   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:

(164)   *aːn   >   aːn
         *aːɲ   >   aːn

         *aːt   >   aːt
         *aːc   >   aːt

A comparison of reconstructions is given below:

(165)   <u>Thurgood</u>   <u>Ostapirat (1993)</u> <u>Ostapirat (2004)</u> <u>PHl</u>

(a)   *aːy   *ay   *aːy   *aːy
(b)   *aːw   *aw   *aːw   *aːw
(c)   *aːm   *am   *aːm   *aːm
(d)   *aːn   *an   *aːn   *aːn
(e)   ---   ---   ---   *aːɲ
(f)   ---   ---   *aːŋ   *aːŋ
(g)   *aːp   *ap   *aːp   *aːp
(h)   *uat   *at   *aːt   *aːt
(i)   *uac   *-w-at   *aːc   *aːc
(j)   *aːk   *ak   *aːk   *aːk

Thurgood generally reconstructs rimes with a long low vowel. He doesn't reconstruct anything in (165e-f) (having reconstructed *iːŋ where I reconstruct *aːŋ, which is listed in section 4.5.1 as more equivalent to *eːŋ), and he reconstructs diphthongs in (165h-i), violating Symmetry.

Ostapirat (1993) reconstructs plain low vowels, except in (165i) where he reconstructs a medial labiovelar glide to account for the reflexes where there are back vowels or diphthongs in NCHl. He also fails to reconstruct anything in (165e-f). Ostapirat's (2004) reconstruction is identical to the present one, save for the omission of *aːɲ (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

(166) *Examples of PHl rimes with low vowels*

(a) ***a:y** (b) ***a:w**

甘蔗 *C-ma:yʔ 流 flow *C-ma:w

(ma:y^3)	ma:y^3	ma:y^3	ma:y^3	ma:y^6	ma:y^3	ma:w^1	ma:w^1	ma:w^1	ma:w^1	ma:w^4	ma:w^1
ma:(y)^3	may^3	ma:y^3	ma:y^3	ma:y^3	muay^6	ma:w^1	maw^1	ma:w^1	ma:w^1	ma:w^1	ma:w^4

見 see *C-la:yʔ 星星 star *ra:w

la:y^3	la:y^3	la:y^3	la:y^3	la:y^6	la:y^3	ra:w^1	ra:w^1	ra:w^1	ra:w^4	la:w^4	la:w^4
la:(y)^3	lay^3	la:y^3	la:y^3	la:y^3	luay^6	la:w^4	laʔ^4	la:w^4	ra:w^1	ra:w^1	ra:w^4

屎 shit *ɦa:yʔ 白 white *kʰa:w

ha:y^3	ha:y^3	ha:y^3	ha:y^3	ha:y^3	ha:y^3	kʰa:w^1	kʰa:w^1	kʰa:w^1	kʰa:w^1	kʰa:w^1	kʰa:w^1
ha:(y)^3	hay^3	ha:y^3	ha:y^3	ha:y^3	huay^3	kʰa:w^1	kʰaw^1	kʰa:w^1	kʰa:w^1	kʰa:w^1	kʰa:w^1

(c) ***a:m** (d) ***a:p**

抬 lift (2) *tʃʰa:m 甲虫 cockroach *ra:p

tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	ra:p^7	ra:p^7	ra:p^7	ra:p^8	la:p^8	la:p^8
hɔm^1	han^1	tsʰa:m^1	tsʰa:m^1	tsʰa:m^1	tsʰam^1	----	laʔ^4	la:p^7	ra:p^7	ra:p^8	(ra:p^8)

問 ask *ra:m 挑 carry on shoulder *tʃʰa:p

(ga:m^1)	ga:m^1	ga:m^1	ga:m^4	ha:m^4	ha:m^4	tsʰa:p^7	tsʰa:p^7	tsʰa:p^7	tsʰa:p^7	tsʰa:p^7	tsʰa:p^7
hɔm^4	ŋanʔ^4	ga:m^4	xa:m^1	xa:m^1	kham^1	----	haʔ^4	tsʰa:p^7	tsʰa:p^7	tsʰa:p^8	tsʰap^7

跨 step *Ciɦa:mɦ 谷粒 pc of rice *ɦa:p

ha:m^2	ha:m^2	hja:m^2	za:m^5	za:m^5	za:m^5	ha:p^7	ha:p^7	ha:p^7	ha:p^7	ha:p^7	ha:p^7
ɲam^5	ŋjɛn^2	ɲɛ:m^2	ɲa:m^2	----	----	hɔp^2	----	ha:p^7	ha:p^7	ha:p^8	hap^7

(e)   ***a:n**

沸騰   boil   *ɗa:n

| ɗa:n¹ | ɗa:n¹ | ɗa:n¹ | ɗa:n¹ | ɗa:n¹ | ɗa:n¹ |
| tsɔn¹ | ɗan¹ | ɗa:ŋ¹ | ɗa:ŋ¹ | ɗa:ŋ¹ | ɗuan¹ |

月(亮)   month/moon   *C-ɲa:n

| ɲa:n¹ | ɲa:n¹ | ɲa:n¹ | ɲa:n¹ | na:n⁴ | ɲa:n¹ |
| ɲɔn¹ | ŋjan¹ | ɲe:n¹ | ɲa:ŋ¹ | ɲa:ŋ¹ | ɲuan⁴ |

上   above   *kʰa:n

| kʰa:n¹ | kʰa:n¹ | kʰa:n¹ | kʰa:n¹ | kʰa:n¹ | kʰa:n¹ |
| kʰɔn¹ | kʰan¹ | kʰa:ŋ¹ | kʰa:ŋ¹ | kʰa:ŋ¹ | kʰuan¹ |

(g)   ***a:ɲ**

*饞嘴   greedy   *C-la:ɲ

| la:n¹ | la:n¹ | la:ɲ¹ | la:n¹ | la:n⁴ | la:n¹ |
| la:n¹ | lɔn¹ | la:n¹ | la:n¹ | la:n¹ | lan⁴ |

蟒蛇   python   *C-na:ɲʔ

| ---- | ---- | na:ɲ³ | ---- | ---- | na:n³ |
| nɔn³ | nɔn³ | ---- | ---- | ---- | ---- |

咬   bite   *hŋ[a:/ə]ɲʔ

| ---- | ka:n³ | ka:ɲ³ | ka:n⁶ | kʰa:n⁶ | ka:n⁶ |
| ---- | ---- | kan³ | kan³ | kan³ | ---- |

(f)   ***a:t**

窮   poor   *ʋa:t

| va:t⁷ | va:t⁷ | va:t⁷ | fa:t⁸ | va:t⁸ | va:t⁷ |
| ---- | ---- | va:ʔ⁷ | va:k⁷ | va:ʔ⁸ | vuat⁸ |

粘   stick   *kʰa:t

| ---- | kʰa:t⁷ | kʰa:t⁷ | kʰa:t⁷ | kʰa:t⁷ | kʰa:t⁷ |
| ---- | kʰaʔ⁴ | kʰa:ʔ⁷ | kʰa:k⁷ | kʰaʔ⁸ | kʰuat⁷ |

傳染   infect   *kʰa:t

| pʰa:t⁷ | kʰa:t⁷ | pʰa:t⁷ | kʰa:t⁷ | kʰa:t⁷ | kʰa:t⁷ |
| ---- | ---- | kʰa:ʔ⁷ | kʰa:ʔ⁷ | kʰaʔ⁸ | kʰuat⁷ |

(h)   ***a:c**

停   stop (turn off)   *C-ŋa:c

| ŋa:t⁷ | ŋa:t⁷ | ŋa:c⁷ | ŋa:t⁷ | ŋa:t⁸ | ŋa:t⁷ |
| ŋɔt² | ---- | ŋo:t⁷ | ŋo:t⁷ | ŋa:t⁸ | ŋuat⁸ |

血   blood   *hla:c

| ɗa:t⁷ | ɬa:t⁷ | ɬa:c⁷ | ɬa:t⁷ | ɬa:t⁷ | ɬa:t⁷ |
| tθɔt² | laʔ⁴ | ɬo:t⁷ | ɬo:t⁷ | ɬa:t⁸ | ɬuat⁷ |

(i) ***aːŋ** (j) ***aːk**

名字 name *pʰaːŋ 高 high *pʰaːk

| pʰaːŋ¹ | pʰeːŋ¹ | pʰeːŋ¹ | pʰeːŋ¹ | pʰeːŋ¹ | pʰeːŋ¹ | pʰaːʔ⁷ | pʰeːʔ⁷ | pʰeːk⁷ | pʰeːʔ⁷ | pʰeːʔ⁷ | pʰeːʔ⁷ |
| pʰɛŋ¹ | pʰeŋ¹ | pʰeːŋ¹ | pʰeːŋ¹ | pʰiaŋ¹ | pʰiaŋ¹ | pʰɛk² | pʰɛʔ⁴ | pʰeːʔ⁷ | pʰɯː² | pʰeːʔ[8] | pʰiaʔ⁷ |

剝 skin (a cow) *ɗaːŋʔ 皮 skin (of fruit) *faːk

| ɗaːŋ³ | ɗeːŋ³ | ɗeːŋ³ | ɗeːŋ³ | ɗeːŋ³ | ɗeːŋ³ | pʰaːʔ⁷ | feːʔ⁷ | feːk⁷ | feːʔ⁷ | feːʔ⁷ | feːʔ⁷ |
| ɗɛŋ³ | ɗeŋ³ | ɗeːŋ³ | ɗeːŋ³ | ɗiaŋ³ | ɗiaŋ³ | fɛk² | fɛʔ⁴ | feːʔ⁷ | fɯː² | feʔ⁸ | fiaʔ⁷ |

羊 sheep *hjaːŋ 水獺 otter *hnaːk

| zaːŋ¹ | zeːŋ¹ | zeːŋ¹ | zeːŋ⁴ | zeːŋ⁴ | zeːŋ¹ | naːʔ⁷ | teːʔ⁷ | teːk⁷ | teːʔ⁸ | tʰeːʔ⁸ | teːʔ⁸ |
| zɛŋ¹ | zɛŋʔ⁴ | ---- | zeːŋ¹ | ziaŋ¹ | ziaŋ⁴ | tsɛk⁴ | ---- | ---- | tɯː² | teʔ⁸ | tiaʔ⁸ |

3.5.5 Interim Summary

Four series of rimes with non-high nuclei have been reconstructed in this section, listed below:

(167)

	*əːy		*aːy
*eːw			*aːw
*eːm	*əːm		*aːm
*eːn	*əːn		*aːn
			*aːɲ
(*eːŋ)	*əːŋ		*aːŋ
*eːp	*əːp		*aːp
*eːt	*əːt		*aːt
			*aːc
(*eːk)	*əːk		*aːk

*əy	
*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 ending, a natural co-occurrence restriction; 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, none of which have readily apparent explanations (but note the hypothesis in (145) above).

Finally, there is an obvious distribution asymmetry in length for this set of rimes, where *e:C and *a:C occur only long, and *oC occurs only short. There is no strong typological precedent for this, yet is seems to be consistent with other Southern Kra-Dai data (see next chapter).

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):

(168)   **Open Rimes**

              *i: *ɯ: *u:
              *[e:]
                                *a:

                                Final Glides

                    Labiovelar   Palatal

          *i:w   *[ɯ:y]   *u:y
          *iw   *uy
          *[e:w]   *ə:y
                          *əw   *əy
                          *a:w   *a:y

                        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 gap in the system is that of the low front and low back vowels. 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 etymologically of Kra-Dai 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 restriction (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), Ostpirat (1993), 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.

(169)   Summary of Reconstructed Systems

(a)   Open rimes

Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
*ei	*əy	*iː	*iː
*əɯ	*əɰ	*ɨː	*ɯː
*ou	*əw	*uː	*uː
*ay	*ɐy	*ay	*iːɦ/ʔ
*aɯ	*ɐɰ	*al	*ɯːɦ/ʔ
---	*-j-aw	*ɨw	*uːɦ
*aw	*ɐw	*aw	*uːʔ
---	---	---	*eː
*a	*a	*aː	*aː

(b)   Closed rimes with high front nuclei

Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
*iːw	*iw	*iːw	*iːw
*iːm	*im	*iːm	*iːm
*iːn	*in	*iːn	*iːn
*iaŋ	*iŋ	*iːŋ	*iːŋ
*iːp	*ip	*iːp	*iːp
*iːt	*it	*iːt	*iːt
*iːk	*ik	*iːk	*iːk
*iw	*ew	*iw	*iw
---	*em	*im	*im
*iɲ	*en	*in	*in
*iŋ	*eŋ	*iŋ	*iŋ
*ip	*ep	*ip	*ip
*ic	*et	*it	*it
*ik	*ek	*ik	*ik

(c)   Closed rimes with high back unrounded nuclei

Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
---	---	(*ɨ:y)	*ɯ:y
*uam (b)	*ɯm	*ɨ:m	*ɯ:m
*u:n (b)	*ɯn	*ɨ:n	*ɯ:n
*u:ŋ (b)	*ɯŋ	*ɨ:ŋ	*ɯ:ŋ
*uap (b)	*ɯp	*ɨ:p	*ɯ:p
---	---	---	*ɯ:t
*uak (b)	*ɯk	*ɨ:k	*ɯ:k
---	*ɤm	*ɨm	*ɯm
---	*ɤn	*ɨn	*ɯn
---	---	---	*ɯŋ
---	*ɤp	*ɨp	*ɯp
---	*ɤt	*ɨt	*ɯt

(d)   Closed rimes with high back rounded nuclei

Thurgood	Ostapirat (1993)	Ostapirat (2004)	PHl
*u:y	*uy	*u:y	*u:y
*u:n (a)	*un	*u:n	*u:n
---	---	---	*u:ɲ
*u:ŋ (a)	*uŋ	*u:ŋ	*u:ŋ
*u:t	*ut	*u:t	*u:t
*u:c	---	*u:c	*u:c
*uak (a)	*uk	*u:k	*u:k
*uy	*oy	*uy	*uy
*un	*on	*un	*un
---	---	---	*uɲ
*oŋ	---	*uŋ	*uŋ
*ut	---	*ut	*ut
*uc	*ot	*uc	*uc

(e)   Closed rimes with front mid nuclei

---	---	---	*e:w
---	---	---	*e:m
---	---	---	*e:p
---	---	---	*e:n
---	---	---	*e:t
*i:ŋ	*-j-aŋ	---	(*e:ŋ)
(*a:k)	*-j-ak	---	(*e:k)

(f)   Closed rimes with central mid nuclei

Thurgood	Ostapirat I	Ostapirat II	PHl
*o:y	*-w-ay	*ə:y	*ə:y
*uam (a)	*-w-ɐm	*əm	*ə:m
*o:n	*-w-ɐn	*ən	*ə:n
*uaŋ	*-w-ɐŋ	*əŋ	*ə:ŋ
*uap (a)	*-w-ɐp	*əp	*ə:p
*o:t	*-w-ɐt	*ət	*ə:t
*o:k	*-w-ɐk	*ək	*ə:k
*ay	*ɐy	*ay	*əy
*aw	*ɐw	*aw	*əw
*o	*-w-ɐw	*əw	*əwh/ʔ
*am	*ɐm	*am	*əm
*an	---	*an	*ən
*aɲ	*ɐn	*aɲ	*əɲ
*aŋ	*ɐŋ	*aŋ	*əŋ
*ap	*ɐp	*ap	*əp
*at	---	*at	*ət
*ac	*ɐt	*ac	*əc
---	---	---	*ək

(g)   Closed rimes with back mid nuclei

Thurgood	Ostapirat I	Ostapirat II	PHl
*om	*əm	*um	*om
*oŋ	*əŋ	*uŋ	*oŋ
*op	---	---	*op
*ok	*ək	*uk	*ok

(h)   Closed rimes with low nuclei

Thurgood	Ostapirat I	Ostapirat II	PHl
*a:y	*ay	*a:y	*a:y
*a:w	*aw	*a:w	*a:w
*a:m	*am	*a:m	*a:m
*a:n	*an	*a:n	*a:n
---	---	---	*a:ɲ
(*i:ŋ)	---	*a:ŋ	*a:ŋ
*a:p	*ap	*a:p	*a:p
*uat	*at	*a:t	*a:t
*uac	*-w-at	*a:c	*a:c
*a:k	*ak	*a:k	*a:k

3.6.2 Thurgood's Reconstruction

Thurgood's reconstructed rime inventory is shown below:

(170)   **Open Rimes**

                                          *o
                        *a

Final Glides

            Labiovelar   Velar   Palatal

*iːu   *uːi
*iu   *ui
                                                  *oːi
            *ou   *əɯ   *ei
            *au   *aɯ   *ai
            *aːu   *aːi

Final Stops (Oral and Nasal)

      Labials   Alveolars

*iːm/*iːp   *iːn/*iːt   *uːn (a/b)/*uːt
*ip   *un/*ut
            *uam (a/b)/*uap (a/b)   *uat
                                                  *oːn/*oːt
            *om
*aːm/*aːp   *aːn
*am/*ap   *an/*at

      Palatals   Velars

            *uːc   *iːŋ/*iːk   *uːŋ (a/b)
*iɲ/*ic   *uc   *iŋ/*ik
            *uac   *iaŋ   *uaŋ
                                               *uak (a/b)
                                               *oːk
                                               *oŋ/*ok
                                 *aːk
      *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 (1993) system is shown next:

(171)   **Open Rimes**

*a

Final Glides

Labiovelar	Velar	Palatal
*iw	---	*uy
*ew		*oy
*əw	*əɰ	*əy
*ɐw	*ɐɰ	*ɐy
*-w-ɐw		
*aw		*ay
*-j-aw		*-w-ay

Final Stops (Oral and Nasal)

Labials				Alveolars	
*im/*ip	*ɯm/*ɯp		*in/*it	*ɯn	*un/*ut
*em/*ep	*əm	*ɤm/*ɤp	*en/*et	*ən/*ət	*ɤn/*ɤt
					*on/*ot
	*ɐm/*ɐp			*ɐn/*ɐt	
	-w-ɐm/-w-ɐp			*-w-ɐn/*-w-ɐt	
	*am/*ap			*an/*at	
				*-w-at	

Velars

*iŋ/*ik	*ɯŋ/*ɯk	*uŋ/*uk
*eŋ/*ek	*əŋ/*ək	
	*ɐŋ	
	-w-ɐŋ/-w-ɐk	
	-j-aŋ/(-j-)ak	

Ostapirat's (1993) system is generally symmetrical in several ways. One way in which his inventory is very strange is that it contains only one open rime (*a). Although I disagree with the choice in reconstruction (and Ostapirat later revises this, see below), the decision to create a difference between high and mid vowels (as opposed to a vowel length distinction) based on the NCHl data is highly systematic, and it is interesting to see how this alternative works out. I consider the one significant shortcoming of the system to be the reliance on medial glides (-j- and -w-) to condition vowel quality and length distinctions, when more traditional explanations for vowel development are available (in my opinion this involves

serious violations of Directionality). Ostapirat also fails to reconstruct final palatal stops, as well as any precursors to the Hlai tone categories, which leaves the alternations in Greater Hlai, Qi, and Cunhua unaccounted for.

In a major reworking of his (1993) hypothesis, Ostapirat's (2004) reconstruction is given below:

(172) **Open rimes**

*iː	*ɨː	*uː
	*aː	

Final Glides

Labiovelar		Palatal	
*iːw		(*ɨːy)	*uːy
*iw	*ɨw		*uy
		*əːy	
*əw			
*aːw		*aːy	
*aw		*ay	

Final Stops (Oral and Nasal)

Labials				Alveolars	
*iːm/*iːp	*ɨːm/*ɨːp		*iːn/*iːt	*ɨːn/ ---	*uːn/*uːt
*im/*ip	*ɨm/*ɨp	*um/ ---	*in/*it	*ɨn/*ɨt	*un/*ut
---/ ---	*əm/*əp		---/ ---	*ən/*ət	
	*am/*ap			*an/*al/*at	
	*aːm/*aːp			*aːn/*aːt	

Palatals				Velars	
	---/*uːc	*iːŋ/ *iːk	*ɨːŋ/*ɨːk	*uːŋ/*uːk
	---/*uc	*iŋ/*ik	---/ ---	*uŋ/*uk
			*əŋ/*ək	
*aɲ/*ac			*aŋ/ ---	
---/*aːc			*aːŋ/ *aːk	

This reconstruction is parallel in many ways with the one suggested in this dissertation. There is a full high vowel inventory (lacking the marginal *eː), 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, 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 same 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 Be and Southwest 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 FOUR: 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, Proto-Be (PB), and Proto-Southwest Tai (PSWT) are compared in this section 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 2000), and Proto-Lakkja (Theraphan 1992)), I do not refer to them here so as to keep interphyletic comparisons manageable, limiting the comparanda to other Southern Kra-Dai families.

It would be optimal to compare PHl with Proto-Tai itself. However, only one of the three primary branches of Tai has been reconstructed in any detail (Southwest Tai, Jonsson (1991); Pittayaporn (ms)); it is only when comparative reconstructions of Central Tai and Northern Tai are available that Proto-Tai itself will be wholly reconstructible. For this reason, I have limited the Tai comparanda to Southwest Tai, using Pittayaporn's reconstruction as a primary source, since in my estimation it has surpassed earlier reconstructions of Southwest Tai in both scope and precision.

Proto-Be is a comparatively small language family also spoken on Hainan, and is reconstructed based on materials from five dialects from among a total of three daughter languages. A full discussion of the reconstruction of Proto-Be will be presented in another venue.

The tree below, focusing specifically on Southern Kra-Dai, shows which branches are being used in the present comparison:

(1) Figure 4:   Southern Kra-Dai Phylogenetic Tree

Southern Kra-Dai

Be-Tai

Tai[31]

C-SW Tai

Hlai   Be   N Tai   C Tai   SW Tai

Section 4.1 gives a brief overview of the prosodic word shape inherited from Proto-Southern Kra-Dai (PSKD), and presents a comparison between the PHl initials and the Proto-Be and Proto-Southwest Tai initials. Section 4.2 repeats this comparison for the rimes. Section 4.3 reviews and motivates the important changes which are hypothesized between Proto-Southern Kra-Dai and Proto-Hlai[32].

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:

(2)   (a) φ (b) φ
                  | /|
                  $\sigma_{\mu\mu}$ ς $\sigma_{\mu\mu}$

This first syllable in a disyllabic form (2b) 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)).

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[31] This is the original classification of Tai given in Li (1977). Pittayaporn (p.c. 9/9/07) suggests that SWT may actually be a subgroup of C Tai.
[32] 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.

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[33]. 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[34]:

(3)　　(a)　　　φ　　　　>　　　　　φ　　　　>　　　　φ
　　　　　　　/|　　　　　　　　　　/|　　　　　　　　　|
　　　　　　σ$_\mu$σ$_{\mu\mu}$　　　　　　ç　σ$_{\mu\mu}$　　　　　　σ$_{\mu\mu}$

Example:　　Ciɾá:w　　>　　　C-ɾjá:w　　>　　　ɾjá: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[35]. 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):

(4)　　(a)　　dog　　　　*hm[a:]　　　(b)　　waist　　　*Cifi[a:]fi
　　　　　　break　　　*pʰ[ə:]nʔ　　　　　　rough　　　*Cuɾ[a:]w
　　　　　　spine　　　*tɕʰ[uɲ]ʔ　　　　　　sore　　　　*Cuʔ[əw]

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

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[33] I adopt Cho & King's (2003) convention of showing a moraless sesquisyllable (or semisyllable) with an ç.
[34] A form such as C-ɾjá:w in (3) may have been produced as [Cɔ̆ɾjá:w], with the intervening schwa existing solely as an artifact of phonetic implementation, but not represented in underlying representations.
[35] 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.

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):

(5)   The two types of feet in Pre-Hlai

(a)   Monosyllable   (b)   Sesquisyllable

Initial in main syllable domain   Initial in foot domain Medial in foot domain
        |--↓----| ↘ |↓---|
        [(CV́:)]   [(Cv̌)(CV́:)]
        |--↑----| |-------↑-----|
Initial in foot domain   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-Hlai categories. The PHl reconstructions are presented first, followed by PB reconstructions, PSWT reconstructions, and finally a tentative Proto Southern Kra-Dai (PSKD) reconstruction. Note that the PSKD reconstructions which follow are necessarily incomplete, due to their lack of input from Northern and Central Tai.

4.1.1 Initial Stops

When the aspirated initial stops reconstructed for PHl are compared with their PB and PSWT cognates, there are three patterns which emerge. The first is a correspondence between the PHl aspirated stops and PB/PSWT plain stops (6a), the second is with PB/PSWT voiced stops (6b), and the final only occurs at the velar place of articulation (6c), with PB/PSWT *x on the one hand, and with PB *g and PSWT *ɣ on the other:

(6)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	$*p^h$	$*p$	$*p$	$*p$
	$*t^h$	$*t$	$*t$	$*t$
	$*k^h$	$*k$	$*k$	$*k$
	$*k^h$	$*k$	$*q^{(h)}$	$*q$
(b)	$*p^h$	---	$*b$	$*b$
	$*t^h$	$*d$	---	$*d$
	$*k^h$	$*g$	$*g$	$*g$
(c)	$*k^h$	$*x$	$*x$	$*x$
	$*k^h$	$*g$	$*\gamma$	$*\gamma$

The first series (6a) is reconstructed here in PSKD as an original set of plain stops (which includes

the uvular place of articulation), the second series as original voiced stops, and the third as a pair of velar

fricatives. Under this hypothesis, PSWT is quite conservative, PB is nearly as conservative, but the PHl

inventory is the end result of a series of mergers which occurred in Pre-Hlai. The merger of the uvular

series with the velar series was the first (a merger shared with PB); the second is that the voiced obstruents

merged with the voiceless obstruents, initiating a constraint on initial voiced obstruents in Hlai which has

continued until the present day; the third was the merger of the velar fricatives with the velar stops. Finally,

the entire series of PHl obstruents underwent what Ostapirat (2004) recognizes as redundant aspiration

(what will be referred to below as *initial 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:

(7)	PSKD		Pre-Hlai		Proto-Hlai
(a)	$*p$	>	$*p$	>	$*p^h$
	$*t$	>	$*t$	>	$*t^h$
	$*k$	>	$*k$	>	$*k^h$
	$*q$	>	$*k$	>	$*k^h$
(b)	$*b$	>	$*p$	>	$*p^h$
	$*d$	>	$*t$	>	$*t^h$
	$*g$	>	$*k$	>	$*k^h$
(c)	$*x$	>	$*x$	>	$*k^h$
	$*\gamma$	>	$*x$	>	$*k^h$

Examples of forms with original voiceless stops are given below. Most PSWT forms are those of Pittayaporn, although there are occasional forms taken from Jonsson (1991), and these will be indicated with a (J). In some cases where there is no PSWT form available, a Proto-Tai form exists based on Central and/or Northern Tai (Li (1977)), which is marked (Li):

(8)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	wing	*pʰiːk	*pik	*piːk	*piːk
	put down, let go	*pʰɯːŋʔ	*piaŋ^X	---	*pɯaŋ^C
	male ancestor~pat. gf	*pʰuːʔ	---	*puː^B	*puː$^{B/C}$
(b)	shallow	*tʰɯːnʔ	*tɯːn^X	*tɯːn^C	*tɯːn^C
	tree clsfr~tree	*tʰuːnʔ	*tuən^X	*ton^C	*to[ː]n^C
	fall	*tʰok	*tok	*tok	*tɔk
(c)	chicken	*kʰəy	*kay	*kay^B	*kəy$^{(B)}$
	eat	*kʰən	*kən	*kin	*k[j]ən
	old	*kʰəwɦ	*kaːw^X	*kaw^B	*kəw^B
(d)	ginger	*kʰɯːŋ	*kjaŋ	*qiːŋ	*qɯaŋ
	arm	*kʰiːn	*keːn 'sleeve'	*qʰɛːn	*qeːn

The voiced stops are less common than the voiceless stops:

(9)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	father[36]	*pʰaːʔ		*bɔː^B	*b[a]ː$^{B/C}$
(b)	rotten	*tʰuy	*day	---	*duy
(c)	bracelet	*kʰim	---	*giːm (Li)	*giːm
	choke	*kʰəːnʔ	---	*geːn^C (Li)	*g[e/ə]ːn^C
	full	*kʰɯːm	*g[ɯ/u]ːm	---	*[g/ɣ]ɯːm

Examples of the reconstructed PSKD velar fricatives are given below:

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[36] This comparison should be considered tentative, given the fact that this word is a 'nursery word', and the fact that OC *baʔ could also potentially be the source of the word in either Hlai or Tai.

(10)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	white	*kʰaːw	---	*xaːw	*xaːw
dry	*kʰɯːɦ	---	*xaɰ^B	*xɯː^B
light	*kʰɯːʔ	*xə:^{X}	---	*xɯː^C
(b)	dirty sweat	*kʰi:	(*gə:y 'dust')	*ɣlay	*[d-]ɣi:[37]
itch	*kʰom	*guəm	*ɣom	*ɣɔm
fishy	*kʰaːw	---	*ɣaːw	*ɣaːw

The correspondences between initials in the following examples are more complex than those above; a brief attempt is made here to show how these correspondences may have arisen. The reader should remember that the analysis here is appropriate only for the amount of data presented, and the eventual reconstruction of Proto-Tai will either confirm the present hypotheses or force their revision.

(11)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	to spit	*pʰ[w]iːɦ	---	*pʰi^B (Li)	*pʰ[w]i:^{B}
(b)	incubate	*pʰə:k	*wak	*vak	*[C-]bə:k
(c)	cheat	*pʰə:ŋ	---	*bra:ŋ	*br[ə/a]:ŋ
(d)	land leech	*tʰa:k	*ta:k	*da:k	*N-ta:k
(e)	louse (body)	*tʰən	*də:n	*mlen	*(m-)dən
(f)	rib	*kʰa:ŋʔ	---	*kʰra:ŋ^C	*k$^{(h)}$ra:ŋ^C
(g)	spider	*kʰəw	---	*klwaw	*kuləw

(11a) is a rare example of a correspondence set involving an aspirated PT initial. It is very possible that the source of the aspiration lies in the expressive, onomatopoeic nature of this word.

In (11b), the PHl form could descend from either an initial *p or *b, but the PB and PSWT forms reflect an intervocalic *-b-. The best explanation for this set, in my view, is that they represent an

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[37] I tentatively reconstruct this as a sesquisyllabic word with initial *d, which lenited and metathesized in Tai.

ambiguously sesquisyllabic proto-form: either the Pre-Hlai form dropped an initial presyllable, or the PB and PSWT forms gained one after the breakup of PSKD.

The forms for *cheat* in (11c) may be cognate, and if so, provide evidence of an original *b in Pre-Hlai; the difference in the rime vowels casts some doubt on this comparison, although it is possible that this difference was conditioned by the original rhotic preserved in the PSWT form

The evidence for the status of voicing in the initial in (11d) is conflicting, with a voiceless initial in PB and a voiced initial in PSWT. I propose that one solution to this paradox is the original existence of an initial nasal, which was lost early in most branches, but lasted long enough in PSWT to lead to homorganic voicing of the initial.

The best account for *body louse* in (11e) may be that it was an original root beginning with *d which underwent regular development in PHl and PB, but which was preceded in PSWT by an *m- prefix (which may have also colored the main vowel).

The word *rib* in (11f) indicates an original cluster in which the liquid was lost in Hlai; the aspiration of the initial is uncertain, since aspiration of plain initials in Hlai occurred automatically, and it will be shown below that *r-clusters in PSWT conditioned aspiration of the preceding initial.

4.1.2 Affricates

There are three sets of correspondences between PHl and PB/PSWT, falling into the same three categories as the stops: original voiceless obstruents, original voiced obstruents, and an original fricative:

(12)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	*tʃʰ(w)	*h	*hr	*ʈ
	*tɕʰ	---	*c	*c
(b)	*tʃʰ (/*tɕʰ)	*d	*hr	*ɖ
	*tɕʰ	*ʐ	*ɟ	*ɟ
(c)	*tɕʰ	*s	*s	*ɕ

As in the case of the stops, it appears that PB and PSWT are generally conservative, whereas a series of mergers occurred in Pre-Hlai. Based on the PSWT evidence, a retroflex series is reconstructed here in PSKD, which affricated in all branches, eventually became alveo-palatal in PHl, and deaffricated to fricatives in PB and PSWT (it will be shown below that the regular PB reflexes of voiced fricatives are voiced stops). If this hypothesis is correct, the voiced retroflex fricative devoiced in Tai at some point previous to PSWT, merging with its voiceless counterpart. Additional evidence in Hlai for reconstruction of a retroflex series is found in the asymmetrical support of an optional labiovelar coarticulation *tʃʰw but not a palatal coarticulation (first mentioned in chapter two, section 2.3.1.2). The same pattern is found in Central Hlai, where *rw is the only possible coarticulated rhotic (superscripted X indicates an impossible initial):

(13)   Pre-Hlai   Central Hlai

     *ʈ   *r
     *ʈw   *rw
     ^{X}ʈj ^{X}rj

There are two cases in which PHl *tʃʰw corresponds to PB *h and PSWT *hr (see (15b) below). Although it is tempting to see this as a case of vocalic transfer, the aspiration in the PHl reflex indicates that this initial was not originally word-medial. I tentatively suggest that the original rime in these cases had a rounded vowel, and that the labialization on the PHl initial is a result of the transfer of rounding from the rime. This provides an alternate explanation for what otherwise appears to be the only case of vocalic transfer of *u in Pre-Hlai, in an unlikely environment (across an affricate).

The palatal reflexes in PSWT shown in (12a-b) offer proof of an original palatal stop series, which underwent affrication in Hlai. The PSKD palatal fricative *ç followed the same trajectory in Hlai as the velar fricative *x, narrowing in stricture in Pre-Hlai and merging with the aspirated reflex of *c by the time of PHl:

(14)   PSKD   Pre-Hlai   Proto-Hlai

    *ʈ   >   *ʈʂ(w)   >   *tʃʰ(w)
    *c   >   *tɕ   >   *tɕʰ

    *ɖ   >   *ʈʐ   >   *tʃʰ (/*tɕʰ)
    *ɟ   >   *tɕ   >   *tɕʰ

    *ɕ   >   *ɕ   >   *tɕʰ

Examples of voiceless retroflex affricates and palatal stops are shown below:

(15)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	fruit/testicles	*tʃʰə:m	*ha:m	*hrəm	*ʈə:m
	carry on shoulder	*tʃʰa:p	*ha:p	*hra:p	*ʈa:p
(b)	weave (fabric)~loom	*tʃʰwɯ:k	*huk	*hru:k	*ʈu:k
	head louse	*tʃʰwu:	---	*hraw	*ʈu:
(c)	(to) wedge	*tɕʰi:m	---	*cim (J)	*ci:m

Examples of voiced *ɖ and *ɟ are given below. There are a surprising number of examples of *ɖ, but one reason for this may be that it has two potential origins: initial *ɖ and intervocalic *ʈ. Also note that the Hlai reflex of PSKD *ɖ becomes palatalized before the high vowel *i:

(16)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	stone	*tɕʰi:n	*di:n	*hrin	*ɖi:n
	take, carry	*tɕʰi:wʔ	*di:w 'lead'	*hriwᶜ	*ɖi:wᶜ
	pain; (be) sick	*tʃʰok	*dək	---	*ɖ[ə/ɔ]k
(b)	taste	*tɕʰim	---	*ɟim	*ɟim
	hole	*tɕʰu:ŋʔ	*ʑə:ŋˣ	*ɟɔ:ŋᴮ	*ɟo:ŋᴮ/ᶜ

Examples of the palatal fricative are given below. Whereas *ɕ merged with PHl *tɕʰ, it depalatalized and merged with *s in PB/PSWT:

(17) <u>Gloss</u>   <u>Proto-Hlai</u>   <u>Proto-Be</u>   <u>PSWT</u>   <u>PSKD</u>

tail	*tɕʰuc	*suc	---	*ɕuc
pestle; pound rice	*tɕʰaːk	---	*saːk	*ɕaːk

The following correspondences are irregular:

(18) <u>Gloss</u>   <u>Proto-Hlai</u>   <u>Proto-Be</u>   <u>PSWT</u>   <u>PSKD</u>

(a)   eye   *tʃʰaː   *taː   *taː   *N-ʈaː

(b)   tongs   *tɕʰiːp   ---   *giːp   *giːp

The word for *eye* (17a) developed from an original retroflex affricate based on the Hlai evidence, but irregularly in both PB and PSWT; I propose the solution to this was an original sesquisyllabic form with an initial nasal (for external reasons; see chapter 6); the same correspondence can be seen in the word for *die* in PB and PSWT, which are not cognate with Hlai forms for *die*.

The word *tongs* (17b) may be explainable through the irregular affrication of the initial velar in Pre-Hlai or PHl before the high vowel.

4.1.3 Fricatives

It has been shown above that the PSKD palatal and velar fricatives *ɕ, *x and *ɣ merged with other Hlai categories, becoming *tɕʰ and *kʰ. The following are the correspondences for the PSKD fricatives which are still realized as such in PHl. PB initial voiced fricatives have closed in stricture to stops (19b), but there is PB evidence for medial labiodental fricatives (19c):

(19)   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   *f   *f   *f   *f
       *s   *s   *s   *s

(b)   *f   *b   *v   *v
       *s   *d   *z   *z

(c)   *f   *w   *v   *C-v
       *fj   *w~s   *v   *Civ

The only change which occurred in Hlai was the devoicing of the initial voiced fricatives, leading

to their merger with the voiceless series.

(20)   PSKD   Pre-Hlai   Proto-Hlai

(a)   *f   >   *f   >   *f
       *s   >   *s   >   *s

(b)   *v   >   *f   >   *f
       *z   >   *s   >   *s

(c)   *C-v   >   *v   >   *f
       *Civ   >   *vj   >   *fj

Examples of the PSKD voiceless fricatives are given below:

(21)   Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   rain   *fun   *fwən   *fɤn   *fon
       millet   *fa:ŋʔ   *[f/w]a:ŋ^X *fa:ŋ^C *fa:ŋ^C
       sky/cloud   *fa:ʔ   *fa:^{X} *fa:^{C} *fa:^{C}

(b)   you (pl)   *səw   *su   *su (Li)   *su:
       ripe   *sɯ:k   ---   *suk   *sɯ:k
       water buffalo/cow   *suyʔ   *say^X ---   *suy^C

Examples of the PSKD voiced fricatives are given below:

(22)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	sky/cloud	*fa:ʔ	*ba:^{X}	*va:^{C}	*va:^{C}
(b)	wash clothes	*sə:k	*dak	*zak	*zə:k
	ash	*su:ʔ	*də:w^X	(*daw^B)	*zu:^{C}

Examples of medial voiced fricatives are given below:

(23)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	fire	*fi:	*wɐy	*vay	*C-vi:
	dream[38]	*fən	*wə:n	*fan	*C-vən
(b)	tooth	*fjən	*sjən	*van	*Civən
	seed	*fjən	*wə:n	*van	*Civən

The following items show irregular correspondences:

(24)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	go	*fi:	*pəy	*pay	*pwi:
	word clsfr; mouth	*fa:k	*pa:k	*pa:k	*pwa:k
(b)	cast (seed)	*fə:nfi	---	*hwa:n^B	*[hw/v][ə/a]:n^B
(c)	cockscomb	*fi:wfi	*si:w^X	---	*[Civ]i:w^B
(d)	vomit	*fa:k	*duak	*ra:k	*rwa:k
(e)	collect, pick up	*sip	---	*kep	*[k/g]ip

The two items in (24a) may be best explained by positing an initial *pw, which delabialized in PL and PT, but which affricated to *pf and then simplified to *f in PHl.

The item in (24b) might be reconstructed with an original *hw, which hardened to *v in PHl; the discrepancy in vowels casts doubt on its authenticity as a cognate set.

The initial in (24c) may be tentatively assumed to have been an original labiodental fricative, which underwent palatalization in PB (see *tooth* above).

---

[38] The PSWT voiceless reflex in this form is irregular.

The word *vomit* (24d) is most easily explained by assuming an original *r, and then positing an irregular change to *z in PB (which later became *d), as well as loss of *r and fortition of medial *w in PHl, which led irregularly to a Pre-Hlai *va:k, then devoicing to *fa:k.

Finally, if the forms in (24e) are truly cognate, the PHl form may be the result of irregular palatalization before [i].

4.1.4 Medial Stops

The intervocalic stop correspondences which exist between PHl, PB and PSWT are the following:

(25)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	*ɓ	*C-b	*ʔb	*C-p
	*C-β	(*v)	*ʔb	*C-p
	*ɗ	*C-r	*ʔd	*C-t
	*tɕ	*C-j	*ʔj	*C-c
	*k	---	*g~*kʰ	*C-k
(b)	*k	*ɕ	*hr	*C-C

It is clear that intervocalic voicing has occurred in all three branches, and it is tempting to reconstruct it in PSKD itself; there are reasons why this is problematic, however, which are discussed below in section 4.1.7.

The development of the initials in (25a) in Hlai is given below; it is assumed that upon becoming initial, voiced initials devoiced in accordance with the global Hlai prohibition against voiced obstruent initials:

(26)	PSKD		Pre-Hlai		Proto-Hlai
	*C-p	>	*C-b	>	*ɓ~*C-β
	*C-t	>	*C-d	>	*ɗ
	*C-c	>	*C-ɟ	>	*tɕ
	*C-k	>	*C-g	>	*k

At the bilabial place of articulation, all three branches show evidence for a medial *C-b. I propose

that PHl *ɓ and *C-β both originate in Pre-Hlai *C-b, and that the majority change was to PHl *ɓ; however,

in a few instances, additional lenition occurred before the implosivization of *C-b, leading to *C-β (this is

additional evidence that intervocalic voicing did occur in Pre-Hlai). At the alveolar place of articulation,

both PHl and PSWT are reconstructible to medial *C-d, but PB seems to have lenited even further to *C-r.

In the case of the palatal stops, both PB and PSWT have lenited first to voiced stops, then to sonorants,

with PHl being the only branch retaining the original stricture of these phonemes. The reconstruction of

*C-g is more tenuous, with no PB examples, and one example of PSWT *g and two of *k^h.

An outline of the differences in the developments in PB and PSWT is given below:

(27) <u>PSKD</u>   <u>Pre-Be</u>   <u>Proto-Be</u>

*C-p	>	*C-b	>	*C-b
*C-t	>	*C-d	>	*C-r
*C-c	>	*C-ɟ	>	*C-j

(28) <u>PSKD</u>   <u>Pre-SWT</u>   <u>Proto-Southwest Tai</u>

*C-p	>	*C-b	>	*ʔb
*C-t	>	*C-d	>	*ʔd
*C-c	>	*C-ɟ	>	*ʔj
*C-k	>	*C-g~$g^ɦ$	>	*g~k^h

The analysis of correspondences including PHl *k is complicated by the other regular

correspondence set (24b) in which PHl *k participates. The PB and PSWT evidence both indicate an *r-

cluster; the specifics of this cluster are more difficult to reconstruct, and for now it is merely reconstructed

as *C-C.

Examples of the medial stops are given below:

(29)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	fly	*ɓin	*C-bjən	*ʔbin	*C-pin
	carry	*ɓi:k	(*C-[b]i:k)	*ʔbɛ:k	*C-pe:k
	overflow	*ɓa:ɦ	---	*ʔba^B	*C-pa:^{B}
(b)	village	*C-βa:nʔ	(*C-wə:^{X})	*ʔba:n^C	*C-pa:n^C
	times	*C-βə:y	*və:y$^{[X]}$	---	*C-pə:y
(c)	face~nose	*ɗəŋ	*C-rəŋ	*ʔdaŋ	*C-təŋ
	sieve	*ɗoŋʔ	*C-ro:ŋ^X	*ʔdoŋ^C	*C-təŋ^C
	gall bladder	*ɗəy	*C-rəy	(*ʔbli:)	*C-təy
(d)	stand	*tɕu:n	*C-[ɲ/j]u:n	*ʔjɯ:n	*C-cun
	step on	*tɕə:mɦ	---	*ʔja:m^B (Li)	*C-c[ə:/a:]m^B
(e)	slant~tilt	*ki:ŋ	---	*gɛ:ŋ (J)	*C-ge:ŋ
	turbid	*kunɦ	---	*kʰun^B	*C-gun^B
	crocodile	*k[i:]ʔ	---	*kʰɛ:^{C} (J)	*C-ge:^{C}
(f)	road	*ku:n	*ɕwən	*hron	*C-Co[:]n
	jar, jug	*kəy	---	*hray	*C-Cəy
	vine	*kəc	*ɕac	---	*C-Cəc

The following example shows variation in place: palatal in PHl, alveolar in PSWT, and mixed reflexes in the Be daughter languages:

(30)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
	extinguish	*tɕəp	*C-[r/j]ap	*ʔdap	*C-[t/c]əp

The following forms seem to show a difference between an original voiceless medial stop in Pre-Hlai, and a voiceless initial stop in PB/PSWT. One possible explanation is that the common ancestor of PB and PSWT lost original minor syllables before they could condition intervocalic voicing. However, there are at least three possible Chinese loans in the examples below (*board*, *duck*, and *more than*), indicating that a major (perhaps exclusive) source of this part of the lexical set may be loanwords. If this is true, then at least some of the PSKD forms below may not have actually existed:

(31) Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   board   *ɓeːn^B   *peːn^X   *pɛːn^C   *(C-)pɛːn^B/C
      duck   *ɓit   *pjət   *pet   *(C-)pet
      crab   *ɓuː^B   ---   *puː   *(C-)puː^(B)
      cotton   *ɓuːy^C   *puːy^X   ---   *(C-)puːy^C

(b)   castrate   *ɗɯːn   *toːn   *toːn   *(C-)toːn
      soak   *ɗəːm^C   *cəːm^X   ---   *(C-)[t/c]əːm^C

(c)   chop   *tɕək   ---   *cək (Li)   *(C-)cək
      breath   *tɕɯː   ---   *caɥ   *(C-)cɯː

(d)   more than   *kua^C   *kua^X   *kwaː^B   *(C-)kua^C/B

4.1.5 Pre-Hlai Nasals

The correspondences between PHl and PB/PSWT nasals is complicated by the fact that while there are correspondences between PHl initial nasals and PB/SWT initial nasals, as well as between PHl medial nasals and PB/SWT medial nasals, there are also mixed correspondences between initial and medial nasals from both branches. Examples are presented from a Hlai perspective, and two hypotheses are suggested in order to explain the mixed correspondences.

4.1.5.1 Initial Nasals

The following are the two sets of correspondences for the Hlai initial nasals[39]:

---

[39] The H-initial forms in (32b) indicate original fricative-initial sesquisyllabic forms.

(32)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	*hm	*m	*m	*m
	*hn	*n	*n	*n
	*hɲ	*ɲ	*ɲ	*ɲ
	*hŋ	*ŋ	*ŋ	*ŋ
	*hŋw	*w	*ŋw	*ŋw
(b)	*hm	*C-m	*hm	*H-m
	*hn	*C-n	*hn	*H-n
	*hŋ	---	*hŋ	*H-ŋ
	*hŋw	---	*hw	*H-ŋw

The only development between PSKD and PHl in the case of the first set of initials is the

development of preaspiration by the time of PHl:

(33) | PSKD | | Pre-Hlai | | Proto-Hlai |
|---|---|---|---|---|
| *m | > | *m | > | *hm |
| *n | > | *n | > | *hn |
| *ɲ | > | *ɲ | > | *hɲ |
| *ŋ | > | *ŋ | > | *hŋ |
| *ŋw | > | *ŋw | > | *hŋw |

In the cases where PHl aspirated nasals correspond with PB/PSWT medial nasals[40], the solution

adopted here is that in PSKD, they were preceded by an initial fricative; this initial fricative conditioned

high tone in PB and PSWT (and preaspiration in Li's Proto-Tai). This preaspiration led to a merger of

these two categories of PHl nasals when plain initial nasals became preaspirated.

(34) | PSKD | | Pre-Hlai | | Proto-Hlai |
|---|---|---|---|---|
| *H-m | > | *hm | > | *hm |
| *H-n | > | *hn | > | *hn |
| *H-ŋ | > | *hŋ | > | *hŋ |
| *H-ŋw | > | *hŋw | > | *hŋw |

Examples of nasal-initial forms are given below:

---

[40] Many of these are animal names, and an animal prefix has been suggested to account for these (Ostapirat 2000, Thurgood 1988b).

(35)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	return/come	*hmɯ:	*mia	*mɯə	*mɯa
	beard	*hmɯ:mʔ	*mu:m^X	*mum^B	*mu:m$^{B/C}$
	ant	*hmuc	*muəc	*mot	*moc
(b)	field	*hna:ɦ	*nia	*na:	*na:$^{(B)}$
	otter	*hna:k	*na:k	*na:k	*na:k
(c)	shoot~bow	*hɲɯ:	*ɲə:	*ɲɯŋ	*ɲɯ:
	dye	*h[ɲ]omʔ	*[r/j]am^X	*ɲɔ:m^C	*ɲɔ[:]m^C
(d)	silver	*hŋən	*ŋə:n	*ŋɤn	*ŋən
	sesame	*hŋɯ:	---	*ŋa:	*ŋɯa
	needle	*hŋuc	*ŋa:c	---	*ŋ[o:]c
(e)	day	*hŋwən	*wə:n	*wɤn	*ŋwən

Examples of fricative initial forms with medial nasals are given below:

(36)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	dog	*hma:	*C-ma:	*hma:	*H-ma:
	flea	*hmə:t	*C-mat	*hmat	*H-mə:t
	pig	*hməw	*C-mo:	*hmu:	*H-mu:
(b)	mouse	*hniw	*C-nu:	*hnu:	*H-niw
	top	*hnɯ:	---	*hnɯə	*H-nɯa
(c)	grey hair	*hŋu:k	---	*hŋɔ:k	*H-ŋo:k
(d)	wind~cold (sickness)	*hŋwə:t	---	*hwat	*H-ŋwə:t

The following word shows a more complex correspondence:

(37)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
	smooth	*hɲɯ:n	---	*mlɯ:n^B	*m-lɯ:n$^{(B)}$

The palatal nasal in the Hlai form above can be explained through the palatalization of the lateral and later coalescence of the two initial consonants: ml > mj > ɲ > hɲ.

4.1.5.2 Medial nasals

The medial nasal correspondence sets also split into two sets:

(38) | Proto-Hlai | Proto-Be | PSWT | PSKD[41] |
|---|---|---|---|
(a) | *C-m | *C-m | *hm | *C-m |
| *C-n | *C-n | *hn | *C-n |
| *C-ɲ | *C-ɲ | *hɲ | *C-ɲ |
| *C-ŋ | *C-ŋ | *h(ŋ) | *C-ŋ |
(b) | *C-m | *m | *m | *C^V-m |
| *C-n | *n | *n~l | *C^V-n |
| *C-ɲ | *ɲ | *ɲ | *C^V-ɲ |
| *C-ŋ | *ŋ | *ŋ | *C^V-ŋ |

For the correspondence series in (38a), there are occasional instances of initial PB forms. I reconstruct sesquisyllabic forms with voiceless initials for this first set, with no changes between PSKD and PHl:

(39) | PSKD | | Pre-Hlai | | Proto-Hlai |
|---|---|---|---|---|
| *C-m | > | *C-m | > | *C-m |
| *C-n | > | *C-n | > | *C-n |
| *C-ɲ | > | *C-ɲ | > | *C-ɲ |
| *C-ŋ | > | *C-ŋ | > | *C-ŋ |

There is a second set of correspondences (38b) where a PHl medial nasal corresponds with PB and PSWT initial nasals. It is notable that at the alveolar place of articulation, all of the PSWT initials belong to the class which Li (1977) reconstructs as PT *nR. I suggest that the PSKD form underlying this particular set of correspondences was a sesquisyllable with an originally voiced stop. These voiced stops devoiced in Pre-Hlai, becoming voiceless and conditioning high register; on the other hand, they conditioned low register in PB and PSWT, merging with monosyllabic items which had plain initial nasals.

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[41] C^V here represents an originally voiced initial in a sesquisyllabic form.

(40)   PSKD   Pre-Hlai   Proto-Hlai

      $*C^V$-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

The following are examples of medial nasals preceded by originally voiceless initials:

(41)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	flesh (of fruit)	*C-ma:k	*mak 'fruit'	*hma:k	*C-ma:k
	bear	*C-muy	---	*hmi:	*C-muy
	sugarcane	*C-ma:yʔ	*C-ma:y^X	---	*C-ma:y^C
(b)	thick	*C-na:	*C-na:	*hna:	*C-na:
	skin	*C-nə:ŋ	*C-naŋ	*hnaŋ	*C-nə:ŋ
	this	*C-ni:ɦ	*nay^X	*(h)n[ə]i^C	*[C-]ni:$^{B/C}$
(c)	garbage/dirty	*C-ɲa:k	---	*hɲa:k	*C-ɲa:k
	wrinkle	*C-ɲi:wʔ	*C-ɲe:w^X	---	*C-ɲe:w^C
	salt	*C-ɲa:wʔ	*C-ɲa:w^X	---	*C-ɲa:w^C
(d)	gill	*C-ŋa:k	*ŋa:k	*hŋɯ:k	*C[i/u]ŋa:k
	cry	*C-ŋi:ʔ	*C-ŋa:y^X	*hay^C	*C-ŋi:^{C}
	goose	*C-ŋa:nɦ	---	*ha:n^B	*C-ŋa:n^B

The following are examples of medial nasals preceded by originally voiced initials:

(42)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	yam	*C-mən	*man	*man	$*C^V$-mən
	you	*C-mɯ:	*mə	*mɯŋ	$*C^V$-mɯ:
	hand	*C-mɯ:	*mə:	*mɯ:	$*C^V$-mɯ:
(b)	water	*C-nəmʔ	*na:m^X	*nam^C	$*C^V$-nəm^C
	bamboo shoot	*C-nɯ:ŋ	*na:ŋ	*nRa:ŋ (Li)	$*C^V$-nɯaŋ^C
	stinger	*C-nəy		*lay	$*C^V$-nəy
(c)	mosquito	*C-ɲu:ŋ	*ɲuəŋ	*ɲuŋ	$*C^V$-ɲu[:]ŋ
	sew	*C-ɲəp	*ɲap	*ɲip	$*C^V$-ɲəp
(d)	branch (tree)	*C-ŋa:mɦ	---	*ŋa:m^B (Li)	$*C^V$-ŋa:m^B
	mute	*C-ŋom	---	*ŋwo[:]m^C (Li)	$*C^V$-ŋom$^{(C)}$
	branch (road)	*C-ŋa:ʔ	---	*ŋa:^{B} (Li)	$*C^V$-ŋa:$^{B/C}$

A few exceptions which do not conform to the pattern above but which may still be cognate include the following:

(43)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	pickle	*C-mə:ŋ	---	*ʔblɔ:ŋ	*C-bl[ə/o]:ŋ
	moon	*C-ɲa:n	---	*ʔblɯən	*C-b[i/u]la:n
(b)	climb~crawl	*C-na:n	---	*gla:n	*g-na:n
(c)	two days later	*C-ɲɯ:	*rə:	*rɯ:	*C-mrɯ:
(d)	straw	*Cuŋiŋʔ	*mu:ŋ^X	---	*C^{V}uŋiŋ^C

The two words in (43a) are both potential examples of a correspondence between PHl *C-N and PSWT *ʔbl. In both cases a cluster must be assumed, where either an original voiced stop nasalized in Hlai, or an original nasal stop denasalized in Tai. The palatal nasal in *moon* can be derived in the same manner as in *smooth* above, from the sequence C-ml > C-mj > C-ɲ. If the two words in (43b) are cognate, it may be an example of lenition in PSWT of *n > *l. If the forms in (43c) are cognate, I propose an initial *C-mr in PSKD. Finally, if PB *mu:ŋ^X is related to PHl *Cuŋiŋ^C (43d), then the PB initial and rime may have both been influenced by the preceding presyllable vowel.

4.1.6 Laterals

There are several correspondence sets for the PHl lateral series, owing largely to the fact that PSKD medial *l had the potential to combine into various clusters and/or was occasionally preempted by an initial consonant. The four PHl lateral series will therefore be subdivided and treated individually in this section.

4.1.6.1 Initial Laterals

The four sets of correspondences for PHl *hl are listed below:

(44) <u>Proto-Hlai</u> <u>Proto-Be</u> <u>PSWT</u> <u>PSKD</u>[42]

Proto-Hlai	Proto-Be	PSWT	PSKD
*hl	*l	*l	*l
*hl	*C-l	*hl	*H-l
*hl	*p	*(p)l	*p-l
*hl	*m	*l	*m-l

The first series provides straightforward evidence for initial PSKD *l, the second series for a fricative initial presyllable, the third for a *p-initial presyllable, and the final series for an *m-initial presyllable. Developments of these series into PHl are given below, in which the labial-initial series loses its presyllable between PSKD and Pre-Hlai, and the plain lateral becomes preaspirated by the time of Proto-Hlai:

(45) <u>PSKD</u> <u>Pre-Hlai</u> <u>Proto-Hlai</u>

PSKD		Pre-Hlai		Proto-Hlai
*l	>	*l	>	*hl
*H-l	>	*hl	>	*hl
*p-l	>	*l	>	*hl
*m-l	>	*l	>	*hl

Examples of these series are given below:

(46) <u>Gloss</u> <u>Proto-Hlai</u> <u>Proto-Be</u> <u>PSWT</u> <u>PSKD</u>

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	tongue	*hli:nʔ	*li:n^X	*li:n^C	*li:n^C
	child	*hlɯ:k	*lɯk	*lu:k	*lɯ:k
	deep	*hlə:k	*lak	*lɤk	*lə:k
(b)	hat (bamboo)	*hla:ŋʔ	*C-la:ŋ^X	---	*H-la:ŋ^C
	many	*hlə:y	---	*hla:y	*H-lə:y
	son-in-law	*hlɯ:	*C-lə:	---	*H-lɯ:

---

[42] C^V here represents an originally voiced initial in a sesquisyllabic form.

| (c) | blood | *hla:c | *pa:c | *luɨət | *p[i/u]la:c |
| | fish | *hla: | *pa: | *pla: | *p-la: |

| (d) | spittle | *hlə:y | *may | *la:y | *m-lə:y |
| | deaf | *hlə:k | *mak | (*hnuək) | *m-lə:k |

The following two examples are exceptional:

(47)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	Hlai~Tai	*hləy	---	*day	*[l]əy
(b)	chaff	*hli:p	*C-lip	*klɛ:p	*[k-]le:p

The autonym in (47a) is in variation between Pre-Hlai *l and Tai *d; if these two forms are truly cognate, then an original lateral is implied which hardened irregularly to *d in Tai. The expected PHl reflex of the word *chaff* in (47b) is *C-l, and this word apparently lost its presyllable in Pre-Hlai.

4.1.6.2 Medial Laterals

The correspondence sets for the PHl medial laterals are the following:

(48)	Proto-Hlai	Proto-Be	PSWT	PSKD
	*C-l	*C-l	*hl	*C-l
	*C-l	*C-l	*kl	*k-l
	*C-l	*r	*l	*C^V-l

The Hlai developments are analogous to the nasals in the last section, voiced and voiceless presyllable obstruents devoice and merge, with no other changes occurring between PSKD and PHl (save for loss of place information for the presyllable initial):

(49)	PSKD		Pre-Hlai		Proto-Hlai
	*C-l	>	*C-l	>	*C-l
	*k-l	>	*k-l	>	*C-l
	*C^V-l	>	*C-l	>	*C-l

Examples are given below:

(50) Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   big   *C-luŋ   ---   *hluəŋ   *C-l[u]ŋ
      return   *C-lɯ:ŋ   *C-lɯŋ   ---   *C-lɯ[:]ŋ

(b)   far   *C-ləy   *C-ləy   *klay   *k-ləy
      drum   *C-ləŋ   *C-loŋ   *klɔ:ŋ   *k-l[o:]ŋ

(d)   forget   *C-lɯ:mɦ   ---   *lɯ:m   *C^V-lɯ:m$^{(B)}$
      fingernail   *C-li:p   (*ri:p)   *lep   *C^V-le[:]p
      small   *C-lik   ---   *dlek (Li)   *C^V-lek

The following form is exceptional, in that is shows variation between a lateral and rhotic medial

liquid. Since the PB form indicates a lateral, I make the tentative assumption that there was confusion

between liquids in Tai:

(51) Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

      lazy   *C-la:nʔ   *la:n^X *gra:n^C *g-la:n^C

4.1.6.3 Palatalized Laterals

The following series are nearly identical to those in the last subsection, the difference being the

presence of a high front vowel in the presyllable which conditioned vocalic transfer in Hlai:

(52) Proto-Hlai   Proto-Be   PSWT   PSKD

      *lj   *C-l   *hl   *Cil
      *lj   *p   *pl   *pil
      *lj   *r   *l   *C^{V}il

The development of these forms in Hlai is as follows:

(53) PSKD   Pre-Hlai   Proto-Hlai

      *Cil   >   *Cilj   >   *lj
      *pil   >   *pilj   >   *lj

$$*C^Vil \quad > \quad *Cilj \quad > \quad *lj$$

Examples are given below:

(54)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	yellow	*lja:ŋ	*C-la:ŋ	*hlɯəŋ	*Cila:ŋ
	remainder	*lja:	---	*hlɯə	*Cila:
	gadfly	*lja:k	---	*hlɯək	*Cila:k
(b)	leech	*ljiŋ	*piŋ	*pli:ŋ	*pili[:]ŋ
(c)	steal	*ljək	*rək	*lak	*C^Vilək

The following form shows a wide range of variation, even within the Hlai languages themselves:

(55)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
	lightning	*[C-]l[j]ip	*C-ljap	*mlɛ:p	*m-le:p

*4.1.6.4 *p-l clusters*

This series of PHl laterals participates in an extremely heterogeneous group of correspondences with PB/PSWT, and it appears that in at least some cases the PHl labial element may be secondary. The PSKD reconstructions below are extremely tentative:

(56)	Proto-Hlai	Proto-Be	PSWT	PSKD
	*p-l	---	*(p)l	*p-l

There was no change between PSKD and PHl:

(57)	PSKD	Pre-Hlai	Proto-Hlai
	*p-l >	*p-l >	*p-l

There is only one illustrative example of each of the above series:

(58)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	swim~float	*p-li:	---	*lɔ:y	*[p-]lo:y
(b)	termite	*p-lu:k	*puk	*pluək (J)	*p-lu:k

In addition to the forms above, the following sets exist as well:

(59)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	forehead	*p-la:ʔ	---	*pʰa:k	*p-[l/r]a:k
(b)	near	*p-lɯ:ʔ	*C-lə:^{X}	*klaɰ^C	*C-ləɰ^C
(c)	hornet	*p-lu:	(*da:w^X)	*to:^{B}	*[p-]to:$^{(C)}$
	simmer	*p-lom^C	---	*tom^B	*[p-]tɔm$^{B/C}$

The form in (59a) shows another confusion between the medial liquids *l and *r, the latter having conditioned the aspiration in the PSWT initial. In the word *near* (59b), it appears as though there is an original root *ləɰ^C which was prefixed independently in each of the two branches of PSKD. Finally, the two examples in (59c) show the same correspondence; if these are truly related, then one hypothesis is that PSWT retained the original roots, and that secondary prefixes were added in Pre-Hlai, resulting in the lenition of *t to *l.

4.1.7 Approximants

The correspondences for PHl approximants are given below. The PB and PSWT reflexes indicate that the PHl labiovelar and alveolar approximants descend from original intervocalic voiced stops which underwent lenition in Hlai:

(60)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	*ʋ	*C-b	*ʔb~*v	*C-b
(b)	*ɾ	*(C-)r	*ʔd	*C-d
	*ɾj	*[C-]r	*j	*Cid
	*Cuɾ	*C-r	*ʔd	*Cud
	*C(u)ɾ	*(C-)r	*r	*C(u)ɖ
(c)	*r	*r~*d	*r	*r
	*r	*ç	*Cʰ	*C-r
	*r	---	*Cl	*C-R

The reflexes of PSKD *C-p/*C-t and PSKD *C-b/*C-d apparently merged in PSWT, although there is one PSWT reflex *v of PSKD *C-b which indicates further lenition[43]. There is also evidence for an original intervocalic retroflex *ɖ reflected in PSWT *r.

The reflexes of the plain rhotic in PHl and PSWT are straightforward. PB has two reflexes with one example each; the reflex *d probably reflects a secondary development to earlier *z. The reflexes of the medial rhotic have merged with those of the initial rhotic in PHl; the regular reflex in PB for a *C-r cluster is *ç, whereas in PSWT it conditions aspiration of the initial. There is another set of correspondences between PHl *r and PSWT *Cl, where the identity of the original liquid is unclear.

The posited developments between PSKD and PHl are as follows:

(61) | PSKD | | Pre-Hlai | | Proto-Hlai |
|---|---|---|---|---|
| *C-b | > | *C-ʋ | > | *ʋ |
| *C-d | > | *C-ɾ | > | *ɾ |
| *Cid | > | *Ciɾj | > | *ɾj |
| *Cud | > | *Cuɾ | > | *Cuɾ |
| *Cuɖ | > | *Cuɾ | > | *Cuɾ |
| *r | > | *r | > | *r |
| *C-r | > | *C-r | > | *r |

---

[43] The standard reflex at the alveolar place of articulation is what Li (1977) reconstructs as *ʔdR, which indicates lenition in Northern Tai as well.

Examples are given below:

(62)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	shoulder	*ʋaːɦ	*C-bia^X	*ʔbaː^B	*C-baː^B
	chop	*ʋəːn	---	*van	*C-bəːn
(b)	hang	*ɾiːŋʔ	*C-riːŋ^X	---	*C-diːŋ^C
	star	*ɾaːw	---	*ʔdaːw	*C-daːw
	which	*ɾaː	*raː	*ʔdaɰ	*C-d[əɰ]
	laugh	*ɾjaːw	*[C-]riaw	---	*Cidaːw
	bad	*ɾjaːk	---	*jaːk	*Cidaːk
	navel	*Cuɾɯː	*[d/r]əː	(*ʔblɯː)	*Cudɯː
	bone	*Cuɾɯːk	*C-rik	*ʔduːk	*Cudɯːk
	raw	*Cuɾiːp	*C-rjəp	*ʔdip	*Cudi[ː]p
(c)	burn~roast	*ɾəŋ	*C-rəŋ	*raŋ	*C-ɗəŋ
	strangle~tight	*ɾəc	(*[r]ət)	*rət (Li)	*C-ɗəc
	boat	*Cuɾaː	*rua	*rɯə	*Cuɗaː
(d)	house	*rɯːn (Bouhin)	*raːn	*rɯən	*rɯan
	we (incl)	*rəw	*d[ə/a]w	*raw	*rəw
	know	*Cuɾɯ	(*ɦuː^X)	*ruː^C	*Cur[ɯ/u]ː$^{(C)}$
(e)	taro	*raːk	*çak	*pʰɯək	*piraːk
	ask	*raːm	---	*tʰaːm	*t-raːm
	to plant	*Curaː	*çaː	---	*Cura
(f)	empty	*ruːʔ	---	*plaw^B	*p-Ru$^{B/C}$
	head/hairknot	*Curəwʔ	(*haːw^X)^{44}	*klaw^C	*kuRəw^C
	round	*Curom	---	*klom	*kuRɔm

There is one group of irregular correspondences:

(63)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
	hair	*[ɾ/hn]om	---	*pʰom	*p-ɗɔm
	centipede	*ɾiːp	*rjəp	*kʰep (Li)	*k-ɗe[ː]p
	frog	*ɾiːt	---	*kʰwiət	*k-ɗeːt

---

[44] Although this PB form appears to be superficially similar to the PHl and PSWT forms, it is probably a borrowing from Hainanese *haw*↘.

The Hlai reflexes of these three words indicate original PSKD *C-d/*C-ɖ̥ but the PSWT reflexes indicate an original *C-r. I tentatively suggest that the Hlai reflexes are regular, and that these are forms with medial *ɖ̥ which underwent lenition to *r in Tai, conditioning aspirated initials.

4.1.8 Glides

There is an asymmetry in the glides, in that the labiovelar glide is generally well represented at the PSKD level, but the palatal glide is can be reconstructed in only one word which is almost certainly a loan (*sheep*), and may not be reconstructible back to PSKD itself (see chapter six, section 6.1). The existence of this phoneme in PSKD is therefore questionable without further reinforcement from other branches of Kra-Dai. The other PSKD initial to which PHl *hj corresponds is medial *C-ɟ.

The labiovelars, while not numerous, are nevertheless evident in the PSKD lexicon. There are two categories which can be reconstructed. The first is the plain labiovelar glides, which have been inherited in the daughter languages unchanged. The second is a set of medial glides which I reconstruct here as having been originally preceded by fricatives, employing the same logic as with the other sonorants.

The correspondences for the PHl glides are given below:

(64)	Proto-Hlai	Proto-Be	PSWT	PSKD
	*hj	*z	---	*j
	*hj	*C-j	*ʔj	*C-ɟ
	*hw	*w	*w	*w
	*hw	*C-w	*hw	*H-w

The developments from PSKD were the following:

(65)   PSKD   Pre-Hlai   Proto-Hlai

       *j   >   *j   >   *hj
       *C-ɟ   >   *C-ɹ   >   *hj

       *w   >   *w   >   *hw
       *H-w   >   *hw   >   *hw

At some point in Pre-Hlai, the medial palatal approximant *C-ɹ lenited to a glide and lost its

presyllable, merging with Pre-Hlai *j. This is motivated by the fact that in the comparisons below with PB

and PSWT, the reflex of PSKD intervocalic *ɟ is PHl *hj, not preglottalized *ʔj, which would be expected

if the lenition to a glide had occurred before the deletion of an original presyllable. This can be compared

to the case of PHl *ʋ and *hw, which followed similar but ultimately non-identical trajectories:

(66)   Pre-Hlai   PHl

       *C-ɹ   >   *ɹ   >   *j   >   *hj
       *j   >   *j   >   *j   >   *hj

       *C-ʋ   >   *ʋ   >   *ʋ   >   *ʋ
       *w   >   *w   >   *w   >   *hw

Examples are given below:

(67)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	sheep	*hjaːŋ	*zuaŋ	---	*jaːŋ
(b)	medicine	*hjaː	*C-jiaː	*ʔjaː	*C-ɟaː
	pull/stretch	*hjiːt	---	*ʔjiət	*C-ɟiːt
	egg	*hjɯːm	*C-ɲwəm	---	*C-ɟoːm
(c)	bail water	*hwiːt	---	*wit (Li)	*wiːt
	pool, whirlpool	*hwaːŋ	---	*wəŋ (Li)	*w[ə/a]ːŋ
	fly (n.)	*hwaːŋʔ	*waːŋ[X]	---	*waːŋ[C]
(d)	typhoon/wind	*hwənɦ	*C-waːn[X]	---	*H-w[ə/a]n[B]
	left side	*hwiːŋ	*C-wiːŋ	---	*H-wiːŋ

4.1.9 Glottals

The correspondence series in which the PHl glottals participate are given below:

(68)	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	*ɦ	*g~ŋ	(*g)	*C-g
	*Ciɦ	*z~ɣ	*ɣ	*Cig
	*Cuɦ	*g	*ɣ	*Cug
(b)	*ɦ	*w	*qʰ	*C-q
	*ɦ	*g	*kʰ	*C-ɢ
(c)	*ʔ	*ʔ/∅	*ʔ	*ʔ
	*Cuʔ	---	*ʔ	*Cuʔ

There are several sets of correspondences for the PHl glottal fricative *C(i/u)ɦ. The most predominant reflexes in PB and PSWT are *g and *ɣ respectively, allowing the reconstruction of PSKD medial *g, filling a gap left in the precursors to the PHl approximant inventory. There are two additional series in which PHl *C(i/u)ɦ participates, which I reconstruct as a pair of medial uvulars (voiceless and voiced) which merged in Pre-Hlai when they underwent intervocalic lenition. The glottal stop series is unremarkable, PHl *ʔ and *Cuʔ corresponding with PB *ʔ/∅ and PSWT *ʔ. The changes from PSKD to PHl are given below:

(69)	PSKD		Pre-Hlai		Proto-Hlai
	*C-g	>	*C-ɣ	>	*ɦ
	*Cig	>	*Ciɣ	>	*Ciɦ
	*Cug	>	*Cuɣ	>	*Cuɦ
	*C-q	>	*C-ʁ	>	*ɦ
	*C-ɢ	>	*C-ʁ	>	*ɦ
	*ʔ	>	*ʔ	>	*ʔ
	*Cuʔ	>	*Cuʔ	>	*Cuʔ

Examples are given below:

(70)　Gloss　　　　Proto-Hlai　Proto-Be　PSWT　PSKD

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	chin	*ɦa:ŋ	*ŋa:ŋ	*ga:ŋ	*C-ga:ŋ
	pinch	*ɦe:p	*ge:p	---	*C-gɛ:p
	thatch grass	*Ciɦa:	*zia	*ɣa:	*Ciga:
	field ridge	*Ciɦə:n	*ɣian	*ɣan	*Cigə:n
	handlength	*Cuɦɯp	---	*ɣɯ:p	*Cugɯ[:]p
	smoke	*Cuɦə:n	*guan	*ɣwan	*Cugə:n
	body/person	*Cuɦu:n	(*ɦu:n)	*ɣon	*Cugo[:]n
(b)	thigh	*ɦa:	*wa:	*qa:	*C-qa:
	horn	*ɦəw	*wa:w	*qʰaw	*C-qəw
	fur	*Cuɦun	*wuən	*qʰon	*Cuqon
(c)	excrement	*ɦa:yʔ	*ga:yˣ	*kʰi:ᶜ	*C-ɢ[a:]y
	bitter	*ɦə:m	*ga:m	*kʰom	*C-ɢ[ə/o]:m
	dig hole	*Ciɦut	*gu:c	*kʰut	*CiɢUt
(d)	bathe	*ʔa:p	---	*ʔa:p	*ʔa:p
	bowl	*ʔa:ŋɦ	---	*ʔa:ŋᴮ	*ʔa:ŋᴮ
	crow	*ʔa:k	*[ʔ]a[:]k	---	*ʔa:k
(e)	open	*Cuʔa:ɦ	---	*ʔa:ᶜ	*Cuʔa:ᴮ/ᶜ

The following examples are irregular:

(71)　Gloss　　　　Proto-Hlai　Proto-Be　PSWT　PSKD

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	I	*ɦu:	(*ɦa:w)	*k[u:/aw]	*C-ku:
(b)	thorn	*Cuɦɯnᶜ	*ʔun	---	
(c)	frog	*ʔɯp	*op	*kop	*[k]op

　　　The initials of the 1ˢᵗ-person pronoun in (71a) are difficult to reconcile, but I suggest that the Hlai

velar stop was originally intervocalic, and shifted irregularly to a uvular before undergoing intervocalic

lenition:　C-ku: > C-gu: > C-ɢu: > C-ɦu:.　The PB initial indicates that it is borrowed from Hlai.　It is

possible that the forms in (71b) are unrelated; if they are cognate, the PB initial is irregular.　Finally, it is

possible but unsure that the forms for *frog* in (71c) are related. If so, the initial $*k^{45}$ was irregularly

debuccalized to *ʔ in Pre-Hlai, and lost altogether in PB (which may be borrowed from Hlai).

4.1.10 Interim Summary

Through the comparison of PHl with PB and PSWT, it is possible to reconstruct a general first

approximation of the PSKD initials. There is evidence that the PSKD prosodic word inventory was

essentially the same as that posited for Pre-Hlai and Proto-Hlai, consisting of both monosyllabic words and

disyllabic, sesquisyllabic words. The number of exceptional examples to otherwise general correspondence

sets indicates that the evolution of initials in the various branches of PSKD has not always been similar, nor

has it been without variation both between and within the daughter languages. The system of PSKD initials

which has been reconstructed in this section, is shown below:

(72)   PSKD Initial Consonants

*p	*t	*ʈ	*c	*k	*q	*ʔ
*b	*d	*ɖ	*ɟ	*g		
*f	*s		*ç	*x		
*v	*z			*ɣ		
*m	*n		*ɲ	*ŋ(w)		
	*l	*r				
*w			*j			

PSKD Medial Consonants

*C-p	*C-t		*C-c	*C-k	*C-q	*Cuʔ
*C-b	*C(i/u)d	*C(u)ɖ	*C-ɟ	*C(i/u)g	*C-ɢ	
*C(i)v						
*C$^{(V)}$-m	*C$^{(V)}$-n		*C$^{(V)}$-ɲ	*C$^{(V)}$-ŋ		
	*C$^{(V)}$(i)l	*C(u)r				
	*p(i)l					
	*k-l					
*H-m	*H-n			*H-ŋ(w)		
	*H-l					
*H-w						

---

[45] External evidence from Kam-Sui and Kra support the hypothesis that the original initial in this word was
*k.

It is evident that the position of a consonant in a prosodic word has determined its evolution from PSKD 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 thoroughly discussed in section 4.3.

The PSKD 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 a wider inventory of place features (with retroflex in place of post-alveolar and the addition of a uvular series), but nothing that isn't attested in attested language inventories.

The gaps which exist in word-initial position are not unusual. There is no evidence for a retroflex fricative series, a voiced palatal fricative, or a voiced uvular stop and fricative series; these are less common places of articulation where gaps are more likely to occur. The gaps in medial position include a plain retroflex stop and most fricatives (only the voiced labiodentals fricative is recsonstructible). I do not have an explanation for why these are absent, but further Kra-Dai comparative work may yet discover evidence for them.

4.2 The Pre-Hlai Rimes

In comparing PHl rimes with those of PB and PSWT, it becomes apparent (more so than in the case of the initials) that the PB correspondences are sometimes irregular, and this may be due to the fact that some of the forms have been borrowed from Hlai. Because of this, only irregularities in correspondence between Hlai and PSWT will be treated in any detail; irregularities in PB will be explored more fully in another venue.

This section is divided into three subsections. The first will compare and discuss the PSKD tone categories. The second section will be devoted to the open rimes, and the final section will focus on the closed rimes.

4.2.1 Tone Categories

In the traditional parlance of Kra-Dai tone categories (A, B, C, D), the correspondences between PHl, PB, and PSWT are the following:

(73)   PHl   PB   PSWT

       A   A   A
       B   X   B
       C   X   C
       D   D   D

The PB tone category X above is the designation used here for the marked tone category which corresponds to both PHl and PSWT categories B and C. It is apparent that PB category X represents a merger between the original categories B and C.

In chapter three, the PHl tone system was examined, and tentatively reconstructed with category B correlated with spread glottis, and category C correlated with constricted glottis. Although the details of PB reconstruction will be treated elsewhere, it can be mentioned here that PB category X can be reconstructed as originally correlated with constricted glottis. Using the same glottal segments to represent this correlation as in chapter three, the relationship between PHl and PB can be restated as follows[46]:

(74)   PHl   PB

       *∅   *∅
       *-ɦ   *-ʔ
       *-ʔ   *-ʔ
       *-ʔ͡C   *-C

In other words, tone B spread glottis merged with tone C constricted glottis in PB. Based on the PHl and PB evidence, the PSKD tone categories can tentatively be reconstructed as the following:

---

[46] The tone categories of PSWT have not yet been reconstructed with any specific values, and PSWT will therefore not be compared with PHl and PB.

(75)   PHl   PB   PSKD

         *∅   *∅   *∅
         *-ɦ   *-ʔ   *-h
         *-ʔ   *-ʔ   *-ʔ
         *-ʔ͡C   *-C   *-ʔ͡C

The only change would have been in category B, where PSKD *-h voiced by the time of PHl, but

merged with *-ʔ in PB. This tentative reconstruction must await complete validation until the

reconstruction of the Proto-Tai tone system. Because of this, tone category letters will continue to be used

with PB, PSWT, and PSKD forms.

4.2.2 Open Rimes

Having discussed the facts above regarding the PHl open rimes, a comparison with PB and PSWT

may now be done. There are two sets of correspondences which appear upon comparison of the data; the

first set in (76a) are the primary correspondences, while those in (76b) are more complex:

(76)   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   *iː   *əy   *iː~*ay   *iː
         *ɯː   *əː   *ɯː~*aɰ   *ɯː
         *uː   *əw   *uː~*aw   *uː
         *aː   *aː~*ia   *aː   *aː

(b)   *iː   *əy   *ɔːy   *oːy
         *ɯː   *ia   *ɯə   *ɯa

The examples in (76a) allow straightforward reconstruction of the three high vowels and the low

vowel. There is variation in PSWT in the high vowel series between pure vowels and diphthongs which

seems to be unconditioned; there is also occasional variation in vowel length and height in PB. There is

variation in the PB reflex of PSKD *aː, between *aː and *ia. The latter will be shown below to descend

from Pre-Be *ɯa; the reason for this variation in PB is unknown at this time.

There have been no changes between PSKD and PHl:

(77)   PSKD   Pre-Hlai   Proto-Hlai

*iː   >   *iː   >   *iː
*ɯː   >   *ɯː   >   *ɯː
*uː   >   *uː   >   *uː
*aː   >   *aː   >   *aː

      The examples in (76b) are more complex, and are the reflexes of a combination of diphthongs and high-low vowel sequences. There are two examples of the first correspondence set, which are very tentatively reconstructed as *oːy. For the second set, the hypothesis presented here is that at least one source of PHl *ɯː originates in an earlier *ɯa (for more evidence, see section 4.2.4 below):

(78)   PSKD   Pre-Hlai   Proto-Hlai

*oːy   >   *wiː   >   *iː
*ɯa   >   *ɯə   >   *ɯː

Examples are given below, first of the correspondence sets of (76a) in (79), then of (76b) in (80):

(79)   Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   go   *fiː   *pəy   *pay   *pwiː
       fire   *fiː   *wɐy   *vay   *viː
       cry   *C-ŋiːʔ   *C-ŋaːy^X   *hay^C   *C-ŋiː^C

(b)   hand   *C-mɯː   *mə: *mɯː   *C^V-mɯː
       leaf   *C-bɯː   *bə: *ʔbaɯ   *C-pɯː
       near   *p-lɯːʔ   *C-lə:^X   *klaɯ^C   *C-lɯː^C

(c)   head louse   *tʃʰwuː   ---   *hraw   *ʈ(w)u:
       urine   *C-duː   *C-rəw   ---   *C-tu:
       turtle   *tʰuːɦ   ---   *taw^B   *tuː^B

(d)   eye   *tʃʰaː   *ta: *ta: *N-ʈaː
       thigh   *ɦaː   *wa: *qa: *C-qaː
       dog   *hmaː   *C-ma: *hma: *H-maː

(e)   cogon grass   *Ciɦaː   *zia   *ɣa: *Cigaː
       shoulder   *ʋaːɦ   *C-bia^X   *ʔbaː^B   *C-baː^B
       field   *hnaːɦ   *nia   *na: *na^(B)

(80)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	shellfish	*tɕʰiː	*həy	*hrɔːy	*ʈoːy
	swim; float	*p-liː	---	*lɔːy	*[p-]loːy
(b)	come/return	*hmɯː	*mia	*mɯə	*mɯa
	top	*hnɯː	---	*hnɯə	*H-nɯa

There are a number of exceptions to the above correspondences:

(81)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	shy	*riː	---	*raːy (Li)	*r[ə]y
(b)	mother	*hmiːʔ	*maːyˣ	*mɛːᴮ	*meːᴮ/ᶜ
	crocodile	*k[iː]ʔ	---	*kʰɛːᶜ (J)	*C-geːᶜ
	wasp	*p-luː	(*daːwˣ)	*tɔːᴮ	*[p-]toː⁽ᴮ⁾
(c)	child	*C-diʔ	---	*ʔdek	*C-tek
	forehead	*p-laːʔ	---	*pʰaːk	*p-[l/r]aːk
(d)	shoot	*hɲɯː	*ɲəː 'bow'	*ɲɯŋ	*ɲɯː
	you	*C-mɯː	*mə	*mɯŋ	*Cⱽ-mɯː
(e)	spirit	*Cuɦɯː	---	*qwan	*CuɢənR
(f)	sesame	*hŋɯː	---	*ŋaː	*[i/u]ŋaː
(g)	which	*ɾaː	*ra:	*ʔdaɰ	*C-d[aː]
(h)	remainder	*ljaː	---	*hlɯə	*Cilaː
	boat	*Cuɾaː	*rua	*rɯə	*Cuɗaː

The Tai rime in the word *shy* (81a) is irregularly low and long in comparison with the PHl rime *iː. The

three words in (81b) have very unexpected correspondences in PSWT, and may represent original PSKD *eː

and *oː, where the mid vowels underwent regular raising in Pre-Hlai to high vowels. The words in (81c), if

they are cognate, show an irregular lenition of final *-k in Hlai to an early glottal stop, which then

conditioned tone C. The forms in (81d) both have well-known irregular nasal endings; there is a similar

case in (81e) where, if cognate, it is possible that the final nasal was lost in Hlai. The mismatch of the

vowels in *sesame* (81f) imply an earlier Pre-Hlai *ŋɯa, possibly a result of an earlier presyllable which did

not effect vocalic transfer in Tai. The PSWT rime in (81g) is irregular, and normally derives form earlier *əɯ; the fact that this word is a function word may explain the irregular development. Finally, the two words in (81h) are both cases of vocalic transfer in PB (*boat*) and PSWT. The outcome in PB is analogous to that which occurred in Central Hlai; it seems that in PSWT, the vocalic transfer of either of the high vowels *i and *u has the potential to raise the final vowel *aː, resulting in the diphthong *ɯə. More evidence for this will be shown in section 4.2.4.

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? When the PHl data is compared with PB and PSWT, there is a general tendency (albeit with several exceptions) for vowel length to correlate, the one exception being the mid central vowels, where PSWT has only a short category. One possibility is that there may have been an inherited feature which existed in, and was inherited from, Proto-Southern Kra-Dai, that led to, but which was not itself, a length distinction. There does not yet seem to be specific clues as to what this feature was, however.

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 iambic rhythm). However, there is one significant obstacle to this hypothesis, which is that it predicts long rimes for all monosyllabic forms, which should have borne a default stress. Since there are several examples of originally monosyllabic words with short rimes, this is a serious problem and indicates that this hypothesis is probably incorrect, at least at the stage under discussion.

The other possibility is that the length distinction was already present in Proto-Southern Kra-Dai, was inherited in the daughter languages, and discrepancies which exist in length are due to secondary changes which occurred after the break-up of Southern Kra-Dai into its daughter branches. In lieu of the problem with the stress-to-weight hypothesis, this is the hypothesis which will be adopted here, with the length distinction reconstructed in the Pre-Hlai rimes.

4.2.3.1 High Front Rimes

Comparisons in this section will not be 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.

The correspondences for this category are given below:

(82)   <u>Proto-Hlai</u>   <u>Proto-Be[47]</u>   <u>PSWT</u>   <u>PSKD</u>

*i:C	*i:C	*i:C~iC	*i:C
*i:C	*e:C	*e:C	*e:C
*iC	*jəC~iC	*iC	*iC
*iC	*jəC	*eC	*eC

It is apparent that the major change which has occurred in this rime category has been the merger in Hlai of the PSKD high and mid rimes, due to the raising of the latter category:

(83)   <u>PSKD</u>   <u>Pre-Hlai</u>   <u>Proto-Hlai</u>

*i:C	>	*i:C	>	*i:C
*e:C	>	*i:C	>	*i:C
*iC	>	*iC	>	*iC
*eC	>	*iC	>	*iC

---

[47] It should be noted that internal reconstruction within Proto-Be allows the interpretation of *jəC as an earlier Pre-Be *eC in all environments except before velar codas. PB *jəC will be used here in order to stay consistent with the period of PB forms being compared.

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.

4.2.3.1.1 Long High Rimes

In the correspondences for the *i:C rime series, there is variation between long (84a) and short (84b) rimes in PSWT; PB rimes are long, with the exception of *wing*. In the case that the PB is long and the PSWT form is short, secondary shortening can be postulated in PSWT (or in Proto-Tai). In the absence of PB evidence, or where PB agrees with PSWT (as in *live, raw*), it is ambiguous whether there was secondary lengthening in Hlai or secondary shortening in the ancestor of PB and PSWT.

(84)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	reap	*k^hi:wɦ	---	*ki:w^B (Li)	*ki:w^B
	mat grass	*ɾji:wʔ	*ri:w^X 'mat'	---	*C[i]ɗi:w^C
	lick	*lji:mɦ	*li:m^X	---	*C^{V}ili:m^B
	tongue	*hli:nʔ	*li:n^X	*li:n^C	*li:n^C
	hang	*ɾi:ŋʔ	*C-ri:ŋ^X	---	*C-ɗi:ŋ^C
	left side	*hwi:ŋ	*C-wi:ŋ	---	*H-wi:ŋ
	tongs	*c^hi:p	---	*gi:p	*gi:p
	wing	*p^hi:k	*pik	*pi:k	*pi:k
	satisfied	*t^hi:k	*ti:k	---	*ti:k
(b)	take~carry	*c^hi:wʔ	*di:w 'lead'	*hriw^C	*ɗi:w^C
	plug up/(to) wedge	*c^hi:m	---	*cim (J)	*ci[:]m
	stone	*c^hi:n	*di:n	*hrin	*ɗi:n
	live, raw	*Cuɾi:p	*C-rjəp	*ʔdip	*Cuɗi[:]p
	peel~cut off	*hli:t	---	*lit (Li)	*li[:]t
	bail water	*hwi:t	---	*wit (Li)	*wi[:]t

4.2.3.1.2 Long Mid Rimes

In this category, there is regular agreement between PB and PSWT before sonorants, but the PB forms have high reflexes before stops; it is unclear whether or not this is always a result of borrowing from Hlai, or whether it is conditioned. The forms in (84b) indicate secondary shortening in PSWT. Finally there are three words (84c) in which there is an unexpected diphthong *iəC in PSWT:

(85)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	wrinkle	*C-ɲi:wʔ	*C-ɲe:w^X	---	*C-ɲe:w^C
	cat	*C-mi:wɦ	*[C-]me:w	*me:w	*C^V-me:w$^{(B)}$
	arm	*kʰi:n	*ke:n	*qʰɛ:n	*qe:n
	slant~tilt	*ki:ŋ	---	*gɛ:ŋ (J)	*ge:ŋ
	chaff	*hli:p	(*C-lip)	*klɛ:p	*[k-]le:p
	carry	*C-bi:k	(*C-[b]i:k)	*ʔbɛ:k	*C-pe:k
(b)	centipede	*ɾi:p	*rjəp	*kʰep (Li)	*q-ɖe[:]p
	fingernail	*C-li:p	(*ri:p)	*lep	*d-le[:]p
(c)	blue	*kʰi:w	*he:w	*xiəw	*xe:w
	pull/stretch	*hji:t	---	*ʔjiət	*C-ɟe:t
	frog	*ɾi:t	---	*kʰwiət	*q-ɖe:t

4.2.3.1.3 Short High Rimes

PSWT vowel length agrees with PHl in (85a), but not in (85b). There are two exceptional forms in (85c) where the Hlai forms have a short *iC rime, but the PB and PSWT forms have *u. In the first case, it appears that the vowel was merely pre-empted by the coda in Be and SWT; in the second case, the Be form (if it is cognate) may have been influenced by the presyllable vowel:

(86)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	taste	*tɕʰim	---	*ɟim	*ɟim
	fly	*C-bin	*C-bjən	*ʔbin	*C-pin
(b)	bracelet	*kʰim	---	*giːm (Li)	*gi[ː]m
	water leech	*ljiŋ	*piŋ	*pliːŋ	*p[i]li[ː]ŋ
(c)	mouse	*hniw	*C-nuː	*hnuː	*H-niw
	straw	*Cuŋiŋʔ	*muːŋˣ	---	*Cⱽuŋiŋᶜ

4.2.3.1.4 Short Mid Rimes

The forms with regular correspondences in this category are given below in (87a). The two forms in (87b) provide conflicting evidence for the length of the original PSKD rime:

(87)

	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	pick up	*sip	---	*kep	*kep
	spicy	*rit	---	*pʰet	*p-ret
	duck	*C-bit	*pjət	*pet	*(C-)bet
	mushroom	*C-dit	*ɦət	*hret	*[C]et
	small	*C-lik	---	*dlek (Li)	*d-lek
(b)	lightning	*[C-]l[j]ip	*C-ljap	*mlɛːp	*m-le[ː]p
	wasp	*tʰin	---	*tɛːn	*te[ː]n

4.2.3.2 High Back Unrounded Rimes

The correspondences between PHl and PB/PSWT are presented below:

(88)

Proto-Hlai	Proto-Be	PSWT	PSKD
*ɯːC	*ɯːC	*ɯːC	*ɯːC
*ɯːC	various	*uːC	*ɯːC
*ɯːC	*iaC~*aːC	*ɯəC	*ɯaC
*ɯC	*ɯːC	*ɯːC	*ɯ[ː]C

There is a larger-than-average degree of variation and indeterminacy in this rime class, and the various instances of this will be discussed below. The evolution of Hlai from PSKD is given below, although the third row is unenlightening due to the uncertainty of the PSKD reconstruction:

(89) PSKD   Pre-Hlai   Proto-Hlai

     *ɯ:C   >   *ɯ:C   >   *ɯ:C
     *ɯaC   >   *ɯəC   >   *ɯ:C
     *ɯ[:]C >   *ɯC   >   *ɯC

4.2.3.2.1 Long High Back Unrounded Rimes

In about half of the examples below (90a), PHl *ɯ:C corresponds to PSWT *ɯ:C (with some variation in PB), and these can be reconstructed as PSKD *ɯ:C. There are also several cases where PHl *ɯ:C rimes correspond with *u:C rimes in Be and/or SWT. In three of these cases (90b-c), the final is a velar stop; since PSWT has no examples of *ɯ:k, it can be inferred that original *ɯ:k rounded to *u:k in PSWT. However, in the example in (90c), it seems likely that the original rime was *u:k, and that the rounding transferred to the initial in Hlai, thereafter triggering dissimilation in the rime. Finally, the two examples in (90d) are indeterminate in the identity of the PSKD vowel:

(90)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	forget	*C-lɯ:mɦ	---	*lɯ:m	*C^V-lɯ:m[(B)]
	full	*kʰɯ:m	*g[ɯ/u]:m	---	*[g/ɣ]ɯ:m
	smooth	*hɲɯ:n	---	*mlɯ:n[B]	*mlɯ:n[[B]]
	shallow	*tʰɯ:nʔ	*tɯ:n[X]	*tɯ:n[C]	*tɯ:n[C]
	return	*C-lɯ:ŋ	*C-lɯŋ	---	*C-lɯ[[:]]ŋ
(b)	child	*hlɯ:k	*lɯk	*lu:k	*lɯ:k
	bone	*Cuɾɯ:k	*C-rik	*ʔdu:k	*Cudɯ:k
(c)	weave (fabric)~loom	*tʃʰwɯ:k	*huk	*hru:k	*ʈu:k
(d)	beard	*hmɯ:mʔ	*mu:m[X]	---	*m[ɯ/u]:m[C]
	pull (scratch)~scrape	*kʰɯ:t	---	*xu:t	*x[ɯ/u]:t

4.2.3.2.2 Long Mid Back Unrounded Rimes

The data implies, and there exists evidence, that the rimes in (91a) below are derived from a form with an original sequence of high-low vowels. Compare the PHl forms with *ɯ:C rimes below with the Middle Chinese forms (Schuessler 2007) from which they are probably borrowed:

(91) <u>Gloss</u>   <u>PHl</u>   <u>MC</u>

two (a pair)   *C-lɯ:ŋɦ   *liɑŋ[B]
measure (rice)   *C-lɯ:ŋʔ   *liɑŋ[C]
sword   *kɯ:mɦ   *kɨɑm[C]
ginger   *kʰɯ:ŋ   *kɨɑŋ
release   *pʰɯ:ŋʔ   *puɑŋ

What appears to have happened is that original *iɑ and *uɑ merged with *ɨɑ in both Hlai and Be, with the high vowel assimilating to the low central vowel. In Hlai, the assumption must then be made that the low half of the diphthong was eventually raised, perhaps through an intermediate stage (92) such as the one shown in the upcoming Tai examples. In Be, on the other hand, the high central vowel eventually fronted (93):

(92)   *iɑC   >   *ɯaC   >   *ɯəC   >   ɯ:C
       *ɨɑC   >   *ɯaC   >   *ɯəC   >   ɯ:C
       *uɑC   >   *ɯaC   >   *ɯəC   >   ɯ:C

(93)   *ɨɑC   >   *iaC   >   *iaC
       *uɑC   >   *ɨaC   >   *iaC

The Proto-Be form of *house* (94b) further suggests that in at least some cases, this complex nucleus may be the result of vocalic transfer of a high vowel from a former presyllable, and that this transfer is not always uniform in all three branches.

Finally, the words in (94c) appear to have originally been Pre-Hlai *u:C rimes which changed irregularly to *ɯ:C rimes:

(94)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	put down, let go	*pʰɯːŋʔ	*piaŋ[X]	---	*pɯaŋ[C]
	ginger[48]	*kʰɯːŋ	*kjaŋ	*qiːŋ	*qɯaŋ
(b)	house	*rɯːn (Baohin)	*raːn	*rɯən	*C[i/u]raːn
	bamboo shoot	*C-nɯːŋ	*naːŋ	*nRaːŋ (Li)	*C[V][i/u]naːŋ
(c)	egg	*hjɯːm	*C-ɲwəm	---	*C-ɟo[ː]m
	castrate	*C-dɯːn	*toːn	*toːn	*(C-)toːn

4.2.3.2.3 Short Back Unrounded Rimes

There doesn't seem to be a general PB/PSWT rime class which corresponds with PHl *ɯC:

(95)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	handlength	*Cuɦɯp	---	*ɣɯːp	*Cugɯ[ː]p
	break (by pulling)	*tʰɯt	*tɯːt 'split'	---	*tɯ[ː]t
(b)	heavy	*kʰɯn	*xəːn	---	*xɯ[ː]n
(c)	thorn	*Cuɦɯnʔ	*ʔun	---	*Cu[h]ɯn[(C)]
(d)	frog	*ʔɯp	*op	*kop	*[ʔ]op
(e)	porcupine~pangolin	*C-mɯnʔ	*C-miːn[X]	*hmen[C]	*C-mVn[C]

The two forms in (95a) suggest an original *ɯ vowel, but the length is uncertain. The PB form in (95b) is parallel with the PB reflex of PSKD *ɯː, PB *əː; what might condition the difference between this and *ɯːC is unclear. The word *thorn* in (95c), if the words are cognate, may have rounded in PB under the influence of an original presyllable vowel. The word *frog* in (95d) may be due to irregular unrounding of the nucleus: *ʔop > *ʔup > *ʔɯp. Finally, if *porcupine* and *pangolin* are legitimate comparanda (which may be doubtful), it is unclear how the three-way discrepancy in rimes originated.

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[48] The vowel in the PSWT is unexpected, and may be the result of independent borrowing from Chinese.

4.2.3.3 High Back Rounded Rimes

In general, the correspondences in this rime category mirror those of the high front rimes:

(96)	Proto-Hlai	Proto-Be	PSWT	PSKD
	*u:C	*u:C~*uC	*u:C~*uəC	*u:C
	*u:C	*uəC	*uC	*u[:]C
	*u:C	*ə:C	*ɔ:C	*o:C
	*u:C	*uəC	*oC	*o[:]C
	*uy	*ay	*i:	*uy
	*uC	*u:C~*uC	*uC	*uC
	*uC	*uəC	*oC	*oC

As with the high front rimes, there was a merger of the PSKD mid back rimes with the high back

rimes in Hlai, due to the raising of the mid back vowels to high back vowels:

(97)	PSKD		Pre-Hlai		Proto-Hlai
	*u:C	>	*u:C	>	*u:C
	*o:C	>	*u:C	>	*u:C
	*uC	>	*uC	>	*uC
	*oC	>	*uC	>	*uC

4.2.3.3.1 Long High Back Rounded Rimes

There are two sets of rime correspondences (98a-b) which I reconstruct as PSKD *u:C, which may

be in complementary distribution according to the place of the coda. The forms in (98c) are ambiguous

between long and short rimes, and the latter between a high and mid vowel:

(98)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	cotton	*C-bu:yʔ	*pu:y^X	---	*(C-)bu:y^C
	stand	*tɕu:n	*C-[ɲ/j]u:n	*ʔjɯ:n	*C-cu:n
	wart	*su:c	---	*[s/h]u:t	*su:c
(b)	termite	*p-lu:k	*puk	*pluək	*p-lu:k
	wrap	*tʰu:k	*tuk	---	*tu:k

(c)	mosquito	*C-ɲu:ŋ	*ɲuəŋ	*ɲuŋ	*C^V-ɲu[:]ŋ
	nest	*ɾu:k	*ruək	---	*C-ɖ[u/o][:]k

4.2.3.3.2 Long Mid Back Rounded Rimes

The first correspondence set in this group (99a) can be unambiguously reconstructed with *o:C rimes. The second (99b) is ambiguous between long *o:C and short *oC:

(99)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	before	*kʰu:nɦ	---	*kɔ:n^B	*ko:n^B
	hole	*cʰu:ŋʔ	*ʑə:ŋ^X	*ɟɔ:ŋ^B	*ɟo:ŋ$^{B/C}$
	copper	*C-du:ŋ	---	*dɔ:ŋ	*[C-]do:ŋ
	inside~brain, marrow	*ʔu:k	---	*ʔɔ:k	*ʔo:k
	grey hair	*hŋu:k	---	*hŋɔ:k	*H-ŋo:k
(b)	tree clsfr/trunk	*tʰu:nʔ	*tuən^X	*ton^C	*to[:]n^C
	road	*ku:n	*çwən	*hron	*C-Co[:]n
	body/person	*Cuɦu:n	(*ɦu:n)	*ɣon	*Cugo[:]n
	fart	*tʰu:t	*twət	*tot	*S-to[:]t

4.2.3.3.3 Short High Back Rounded Rimes

The rime in the first set of examples in this category (100a) can be reconstructed as *uy, having centralized and then lowered in PB. The second group can be reconstructed with *uC rimes. The final example is the lone example of PHl *uŋ, and is an exceptional correspondence.

(100)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	bear	*C-muy	---	*hmi:	*C-muy
	drunk	*hmuy	*may	---	*muy
	water buffalo~cow	*suyʔ	*say^X	---	*suy^C
(b)	warm	*hlunɦ	*C-lu:n^X	*ʔun^B	*H-lun^B
	turbid	*kunɦ	---	*kʰun^B	*C-gun^B
	dig hole	*Ciɦut	*gu:c	*kʰut	*Cigut
	take off	*ljuc	---	*hlwut (Li)	*Ciluc
	tail	*cʰuc	*suc	---	*çuc

(c)   big   *C-luŋ   ---   *hluəŋ   *C-luŋ

4.2.3.3.4 Short Mid Back Rounded Rimes

The majority of rimes in this category (101a) can be reconstructed as *oC. The length in (101b) is ambiguous, and the PB rime in (101c) seems to have undergone an irregular centralization and lowering:

(101)

Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a) fur	*Cufiun	*wuən	*qʰon	*Cuqon
rain	*fun	*fwən	*fɤn	*fon
ant	*hmuc	*muəc	*mot	*moc
(b) teach	*sun	(*hu:n)	*so:n	*so[:]n
(c) needle	*hŋuc	*ŋa:c	---	*ŋ[o]c

4.2.3.4 Front Mid Rimes

There are only two examples of correspondences between PHl front mid vowels and PB/PSWT forms. These correspondences are the following:

(102)

Proto-Hlai	Proto-Be	PSWT	PSKD
*ɛ:C	*e:C	*ɛ:C	---

The actual examples are the following:

(103)

Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
board	*ɓe:nɦ	*pe:nˣ	*pɛ:nᶜ	*pɛ:nʔ
press	*ɦie:p	*ge:p	---	*C-gɛ:p

According to the discussion in section 4.2.3.1, these are exceptions to the rule that all Hlai 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, most of them without known Kra-Dai cognates (the two exceptions being the above *board* and *press*). One potential solution presents itself where most if not all of these are ultimately loans from Chinese, which entered Pre-Hlai after the raising of the front mid vowels:

(104) | Gloss | PHl | MC | | OC |
|---|---|---|---|---|
| flat | ɓe:nɦ | pen^B | < | penʔ |
| board | ɓe:nɦ | (pan^B | < | pranʔ) |
| press | ɦe:p | gɛp | < | grep |
| flat (clfr) | C-le:p | dep | < | lep |

Another possible hypothesis is that these 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, excepting some variation in PB for the PSKD short rimes, are for the most part straightforward. In general, the long and short rimes have merged completely in PSWT due to the shortening of the long rimes.

The case of PHl *ə:y is more complicated. It corresponds with PB and PSWT *a:y in all instances except *saliva*, in which it corresponds with PB *ay. It is tempting to suggest that PSKD *ə:y remained distinct from *a:y in Hlai, but lowered and merged with *a:y elsewhere. The only problem with this is the fact that there is a distributional gap in PHl, where *a:y occurs only in categories B and C, with only one exceptional form (*slow*) in category A. This suggests that the original rime *a:y in category A raised in Hlai, merging with *ə:y. In light of the fact that there is no long PHl *ə:w reconstructed here, it is

suggested that the Pre-Hlai development of the Hlai palatal-final diphthongs with mid central and low nuclei was the following:

(105)   Pre-Hlai   Proto-Hlai   Pre-Hlai   Proto-Hlai

*əy   >   *əy   *a:y   >   *ə:y

*əyh/ʔ > *ə:yh/ʔ   *a:yh/ʔ > *a:yh/ʔ

The following PSKD rimes are reconstructed under this hypothesis:

(106)   Proto-Hlai   Proto-Be   PSWT   PSKD

*ə:y   *a[:]y   *a:y   *a:y

*ə:C   *aC   *aC   *ə:C

*əC   *a[:]C~*ə[:]C *aC   *əC

Except for *a:y, the transition from PSKD to PHl was quite stable:

(107)   PSKD   Pre-Hlai   Proto-Hlai

*a:y >   *a:y >   *ə:y

*ə:C >   *ə:C >   *ə:C

*əC >   *əC >   *əC

4.2.3.5.1 Long Mid Central Rimes

Examples of the long mid central rimes are as follows:

(108)   Gloss   Proto-Hlai   Proto-Be   PSWT   PSKD

(a)   saliva   *hlə:y   *may   *la:y   *m-la:y

        pass by   *Curə:y   *ra:y   *kla:y   *kuRa:y

        widow[49]   *hmə:yʔ   *C-ma:y^X *hma:y^C *H-ma:y^C

---

[49] This must be admitted as an exception to the hypothesis presented above.

(b)	fruit/testicles	*tʃʰə:m	*ham	*hram	*ʈə:m
	chop/slash	*ʋə:n	---	*van	*C-bə:n
	field dike	*Cifiə:n	---	*ɣan	*Cigə:n
	smoke	*Cufiə:n	*guan	*ɣwan	*Cugə:n
	skin	*C-nə:ŋ	*C-naŋ	*hnaŋ	*C-nə:ŋ
	flea	*hmə:t	*C-mat	*hmat	*H-mə:t
	wind; cold (sickness)	*hŋwə:t	---	*hwat	*H-wə:t
	break off	*cʰə:k	---	*hrak	*ʈə:k
	wash clothes	*sə:k	*dak	*zak	*zə:k
	deep	*hlə:k	*lak	*lɣk	*lə:k

There are several kinds of exceptions in this group. The first (109a) is a group of PB forms which have mid central rimes, some or all of which may be loans from Hlai. The second (109b) is a group of words which have irregularly low rimes in PSWT. The last three examples (109c) may all represent either irregular neutralization of the PHl nucleus, or otherwise irregular coloring of the nucleus in Tai:

(109)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	finish	*ɓə:yʔ	*C-[b]ə:y^X	---	*C-pə:y^C
	times	*C-βə:y	*və:y$^{(X)}$	---	*C-pə:y
	soak	*ɗə:m^C	*cə:m^X	---	*(C-)[t/c]ə:m^C
(b)	step on	*tɕə:mɦ	---	*ʔja:m^B (Li)	*C-c[ə/a]:m^B
	sow, scatter	*fə:nɦ	---	*hwa:n^B	*[f/H-w][ə/a]:n^B
	deceive	*pʰə:ŋ	---	*bra:ŋ	*br[ə/a]:ŋ
(c)	choke	*kʰə:nʔ	---	*ge:n^C (Li)	*g[e/ə]:n^C
	bitter	*fiə:m	*ga:m	*kʰom	*C-ɢ[ə:/ɔ]m
	pickle	*C-mə:ŋ	---	*ʔblɔ:ŋ	*C-bl[ə/o]:ŋ

4.2.3.5.2 Short Mid Central Rimes

Examples of the short mid central rimes are given below:

(110)

Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
far	*C-ləy	*C-ləy	*klay	*k-ləy
gall bladder	*ɗəy	*C-rəy	(*ʔbli:)	*p-təy
chicken	*kʰəy	*kay	*kay[B]	*kəy[(B)]
we (incl)	*rəw	*d[ə/a]w	*raw	*rəw
horn	*ɦəw	*wa:w	*qʰaw	*qəw
head~hairknot	*Curəwʔ	(*ha:wˣ)[50]	*klaw[C]	*kurəw[C]
black	*ɗəmʔ	*C-ram	*ʔdam	*C-[t/d]əm[[C]]
water	*C-nəmʔ	*na:mˣ	*nam[C]	*Cⱽ-nəm[C]
seed	*fjən	*wə:n	*van	*Cibən
tooth	*fjən	*sjən	*van	*Cibən
yam	*C-mən	*ma:n	*man	*Cⱽ-mən
face/nose	*ɗəŋ	*C-rəŋ	*ʔdaŋ	*C-təŋ
burn/roast	*ɾəŋ	*C-rəŋ	*raŋ	*C-dəŋ
forest~mountain	*rəŋ	*çaŋ	---	*C-rəŋ
cover	*kʰ[ə/o]p	*xə[:]p	---	*xəp
extinguish	*tɕəp	*C-[r/j]ap	*ʔdap	*C-[t/c]əp
rice	*Cuɾəp	*rap	---	*Cudəp
vine	*kəc	*çac	---	*C-Cəc
strangle~tight	*ɾəc	*[r]ət (D)	*rət (Li)	*C-dəc
chop/split	*tɕək	---	*cək (Li)	*(C-)cək

There are several sets of exceptions in this class as well. The first (111a) are probably originally original pure high vowels, which have diphthongized in Hlai. The second (111b) have high front vowels in PSWT, probably conditioned by a preceding palatal. The third (111c) are a pair of words where there are unexpected reflexes in both PB and PSWT. *Body louse* (111d) is a similar case, except that it has an irregular front vowel in PSWT. The final two examples (111e) contrast PHl *əC with back vowels in PB/PSWT.

---

[50] Although the PB form looks very similar to the PHl and PSWT forms, it is ultimately more likely to be a borrowing from Hainanese *haw²¹*.

(111)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	you (pl)	*səw	*su	*su (Li)	*su:
	pig	*hməw	*ʔmo:	*hmu:	*H-mu:
	stay, be at; alive	*hjəw	*C-jəw^X	*ʔju:^{B}	*C-ɟu:$^{(B)}$
(b)	eat	*kʰən	*kən	*kin	*k[j]ən
	sew	*C-ɲəp	*ɲap	*ɲip	*C^V-ɲəp
(c)	silver	*hŋən	*ŋə:n	*ŋɤn	*ŋən
	day	*hŋwən	*wə:n	*wɤn	*ŋwən
(d)	louse (body)	*tʰən	*də:n	*mlen	*m-dən
(e)	drum	*C-ləŋ	*C-loŋ	*klɔ:ŋ	*k-l[ɔ]ŋ
	mute	*C-ŋəm	---	*ŋwo[:]m^C (Li)	*C^V-ŋ[ɔ]m

4.2.3.6 Mid Back Rimes

The two main correspondence sets including PHl *oC are the following:

(112) | Proto-Hlai | Proto-Be | PSWT | PSKD |
|------|-----------|----------|------|
| *oC | *o[:]C | *oC | *ɔC |
| *oC | *ə[:]C | *aC | *[ə/ɔ]C |

The second of these indicates variation between PHl and PB/PSWT, not necessarily evidence for a separate set of rimes. Since the hypothesis in section 4.2.3.3 states that all Pre-Hlai *oC rimes raised to *uC, this set of correspondences cannot be reconstructed as *oC in PSKD. I therefore reconstruct a low back rime *ɔC, which raised to *oC in Hlai, filling the space vacated by original *oC when it raised to *uC:

(113) | PSKD | | Pre-Hlai | | Proto-Hlai |
|------|---|----------|---|------------|
| *ɔC | > | *oC | > | *oC |

Examples of the correspondences in (112) are given below:

(114) | Gloss | Proto-Hlai | Proto-Be | PSWT | PSKD |
|---|---|---|---|---|
| (a) | hair | *ɾ/hnom | --- | *pʰom | *p-ɖɔm |
| | itch | *kʰom | *guəm | *ɣom | *ɣɔm |
| | simmer/boil | *p-lomʔ | --- | *tomᶜ | *[m-]tɔmᶜ |
| | round | *Curom | --- | *klom | *kuRɔm |
| | winnowing basket | *ɗoŋʔ | *C-roːŋˣ | *ʔdoŋᶜ | *C-tɔŋᶜ |
| | fall | *tʰok | *tok | *tok | *tɔk |
| | incubate | *C-mok | --- | *hmok | *C-mɔk |
| | leg | *kʰok | *kok | --- | *kɔk |
| | | | | | |
| (b) | bran | *rom | --- | *ram | *r[ə/ɔ]m |
| | neck | *ljoŋʔ | *liəŋˣ | --- | *Cⱽil[ə/ɔ]ŋᶜ |
| | sieve | *[ɗ/ɾ]oŋʔ | *rəːŋ | --- | *C-d[ə/ɔ]ŋ |
| | pain; sick | *tʃʰok | *dək | --- | *d[ə/ɔ]k |
| | steal | *ljok | *rək | *lak | *dil[ə/ɔ]k |

There are only two sets of exceptions in this rime class. The first (115a) is two cases where PSWT shows an unexpectedly high reflex *uC. The second (115b) is another two words in which *ɔC may have sporadically lengthened in PSWT:

(115) | Gloss | Proto-Hlai | Proto-Be | PSWT | PSKD |
|---|---|---|---|---|
| (a) | carry in arms | *ʔomʔ | --- | *ʔumᶜ | *ʔ[u/ɔ]mᶜ |
| | vine basket | *ɓoŋ | --- | *ʔbuŋ (Li) | *C-p[u/ɔ]ŋ |
| | | | | | |
| (b) | dye | *[hɲ]omʔ | *[r/j]amˣ | *ɲɔːmᶜ | *ɲɔmᶜ |
| | hold w/ both hands | *kʰop | *kup | *kɔːp | *kɔp |

4.2.3.7 Low Rimes

There are two primary kinds of correspondences including PHl low vowels: those with and without the complications of vocalic transfer from preceding high vowels. These series are given below:

(116) | Proto-Hlai | Proto-Be | PSWT | PSKD |
|---|---|---|---|
| *aːC | *aːC | *aːC | *aːC |
| *aːC | *aːC | *ɯəC | *[i/u]CaːC |
| *aːC | *iaC | --- | *iCaːC |
| *aːC | *uaC | *aːC | *uCaːC |

The first series of the four above is by far the most numerous, and is uncomplicated. The second series is the next-best represented, and can be reconstructed as sesquisyllabic forms which had an initial high vowel that conditioned vocalic transfer and ultimate raising of the final vowel in PSWT with no effect in PB. The final two series are in the minority, and are examples of cases where vocalic transfer occurred in PB but not in PSWT, the converse of the second series. The evolution of these rimes in Hlai is straightforward:

(117) PSKD   Pre-Hlai   Proto-Hlai

*a:C   >   *a:C   >   *a:C
*[i/u]Ca:C >   *a:C   >   *a:C

Examples are given below:

(118)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	sugarcane	*C-ma:yʔ	*C-ma:y^X	---	*C-ma:y^C
	star	*ɾa:w	---	*ʔda:w	*C-da:w
	fishy	*kʰa:w	---	*ɣa:w	*ɣa:w
	salt	*C-ɲa:wʔ	*C-ɲa:w^X	---	*C-ɲa:w^C
	carry (2)	*tʃʰa:m	*ha:m	*hra:m	*ʈa:m
	branch (tree)	*C-ŋa:mɦ	---	*ŋa:m^B (Li)	*C^V-ŋa:m^B
	ask	*ra:m	---	*tʰa:m	*t-ra:m
	village	*C-βa:n	(*ʔwə:^{X})	*ʔba:n^C	*Cuba:n^C
	goose	*C-ŋa:nɦ	---	*ha:n^B	*C-ŋa:n^B
	lazy	*C-la:nʔ	*la:n^X	*gra:n^C	*g-Ra:n^C
	chin	*ɦa:ŋ	*ŋa:N	*ga:ŋ	*C-ga:ŋ
	ribs	*kʰa:ŋʔ	---	*kʰra:ŋ^C	*kra:ŋ^C
	fly (n.)	*hwa:ŋʔ	*wa:ŋ^X	---	*wa:ŋ^C
	carry on shoulder	*tʃʰa:p	*ha:p	*hra:p	*ʈa:p
	bathe	*ʔa:p	---	*ʔa:p	*ʔa:p
	yawn~gasp	*hŋa:p	---	*ŋa:p (Li)	*ŋa:p
	otter	*hna:k	*na:k	*na:k	*na:k
	sentence; mouth	*fa:k	*pa:k	*pa:k	*pwa:k
	land leech	*tʰa:k	*ta:k	*da:k	*N-ta:k

(b)	moon	*C-ɲa:n	---	*ʔblɯən	*C-b[i/u]la:n
	blood	*hla:c	*pa:c	*lɯət	*p[i/u]la:c
	yellow	*lja:ŋ	*C-la:ŋ	*hlɯən	*Cila:ŋ
	gadfly	*lja:k	---	*hlɯək	*Cila:k
	gill	*C-ŋa:k	*ŋa:k	*hŋɯək	*C[i/u]ŋa:k
	taro	*ra:k	*ça:k	*pʰɯək	*p[i/u]ra:k
(c)	laugh	*Ciɾa:w	*[C-]riaw	---	*Cida:w
	fog	*hŋa:wʔ	*ŋiawˣ	---	*[i]ŋa:wᶜ
	boil	*C-da:n	*C-rjan	---	*C[i]ta:n
(d)	shrimp	*Cuɾa:ŋ	*ruaŋ	---	*Cuda:ŋ
	vomit	*fa:k	*duak	*ra:k	*rwa:k

There are a small number of exceptions. The first (119a) is probably a loan from Chinese, and may not actually reconstruct back to PSKD. The second form (119b) has an irregular monophthong in PSWT. If the forms in (119c) are cognate, then this may be a rare instance of PHl *e:ŋ, but there is a discrepancy in vowel height in PB. The form in (119d) is irregular in both height and length. The word *sheep* in (119e) is very likely an old loan from Old Chinese *jaŋ, and the PB medial *-u- is mysterious in this context. Finally, the word in (119f) has almost certainly been borrowed independently from Chinese, and no common ancestral form can be reconstructed.

(119)	Gloss	Proto-Hlai	Proto-Be	PSWT	PSKD
(a)	more than	*kuaʔ	*kuaˣ	*kwa:ᴮ	*(C-)kuaᶜ/ᴮ
(b)	excrement	*ɦa:yʔ	*ga:yˣ	*kʰi:ᶜ	*C-ɢa:yᶜ
(c)	orange/red	*d[e]:ŋ	*C-riŋ	*ʔdɛ:ŋ	*C-t[e]:ŋ
(d)	pool, whirlpool	*hwa:ŋ	---	*wəŋ (Li)	*w[ə/a:]ŋ
(e)	sheep	*hja:ŋ	*zuaŋ	---	*ja:ŋ
(f)	tin~iron	*hla:k 'tin'	---	*hlek	---

4.2.3.8 Interim Summary

The comparison of PHl rimes with those of PB and PSWT, 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. These mismatches have not been explored here, as it is best to await the reconstruction of Proto-Tai and examine the place of PSWT therein before attempting to reconcile these mismatches at higher levels in the PSKD tree. It was demonstrated, however, that the PB tone system merged the PSKD B tone category with the C tone category, so that in effect tone category B was lost in PB.

The tentative inventory of PSKD rimes, reconstructed here, which developed into the PHl rimes is the following:

(120)   Open rimes

*i:	*ɯ:	*u:
(*e:)		(*o:)
*ɛ:	*a:	
	*ɯa	

Closed rimes

*i:C	*ɯ:C	*u:C
*iC	*ɯC	*uC
*e:C	*ə:C	*o:C
*eC	*əC	*oC
*ɛ:C	*a:C	
		*ɔC
	*ɯaC	

The most significant finding in this section is that the class of PSKD peripheral mid vowels underwent raising, merging with their high counterparts. It has also been hypothesized that PHl peripheral

mid vowels must reflect original low vowels which raised to mid vowels, filling the gap left by the original

mid vowels.

The reconstruction of the PSKD rime inventory ultimately reveals a nine-vowel system, with three

levels of height and backness, the diphthong *ɯa, and a length distinction. The *ɛ:C category is still

marginal, and if ignored leaves an eight-vowel system which is essentially a seven-vowel system plus *ɔC.

There is no present explanation for this asymmetry (however, comparison with Austronesian in chapter six

indicates that *ɔC may be a variant of *əC).

4.3 Changes Between Pre-Hlai and Proto-Hlai

The goal of this section is to move through the various changes which occurred after PSKD 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 PSWT evidence, for the presence of the following categories in PSKD: *q,

*C-q, *C-ɢ. 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:

(121)   Pre-Hlai   Proto-Hlai

         q   >   q   >   k   >   kʰ
         C-q   >   C-ʁ   >   C-ɣ   >   ɦ
         C-ɢ   >   C-ʁ   >   C-ɣ   >   ɦ

As presently reconstructed, there is no evidence for initial *ɢ in the PSKD uvular inventory, which would have been expected to devoice and merge with *q in Pre-Hlai and be reflected as PHl *kʰ. Further work in Tai or other Kra-Dai branches may uncover this evidence provided that the present reconstruction is accurate.

As a result of this change, the original Pre-Hlai oral stop inventory (122) was modified to that in (123):

(122)	p	t	c	k	q
	b	d	ɟ	g	---
	C-p	C-t	C-c	C-k	C-q
	C-b	C-d	C-ɟ	C-g	C-ɢ

(123)	p	t	c	k
	b	d	ɟ	g
	C-p	C-t	C-c	C-k
	C-b	C-d	C-ɟ	C-g

Examples are given below:

(124)		Pre-Hlai				Proto-Hlai
(a)	arm	*qe:n	>	*ki:n	>	*kʰi:n
(b)	thigh	*C-qa:	>	*C-ɣa:	>	*ɦa:
(c)	excrement	*C-ɢa:yʔ	>	*C-ɣa:yʔ	>	*ɦa:yʔ

4.3.2 Intervocalic Lenition

It was shown in section 4.1 that Pre-Hlai medial obstruents underwent a process of intervocalic lenition. This intervocalic lenition can be seen as a reduction in the magnitude and/or increase in the sonority of intervocalic gestures, so that voiceless obstruents became voiced (125a), and voiced stops

became approximants (125b). The evidence in section 4.1 shows that there was no lenition of intervocalic voiced fricatives (125c). The two kinds of intervocalic stop lenition[51] are shown below:

(125) (a)   CVpV   >   CVbV   (b)   CVbV   >   CVʋV
             CVtV   >   CVdV   CVdV   >   CVɾV
             CVcV   >   CVɟV   CVɟV   >   CVʝV
             CVkV   >   CVgV   CVgV   >   CVɦV

             CVfV   >   CVvV   (c)   CVvV   >   CVvV

This is an archetypical example of temporal compression, resulting in a diminuition of duration of intervocalic consonants:

(126)   φ
                     /|
                  [ς ό_{μμ}]
                   /| ∧
                  [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.

The comparison with PB and PSWT (in which these categories merged) indicates that this occurred as a chain-shift in Hlai: original intervocalic voiced stops were first reanalyzed as approximants, leaving a gap in the system which was later filled when the original voiceless stops were reanalyzed as voiced:

---

[51] The lenition in (125b) was originally suggested in Ostapirat (2004); that in (125a) is suggested here for the first time.

(127) (i) CVbV > CVʋV
   (ii) CVpV > CVbV

The process of intervocalic lenition which Pre-Hlai medial consonants underwent is similar to changes which occurred in Spanish (Harris-Northall 1990:6). In Spanish, there was a three-way contrast between intervocalic geminates, voiceless consonants, and voiced consonants; geminates became singletons, voiceless stops became voiced, and voiced stops became voiced fricatives:

(128)

Geminate stop to plain stop			Plain stop to voiced stop			Voiced stop to fricative		
VppV	>	VpV	VpV	>	VbV	VbV	>	VβV
VttV	>	VtV	VtV	>	VdV	VdV	>	VðV
VkkV	>	VkV	VkV	>	VgV	VgV	>	V⊗V

Pre-Hlai did not have medial geminates, but otherwise the changes which it underwent seem to have been ultimately quite similar to the Spanish case.

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):

(129)

Proto-VN		Voicing		Lenition		Modern VN[52]
-p/b-	>	-b-	>	-β-	>	v
-t/d-	>	-d-	>	-ð-	>	z <d>
-s/ç-	>	-z-	>	-r-	>	z <r>
-tʃ/dʒ-	>	-dʒ-	>	-j-	>	z <gi>
-c/ɟ-	>	-ɟ-	>	-j-	>	z <gi>
-k/g-	>	-g-	>	-ɣ-	>	ɣ <g(h)>

---

[52] The convention is followed here of placing orthography within angled brackets.

Below are some examples of Vietnamese forms which have undergone lenition and subsequently lost their initial syllable. They are compared with Thavung, a related language (Hayes 1983) in which this intervocalic lenition has not occurred:

(130)   Comparison of Vietnamese (lenited) with Thavung (non-lenited)

English	Vietnamese	Thavung
cotton	<vảy> [v-]	kpa:ɕ^4
testicle	<dáy> [z-]	kta:l^1
paw	<giò> [z-]	kco
bear	<gâu> [ɣ-]	cku^4

Intervocalic lenition may have also occurred in Proto-Min, in the case of what Norman (1986) calls the 'softened initials'. There is evidence in the Northern Min group for three series of initials which may be distinguished both segmentally and tonally: (a) aspirated, (b) plain, and (c) 'softened'. Each of these groups can be subdivided into groups (on the basis of register indicated by the tone) with original voiceless initials and with original voiced initials:

(131)   Northern Min initial reflexes (adapted from Handel 2003)

	JO	JQ	SB	CC	JY	Proto-Min (present interpretation)
(a)	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
(b)	p	p	p	p	p	*p
	t	t	t	t	t	*t
	k	k	k	k	k	*k
(c)	p	p	b^ɦ	w	w	*-p-
	t	t	d^ɦ	l	l	*-t-
	k	k	g^ɦ	Ø	Ø	*-k-

The five dialects above show segmental correspondences which fall into three groups for the 'softened' initials of (130c): (1) non-leniting (JO and JQ), (2) voicing (SB), and (3) leniting (CC and JY). Norman

(1986) provides evidence for original presyllables (particularly nasals, based on Hmong-Mien loanwords) in this group of lexical items.

Handel (2003) argues convincingly that the tone reflexes of group (c) in Northern Min were conditioned by stops with an original breathy voice phonation; however, the segmental reflexes in the 'softening dialects', where what Handel reconstructs as originally breathy voiced stops are reflected as sonorants, remain unexplained. I believe that this is another example of the intervocalic lenition which we have been observing in other languages, and that they may have followed a similar progression as that postulated here for Hlai:

(132)   -p-   >   -b-   >   -ʋ-   >   w
        -t-   >   -d-   >   -ɾ-   >   l
        -k-   >   -g-   >   -ɦ-   >   ∅

The differences in reflexes in these three groups were likely conditioned by the persistence of the presyllable. If presyllables were lost early, then little if any lenition occurred; if, on the other hand, presyllables persisted for a longer period of time, the environment was preserved which facilitated lenition, which proceeded to occur cyclically.

The Pre-Hlai lenition erased the class of intervocalic voiceless obstruents, and added a new series of approximants into the Hlai phoneme inventory which was allophonic (at this point) in word-medial position. In general, the word-initial (133a) and intervocalic (133b) obstruent inventories became disjoint, with the identity of initials becoming partially dependent on their prosodic position within the phonological word:

(133)   (a)   p   t   ʈ   c   k
              b   d   ɖ   ɟ   g
              f   s   ç   x
              v   z   ɣ

        (b)   C-b   C-d   C-ɖ   C-ɟ   C-g
              C-v
              C-ʋ   C-ɾ   C-ʝ   C-ɦ

Examples are given below:

(134)   Pre-Hlai   Proto-Hlai

(a)   fly   *C-pin   >   *ʔbin   >   *ɓin
       face   *C-təŋ   >   *ʔdəŋ   >   *ɗəŋ
       stand   *C-cuːn   >   *ɟuːn   >   *tɕuːn
       slant   *C-keːŋ   >   *giːŋ   >   *kiːŋ
 (b)   shoulder   *C-baːɦ   >   *C-ʋaːɦ   >   *ʋaːɦ
       hang   *C-diːŋʔ   >   *C-ɾiːŋʔ   >   *ɾiːŋʔ
       medicine   *C-ɟaː   >   *C-ɟaː   >   *hjaː
       chin   *C-gaːŋ   >   *C-ɣaːŋ   >   *ɦaːŋ

4.3.3 Initial Devoicing

    The first instance of devoicing occurred in Pre-Hlai, affecting initial obstruents in both

monosyllabic (135a-b) and sesquisyllabic words (135c-d – remember that *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 (135d) as mergers in PHl, PB and PSWT would have obscured it as an independent

category, but it is listed below as a logical possibility:

(135)   (a)   *b   >   *p   (b)   *v   >   *f
               *d   >   *t   *z   >   *s
               *ɖ   >   *ʈ   *ɣ   >   *x
               *ɟ   >   *c
               *g   >   *k

        (c)   *C^V-C >   *C-C   (d)   *H^V-C >   *H-C

As a result of this change, the Pre-Hlai initial obstruent inventory (136) was modified to that in (137):

(136) p   t   ṭ   c   k
       b   d   ḍ   ɟ   g
       f   s   ç   x
       v   z   ɣ

       C-C
       Cⱽ-C
       H-C
       Hⱽ-C

(137) p   t   ṭ   c   k
       f   s   ç   x

       C-C
       H-C

Examples are given below:

(138)   Pre-Hlai   Proto-Hlai

(a)   father   *ba:ʔ   >   *pa:ʔ   >   *pʰa:ʔ
       rotten   *duy   >   *tuy   >   *tʰuy
       stone   *ḍi:n   >   *ṭi:n   >   *tɕʰi:n
       hole   *ɟo:ŋʔ   >   *cu:ŋʔ   >   *tɕʰu:ŋʔ
       bracelet   *gim   >   *kim   >   *kʰim

(b)   sky   *va:ʔ   >   *fa:ʔ   >   *fa:ʔ
       wash clothes *zə:k   >   *sə:k   >   *sə:k
       itch   *ɣɔm   >   *xom   >   *kʰom

(c)   yam   *Cⱽ-mən   >   *C-mən   >   *C-mən
       branch (tree) *Cⱽ-ŋa:mɦ >   *C-ŋa:mɦ   >   *C-ŋa:mɦ
       fingernail   *Cⱽ-le:p   >   *C-li:p   >   *C-li:p

4.3.4 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 after the breakup of PHl in the Central Hlai velar

nasal (ŋ), coronal approximants (ɾ, r), and glottals (ɦ, ʔ). There were also a group of initials reconstructed in PHl which already hosted coarticulations:

(139)　　　　　*fj
　　　　　　　*lj
　　　　　　　*ɾj

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 and *ɾ, and therefore occurred early. There are only three known instances of *fj, so it seems that these were rather exceptional cases, probably due to the fact that *f was an obstruent (it is apparent in general that more sonorous consonants are weaker barriers to vocalic transfer than less sonorous consonants):

(140)　　　　　Civ　　　>　　　Civj
　　　　　　　Cil　　　>　　　Cilj
　　　　　　　Ciɾ　　　>　　　Ciɾj

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 (141a) a full bisyllabic word where the medial consonant acts as a clearly defined boundary, and in (141b) the sesquisyllabic equivalent, where there is bleedthrough as the vowel space remains roughly proportionate in overall timing, despite the imbalance in syllable length:

(141)　(a)　　　Cilaŋ　　　　　>　　　(b)　Ci̯ljá: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 Awŋṭim, 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 (142a). In words

with a long initial syllable, the same phenomenon occurred, but a vestigial schwa remained at the beginning

of the word (142b).

(142) (a)   <u>English</u>   <u>Proto-Paman</u>   >   <u>Awŋtim</u>

     mother's mother   *kámi   máj
     skin   *Cákur   káwɣ
     arm   *pínta   ndjá:
     3sg obl.   *ɲíɳu   ŋjú:
     sun   *púŋa   ŋwá:
     tooth   *múlir   lwíð

    (b)   <u>English</u>   <u>Proto-Paman</u>   >   <u>Awŋtim</u>[53]

     what   *ŋá:ni   ənáj
     armpit   *ŋá:mur   əmáwɣ
     south   *ɟí:par   əβét   (< əβját)
     smoke   *Cí:puj   əβǿr   (< əβjúr)
     father's father   *pú:la   əlwá:
     two   *kú:ʈi-   əðwíʈ

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 distinction where in the

conservative (citation) register, syllables are 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 Awŋtim above, and is correlated with stress: trochaic in

the case of Rotuman and Kwara'ae, as opposed to iambic in Hlai and Awŋtim. 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:

---

[53] Notice the lenition of Awŋtim intervocalic stops, similar to that posited for Hlai.

(143)   Rotuman   Kwara'ae

	Citation	Discourse		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.mǿr	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:

(144)   *Kwara'ae* (Blevins & Garrett 1998: 530; Heinz 2004: 29)

	Citation	Discourse		Citation	Discourse
cat	fúsi	húis̩i̩	fear	má̩ʔu	má̯u̩ʔu̩
thin	kádo	káodo̩	wife	ʔáfe	ʔáe̩he̩
name	sáta	sá:ta̩	to burst	búsu	bú:su̩

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:

(145)   Pre-Hlai   Proto-Hlai

tooth   *Civə́n   >   *Ci̥vjə́n   >   *fjə́n

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, shown in (146) below:

(146)　　　　　　C-b　　C-d　　　　　　C-ɟ　　C-g
　　　　　　　　　C-v(j)　　　　　　　　　　　　　C-ɦ
　　　　　　　　　C-m　　C-n　　　　　　C-ɲ　　C-ŋ
　　　　　　　　　C-ʋ　　C-ɾ(j)　　　　C-ɹ
　　　　　　　　　　　　　C-l(j)　C-r

Examples are given below:

(147)　　　　　　　　　Pre-Hlai　　　　　　　　　　　　　　Proto-Hlai

(a)　　tooth　　　*Civən　　　>　　　*C-vjən　　　>　　　*fjən
(b)　　yellow　　*Cila:ŋ　　　>　　　*C-lja:ŋ　　　>　　　*lja:ŋ
(c)　　laugh　　　*Cida:w　　　>　　　*C-ɾja:w　　　>　　　*ɾja:w

4.3.5 Initial 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 word-initial consonants, which involved increased airflow at the left edge of monosyllabic words leading to the aspiration of all initial consonants except the glottal stop. That this change did not affect presyllable consonants is demonstrated by the fact that *p-l did not change to *pʰ-l. It can therefore be stated that aspiration only occurred at the left edge of a word which was aligned with the left edge of a main syllable (and was therefore correlated with stress) (148a); aspiration did not occur when if these categories were unaligned (148b):

(148)　(a)　　　[(CV́:)]　　　(b)　　　[(CV̆)(CV́:)]
　　　　　　　　　↑　　　　　　　　　　↑　　↑
　　　　　　Target of aspiration　　　Exempt from aspiration

The Pre-Hlai initial consonants which were affected are listed below:

(149) (a) Obstruents   (b) Sonorants

p	>	pʰ	m	>	hm
t	>	tʰ	n	>	hn
ʈ	>	ʈʰ	ɲ	>	hɲ
c	>	cʰ	ŋ	>	hŋ
k	>	kʰ	ŋw	>	hŋw
			l	>	hl
			w	>	hw
			j	>	hj

Those which were not affected included the glottal stop, the rhotic liquid (which does not show any evidence of a distinction between initial and medial position in PHl), and probably the fricatives (as they were already redundantly aspirated).

In light of the above discussion, the following description of Loloish (a branch of Tibeto-Burman) languages from Bradley (1978) is very interesting:

'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 mine]

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 from that in (150) to that in (151), leaving the only unaspirated initial the rhotic *r (which, if a trill, may have been redundantly aspirated despite specific evidence for this in the Hlai daughter languages):

(150)

p	t	ʈ	c	k		ʔ
f	s		ç	x		
m	n		ɲ	ŋ	ŋw	
	l	r				
w			j			

(151) pʰ   tʰ   ʈʰ   cʰ   kʰ   ʔ
       f   s   ç   x
       hm   hn   hɲ   hŋ   hŋw
               hl   (h)r
       hw   hj

Examples are given below:

(152)   Pre-Hlai   Proto-Hlai

(a)   wing   *pi:k   >   *pʰi:k
       fall   *tɔk   >   *tʰok
       carry on shoulder *ʈa:p   >   *tʃʰa:p
       (to) wedge   *ci:m   >   *tɕʰi:m
       chicken   *kəy   >   *kʰəy

(b)   return/come   *mɯa   >   *hmɯ:
       field   *na:ɦ   >   *hna:ɦ
       shoot~bow   *ɲɯ: >   *hɲɯ:
       silver   *ŋən   >   *hŋən
       day   *ŋwən   >   *hŋwən
       tongue   *li:nʔ   >   *hli:nʔ
       sheep   *ja:ŋ   >   *hja:ŋ
       bail water   *wi:t   >   *hwi:t

4.3.6 Monosyllabification

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, all of these initials devoiced upon becoming initial. The sesquisyllabic words with medial obstruents which underwent this change in Pre-Hlai were the following:

(153) (a)   C-b   >   ɓ   C-v   >   v > f
               C-d   >   ɗ   Civj   >   vj > fj
               C-ɟ   >   ɟ > c
               C-g   >   g > k

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.[54] The idiosyncratic lenition of *C-b to *C-β must have occurred by this time, and it remained in sesquisyllabic form as well:

(154)   C-β   >   C-β
               C-m   >   C-m
               C-n   >   C-n
               C-ɲ   >   C-ɲ
               C-ŋ   >   C-ŋ
               Cuŋ   >   Cuŋ
               C-l   >   C-l

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 potentially 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:

(155)   Cuɾ   >   Cuɾ
               Cur   >   Cur
               Cifi   >   Cifi
               Cufi   >   Cufi
               Ciʔ   >   Ciʔ
               Cuʔ   >   Cuʔ

The initials for which evidence of a former presyllable is structural and ultimately indirect are the following:

---

[54] 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.

(156)   Cilj   >   [C-]lj
           C-ʋ   >   [C-]ʋ
           C-ɾ   >   [C-]ɾ
           Ciɾj   >   [C-]ɾj
           C-ɹ   >   [C-]ɹ
           C-r   >   [C-]r
           C-ɦ   >   [C-]ɦ
           C-ʔ   >   [C-]ʔ

Since there is no direct evidence from the Hlai daughter languages supporting the reconstruction of the presyllable, 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 overlap of gestures. 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 (156a) and possibly to debuccalization in pre-sonorant position (157b):

(157) (a)   Cə̥gáː   >   gáː
       (b)   Cə̥láː   >   ʔláː

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 later leniting to a palatal glide), then the initial consonant was preserved (Figure 158a); this is contrary to the Hlai development, but similar to PSWT. If no cluster was phonotactically possible, then the initial consonant was lost entirely (Figure 158b). The first of the two vowels was lost in every instance. (Tsat also developed tone, in conformity with the language area into which it was integrated):

(158)   Reduction of bisyllabic forms to monosyllabic forms in Tsat

(a)   Gloss   P-Chamic   >   Tsat   (b)   Gloss   P-Chamic   >   Tsat

      shoulder   *bará: pʰja:¹   wet; damp   *basáh   sa:⁵
      moon   *bulá:n   pʰja:n¹   flower   *buŋá: ŋa:¹
      blood   *daráh   sja:⁵   thick   *kapá:l   pa:n¹
      village   *paləj   pjaj³   bamboo shoot   *rabúŋ   pʰuŋ¹

A Mon-Khmer example is the language Nhaheun, which descends from sesquisyllabic West Bahnaric (Sidwell 2000), but has undergone monosyllabicization, with intervocalic lenition also occurring in some environments:

(159)   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: ᵐmá:

The most important consequence of monosyllabification was the collapse of the originally separate initial and medial obstruent series (160); the plain stop inventory was repopulated, after the original initial stops had become aspirated. The following expanded inventory (161) was the result[55]:

(160)   pʰ   tʰ   ʈʰ   cʰ   kʰ   ʔ
       f   s   ç   x
       C-b   C-d   C-ɟ   C-g
       C-v(j)

(161)   pʰ   tʰ   ʈʰ   cʰ   kʰ   ʔ
       ɓ   ɗ   c   k
       f(j)   s   ç   x

---

[55] I make the assumption that the implosives *ɓ and *ɗ originated at this point. It is possible that they passed through a medial stage of plain *b and *d after losing their presyllables, but the conditioning environement of an earlier presyllable consonant makes this seem less likely.

Examples are given below:

(162)	Pre-Hlai				Proto-Hlai
overflow	*C-ba:ɦ	>	*ʔba:ɦ	>	*ɓa:ɦ
gall bladder	*C-dəy	>	*ʔdəy	>	*ɗəy
step on	*C-ɟə:mɦ	>	*ɟə:mɦ	>	*tɕə:mɦ
turbid	*C-gunɦ	>	*gunɦ	>	*kunɦ
fire	*C-vi:	>	*vi:	>	*fi:
tooth	*C-vjən	>	*vjən	>	*fjən

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. This was followed in the case of the retroflex by a shift to the palato-alveolar place of articulation, the first step in the loss of retroflex as a place of articulation (which would be completed with the loss of *r after the breakup of PHl):

(163) ʈ^h > ʈʂ^h > tʃ^h
       c^h > tɕ^h
       c > tɕ

At some point after initial obstruent devoicing, the dorsal fricatives underwent affrication and merged with their affricate or stop counterparts:

(164) ç > tɕ^h
       x > k^h

These two forms of affrication modified the obstruent inventory from (164a) to (164b):

(165) (a) p^h t^h ʈ^h c^h k^h ʔ
            ɓ   ɗ   c   k
            f(j)   s   ç   x

       (b) p^h t^h tʃ^h tɕ^h k^h ʔ
            ɓ   ɗ   tɕ   k
            f(j)   s

Examples are given below:

(166)   Pre-Hlai   Proto-Hlai

(a)   head louse   *ʈu: >   *ʈʰwu: >   *tʃʰwu:
      taste   *ɟim   >   *cʰim   >   *tɕʰim
      stand   *C-cu:n   >   *cu:n   >   *tɕu:n

(b)   pestle   *ça:k   >   *ça:k   >   *tɕʰa:k
      white   *xa:w   >   *xa: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 peripheral (front and back) mid vowels, allowing their merger with the high vowels (167a). This stands in opposition to the central vowel series (*ə), which did not merge with the high back unrounded vowel series (*ɯ). If the hypothesis presented in section 4.2 is correct, this was part of a chain shift which allowed the low peripheral vowels to raise in turn and fill the gaps left by the original mid-vowels (167b):

(167)   (a)   e(:C) > i(:C)   o(:C) > u(:C)

        (b)   ɛ:(C) > e:(C)   ɔC > oC

This change in the original Pre-Hlai rime inventory (168) resulted in the smaller inventory in (169):

(168)   i(:C)   ɯ(:C)   u(:C)
        e(:C)   ə(:C)   o(:C)
        ɛ:(C)   a(:C)   ɔC

(169)   i(:C)   ɯ(:C)   u(:C)
        e:(C)   ə(:C)   oC
                        a(:C)

Examples are given below:

(170) Pre-Hlai Proto-Hlai

(a) wrinkle *C-ɲeːwʔ > *C-ɲiːwʔ
small *Cⱽ-lek > *C-lik
before *koːnɦ > *kʰuːnɦ
needle *ŋoc > *hŋuc

(b) board *C-pɛːnɦ > *ɓeːnɦ
brood *C-mɔk > *C-mok

4.3.9 Monophthongization

If the PSKD reconstruction in section 4.2 is correct, then the following two mergers took place in the rime inventory via monophthongization:

(171) *ɯa(C) > *ɯə(C) > *ɯː(C)
       *oːy > *wiː > *iː

Examples are given below:

(172) Pre-Hlai Proto-Hlai

(a) top *H-nɯa > *H-nɯə > *hnɯː
put down, let go *pɯaŋʔ > *pɯəŋʔ > *pʰɯːŋʔ

(b) shellfish *ʈoːy > *ʈwiː > *tɕʰiː

4.3.10 Summary

The goal of this section was to take the postulated PSKD 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, word-initial aspiration, monosyllabification, and dorsal 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 valid place of articulation. The medial consonant inventory was then modified through intervocalic lenition, which eliminated the intervocalic voiceless stops, 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 palatal articulations. Stress-correlated word-initial 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 palatal affricate and the 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 *oːy and *ɰa with *iː and *ɯː 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, and tap are the result of palatal vocalic transfer, which primarily targeted the latter two phonemes. Finally, the number of aspirated and preaspirated initials in proportion to plain initials is the result of initial aspiration, which aspirated all word-initial consonants but had no effect on medial consonants. The only aymmetry in the set of initials left unexplained is that of the PHl postalveolar series, which was argued to derive from an original retroflex series; it was shown above that there is no evidence for an original retroflex nasal, and the evidence for an original retroflex fricative is very sparse.

The two asymmetries which exist in the PHl rime inventory, long *e:C rimes without short *eC rimes, and short *oC rimes without long *o:C rimes, has not been completely explained. In the case of the *e:C rimes, it was seen that the evidence strongly suggests that these rimes are ultimately borrowed from Chinese. In the case of the *oC rimes, which derive from Pre-Hlai *ɔC, two comparisons with Proto-Austronesian suggest that they may have been derived from original *əC rimes before grave initials (the conditioning environment for the change from *əC to *ɔC is unclear).

4.4 Conclusion

The main focus of this chapter has been to compare Proto-Hlai with Proto-Be and Proto-Southwest Tai, in view of performing a preliminary reconstruction of Proto-Southern Kra-Dai. This reconstruction is not exhaustive, and cannot be until the reconstruction of Northern and Central Tai and, ultimately, of Proto-Tai itself. However, this preliminary reconstruction is sufficient for the primary purpose of this chapter, which was to uncover the changes which occurred in Pre-Hlai between Proto-Southern Kra-Dai and Proto-Hlai.

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 PSKD and PHl. The first of these, intervocalic lenition and subsequent vocalic transfer, was position-dependent and served to create important asymmetries between the inventory of initial and medial consonants. The second, initial aspiration, was also position dependent, and served to sharpen the asymmetry between the initial and medial consonants. The third, 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 PSKD inventory of initials in (173) can be compared with that of PHl (174) below. There are some noticeable gaps in the inventory which are not reconstructible with the amount of evidence examined in this chapter; some of these may be filled in the future with more work on Tai:

(173) PSKD Initial Consonants

*p	*t	*ʈ	*c	*k	*q	*ʔ
*b	*d	*ɖ	*ɟ	*g		
*f	*s		*ɕ	*x		
*v	*z			*ɣ		
*m	*n		*ɲ	*ŋ(w)		
	*l	*r				
*w			*j			

PSKD Medial Consonants

*C-p	*C-t		*C-c	*C-k	*C-q	*Cuʔ
*C-b	*C(i/u)d	*C(u)ɖ	*C-ɟ	*C(i/u)g	*C-ɢ	
*C(i)v						
*C$^{(V)}$-m	*C$^{(V)}$-n		*C$^{(V)}$-ɲ	*C$^{(V)}$-ŋ		
	*C$^{(V)}$(i)l	*C(u)r				
	*p(i)l					
	*k-l					
*H-m	*H-n			*H-ŋ(w)		
	*H-l					
*H-w						

(174) PHl Initial Consonants

*p^h	*t^h	*tʃ^h(w)	*tɕ^h	*k^h		*ʔ
*ɓ	*ɗ		*tɕ	*k		
*f(j)	*s					
						*ɦ
*hm	*hn		*hɲ	*hŋ(w)		
	*hl					
	*lj					
*ʋ	*ɾ(j)	*r				
*hw			*hj			

PHl Medial Consonants

					*Ciʔ, *Cuʔ
*C-β					*Ciɦ, *Cuɦ
*C-m	*C-n		*C-ɲ	*C(u)ŋ	
	*C-l				
	*Cuɾ	*Cur			

The differences between the PSKD rime inventory (175) and the PHl rime inventory (176) are also shown below. Since there is no evidence for changes in codas between PSKD and PHl, and the PSKD pre-tone system is too tentative to reconstruct without additional input from Tai, the exposition below will be simplified by writing -C for all codas and omitting tonal precursors:

(175)   PSKD Open Rimes

*iː   *ɯː   *uː
(*eː)   (*oː)
*ɛː   *aː

                 *ɯa

PSKD Closed Rimes

*iːC   *ɯːC   *uːC
*iC   *ɯC   *uC
*eːC   *əːC   *oːC
*eC   *əC   *oC
*ɛːC   *aːC

                                *ɔC

                 *ɯaC

 (176)   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

both the Pre-Hlai and post-Proto-Hlai periods, and data from Jiamao is therefore important in supporting the reconstructions of both periods.

CHAPTER FIVE: 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 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 in turn 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[56] and borrowing from Proto-Hlai or its immediate daughter, Ha Em. 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 Jiamao 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 Jiamao 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):

---

[56] 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 Kra-Dai evidence; the same is true in differentiating original *ɯa and *o:y. Proto-Hlai peripheral mid vowel rimes therefore can't be used in the Pre-Hlai reconstructions.

(1)   Jiamao tone reflexes

Tone Category	High		Low	
A	55	(1)	11	(4)
X	51	(5)	31	(2)
DLong	53	(9)	31	(8)
DShort	55	(7)	22	(10)

The same convention which is used with Proto-Be is used here, namely the designation of the unmarked tone category as A, and the marked tone category as X. An important difference is that while PB tone X correlates directly with Hlai tone categories B and C, Jiamao tone X does not show any such straightforward correlation (see section 5.2.1).

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 other Hlai languages, as it indicates the voicing status of initials at the time or 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 period of loans into Jiamao began at a stage before PHl, both Pre-Hlai and PHl reconstructions will be provided as appropriate.

5.1.2 Stops

The PHl 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 initial aspiration occurred, and afterwards followed two distinct paths of development. The bilabial and alveolar stops underwent implosivization, 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:

(4)   (a)   Pre-Hlai   Jiamao   (b)   PHl   Jiamao

　　slap   *piːk   ɓia^5 escape   *pʰiw   pʰiw^1
　　break   *pəːnʔ   ɓɯan^1 hide   *pʰəːk   pʰak^7
　　branch (road) *paː   ɓow^1 high   *pʰaːk   pʰɯ:^{5}

　　(c)   Pre-Hlai   Jiamao   (d)   PHl   Jiamao

　　exit   *tɯːn   ɗaŋ^1 rotten   *tʰuy   tʰɯy^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	hi:w^1	full	*k^{h}ɯ:m	k^{h}ɔm^1
nose	*kət	hɔ:t^9	chicken	*k^{h}əy	k^{h}ay^1
leg	*kɔk	hɔ:k^9	ascend	*k^{h}a:n	k^{h}uən^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
	sound	*t^{h}i:w	ts^{h}ew^1
	chopsticks	*t^{h}i:p	ts^{h}ep^7
	full	*t^{h}i:k	ts^{h}ia^5

One other exceptional correspondence occurs in this category:

(6)		Pre-Hlai	Jiamao
	louse	*tən	ten^1

The expected Jiamao initial for this word is *ɗ*, and the actual initial and register for this word is indicative of *C-d. As shown in the last chapter, the Pre-Hlai form is descended from an original *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
	*tʃ	*tʃ^h(w)	t
	*tɕ	*tɕ^h	ts, ts^h

Jiamao, like Bouhin and Ha Em, has merged PHl *tʃʰ and *tʃʰw, preserving no evidence of the labiovelar coarticulation in the latter. 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 this affricate aspirated after early instances of borrowing, shifted to a fricative ʃ, and participated in a chain shift with *s (see below), so that ʃ shifted to s, which then participated in the regional shift of s to t. The palatal affricate, if the one example below in (8) 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   *tʃ   →   tʃʰ > s > t   *c   →   c > tɕ > ts
                     ↓   ↓
     PHl   *tʃʰ(w) →   tʃʰ > s > t   *tɕʰ   →   tɕʰ > tsʰ

Examples are given below:

(9)   (a)   PHl   Jiamao   (b)   PHl   Jiamao

     repay   *tʃʰə:mʔ   tiam^1 weave (fabric)   *tʃʰwɯ:k   ta:k^9
     sick   *tʃʰok   ta:k^9 head louse   *tʃʰwu: taw^1
     eye   *tʃʰa: tow^1 below   *tʃʰwəw   ta:w^1

      (c)   Pre-Hlai   Jiamao   (d)   PHl   Jiamao

     burn   *cuyʔ   tsey^1 shellfish   *tɕʰi: tsʰay^1
                                                    hole   *tɕʰu:ŋʔ   tsʰua^1
                                                    wear   *tɕʰət   tsʰɔ:t^9

There is one exceptional correspondence in this category:

(10)   Gloss   PHl   Jiamao

      tree   *tʃʰəy   tsʰay^1

This irregular initial probably indicates a relatively late date of borrowing, most likely from Baoting ts^hay^1

(as Baoting is the language with which Jiamao has been in a more recent contact relationship).

5.1.4 Fricatives

The relexes of the Hlai fricatives in Jiamao are given below:

(11)   <u>Pre-Hlai</u>   <u>Proto-Hlai</u>   <u>Jiamao</u>

    *f   *f   p
    *C-vj   *fj ts^h
    *s   *s ts^h
    *C-β   *C-β   f

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)   <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

  Pre-Hlai   *f   →   f > p   *C-vj   →   vj > fɕ > ts^h
               ↓   ↓
  PHl   *f   →   f > p   *fj   →   fj > fɕ > ts^h

               <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

  Pre-Hlai   *s   →   s > ts^h *C-β   →   β > ɸ > f
               ↓   ↓
  PHl   *s   →   s > ts^h *C-β   →   β > ɸ > f

The fricatives appear to have been stable throughout the first two waves of borrowing, with only

one reflex apiece in Jiamao. PHl *f 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 in the case of *C-β. There is more

than one way that it can be conjectured that *fj led to ts^h in Jiamao, but I hypothesize an intermediate stage

of *f*ɕ (with the aperture of the gliding assimilating to that of the preceding fricative). This is parallel to the

development of *tʃʰw 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
*pi̧	>	sʷ	stick	*-pímbo	>	sʷimbo
*tṷ	>	pf	forge	*-tṹd-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

Pre-Hlai		PHl		Jiamao				
*s	>	*s	→	s	>	tsʰ		
*tʃ	>	*tʃʰ	→	tʃʰ	>	s	>	t

Examples are given below. Note that only three examples of *fj 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	*fi:	pay[1]	scrub	*C-vjɯ:p	tsʰuəp[9]
hairbun	*fun?	pɔŋ[1]	seed	*C-vjən	tsʰan[1]
dream	*fən	pɔ:n[1]	tooth	*C-vjən	tsʰaŋ[1]

(c)	PHl	Jiamao	(d)	PHl	Jiamao
poke a hole	*sɯ:ŋ?	tsʰa:ŋ[5]	done	*C-βuy	fuəy[1]
you (pl)	*səw	tsʰaw[1]	village	*C-βa:n	fuən[1]
thread needle	*sok	tsʰɔ:k[9]	nine	*C-βɯ:?	fə:[1]

There is one exceptional correspondence in this category:

(16)

Gloss	PHl	Jiamao
return	*sut	tsɔk[7]

In the case of this word, the expected Jiamao initial is aspirated ts^h, and if related, it is unclear why it is unaspirated.

5.1.5 Medial Stops

The reflexes of the Hlai medial stops are the following. There are three reflexes each of *ɓ and *ɗ, and two each of *tɕ and *k (as in chapter two, a reflex in bold font indicates that it is correlated with low register):

(17) <u>Pre-Hlai</u>   <u>PHl</u>   <u>Jiamao</u>

      *C-b   *ɓ   p, ɓ, **f**
      *C-d   *ɗ   t, ɗ, **ɬ**
      *C-ɟ   *tɕ   ts, ts^h
      *C-g   *k   k, h

Reflexes of words borrowed at the time of PHl or subsequently are straightforward. Those borrowed during the period of Pre-Hlai, 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, 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 devoice until afterward:

(18)

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*C-b	→	C-b > b > p	*C-d	→	C-d > d > t
		↘			↘	
	↓		C-β > β > v > f	↓		C-l > l > ʐ > ɬ
PHl	*ɓ	→	ɓ	*ɗ	→	ɗ

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*C-ɟ	→	C-ɟ > dʑ > ts	*C-g	→	C-g > g > k
		↘			↘	
	↓		C-ʑ > z > s > tsʰ	↓		C-ɣ > ɣ > x > h
PHl	*tɕ	→	tɕ > ts	*k	→	k > k

Examples are given below:

(19)

(a)	Pre-Hlai	Jiamao		(b)	PHl	Jiamao
leaf	*C-bɯː	piː[1]		decorate	*ɓiːnɦ	ɓiən[5]
overflow	*C-baːɦ	pɔː[1]		duck	*ɓit	ɓet[7]
end	*C-bəːɤʔ	pɯy[5]		to hoe	*ɓəwɦ	ɓɔːw[5]

(c)	Pre-Hlai	Jiamao
fly	*C-bin	fin[4]
thief	*C-buy	fuy[4]
feed	*C-buːɦ	foː[4]

(d)	Pre-Hlai	Jiamao		(e)	PHl	Jiamao
porcupine	*C-dəɤ	tiː[1]		bright	*ɗinʔ	ɗin[1]
bamboo	*C-dom	təm[1]		bamboo	*ɗom	ɗum[5]
dregs	*C-daːk	tɯː[5]		ladle	*ɗok	ɗɔːk[9]

(f)	Pre-Hlai	Jiamao
castrate	*C-dɯːn	ɬɯŋ[4]
fear	*C-daːʔ	ɬɔː[4]

(g)	Pre-Hlai	Jiamao		(h)	Pre-Hlai	Jiamao
bear fruit	*C-dʑiːŋ	tseŋ[1]		elder bros wife	*C-dʑuː	tsʰuː[1]
jump	*C-dʑuːnʔ	tsuən[1]		stand	*C-dʑuːn	tsʰuːn[1]
extinguish	*C-dʑəp	tsep[7]				

(i)	Pre-Hlai	Jiamao	(j)	Pre-Hlai	Jiamao
able	*C-gi:w	kiw[1]	yawn	*C-ga:w	hɔ:[5]
jar	*C-gə:ŋʔ	kɔ:ŋ[1]			
grind (rice)	*C-ga:nɦ	ka:n[5]			

Note that the timing of the devoicing of voiced stops which entered Jiamao in the first wave of borrowing must be timed against the changes which occurred with the plain voiceless stops which entered at the same time:

(20)   p > ɓ
        t > ɗ
        k > x

        b > p
        d > t
        g > k

There are several exceptional correspondences in this category, the reasons for which are unclear:

(21)	Gloss	Pre-Hlai	Jiamao
(a)	pheasant	*C-dɯ:n	tʰɯŋ[4]
	front	*C-dəŋ	tʰiəŋ[4]
(b)	soak	*C-də:mʔ	tsiəm[4]
	light, insipid	*C-dəc	tsia[2]
(c)	sink	*C-ɟə:n	tsen[4]
	grandma	*C-ɟɯ:ʔ	tsə:[2]
(d)	grasshopper	*[C-g/ŋ]it	ʔet[7]

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)   <u>Pre-Hlai</u>   <u>PHl</u>   <u>Jiamao</u>

      *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)   <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

  Pre-Hlai   *m   →   m > **m**   *n   →   n > **n**
               ↓   ↓
  PHl   *hm   →   mb > b > **p**   *hn   →   nd > d > **t**

               <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

  Pre-Hlai   *ɲ   →   ɲ > **ɲ/n**   *ŋ   →   ŋ > **ŋ**
               ↓   ↓
  PHl   *hɲ   →   ɲ| > dʑ > **ts**   *hŋ   →   ŋg > g > **k**

               <u>Hlai</u>   <u>Jiamao</u>

  Pre-Hlai   (*ŋw   →   w > hw > v)
               ↓
  PHl   *hŋw   →   hw > hw > v

Examples are given below:

(24)

(a)		Pre-Hlai	Jiamao	(b)		PHl	Jiamao
beard		*mɯːmʔ	mum²	ant		*hmuc	puət⁸
come		*mɯːn	mɯɯŋ⁴	wet		*hmənʔ	pəːn⁴
mouth		*məmʔ	muəŋ⁴	dog		*hmaː	pow⁴

(c)		Pre-Hlai	Jiamao	(d)		PHl	Jiamao
mos y. brother		*nɯːʔ	niː⁴	long		*hnaːwʔ	tow⁴
six		*nɔm	nəm⁴	dragon		*hnəŋ	təːŋ⁴
otter		*naːk	nɯː²	wetfield		*hnaːɦ	tow⁴

(e)		Pre-Hlai	Jiamao	(f)		PHl	Jiamao
shoot		*ɲɯː	niː⁴	unhusked rice		*hɲ[e]ːŋ	tsiːŋ²
card (cotton)		*ɲɯː	niː⁴				
surround		*ɲaːwʔ	nəːw²				

(g)		Pre-Hlai	Jiamao	(h)		PHl	Jiamao
aunt		*ŋiːn	ŋiən²	necklace		*hŋiːw	kew⁴
lay down		*ŋuːɦ	ŋɔː⁴	needle		*hŋuc	kuət⁸
lid		*ŋəːt	ŋɯɯt⁸	fog		*hŋaːwʔ	kɔːw⁴

(i)		PHl	Jiamao
wind		*hŋwəːt	vɯɯat⁷
day		*hŋwən	vɔːn¹

There are several exceptional correspondences in this category as well:

(25)

	Gloss	PHl	Jiamao
(a)	hemp	hmiːn	mian¹
	mother	hmiːʔ	maːy⁵
	slip(pery)	hŋɯːn	ɲɯɯan⁵
	glutinous rice	hŋaːʔ	ŋow¹
	frog (inedible)	hŋɯːɦ	ŋay¹
(b)	mouse	hniw	kew⁴
(c)	yawn	hŋaːp	hɔːp⁸

The forms in (25a) are all in high register; the best explanation for this is that they were borrowed after initial aspiration, so that preaspirated nasals conditioned high register (and therefore before the shift to post-stopped nasals in Greater Hlai). The word *yawn* in (25c) indicates an irregular original glottal fricative, which may have formed under the presence of the preceding word in the opaque compound $h\mathfrak{o}{:}^5 h\mathfrak{o}{:}p^8$.

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)   Correspondences between Proto-Hlai stops and Jiamao stops

       <u>Proto-Hlai</u>   <u>Jiamao</u>

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 are therefore only one set of reflexes for each initial:

(27)

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
Pre-Hlai	*C-m	→	C-m > m	*C-n	→	C-n > n
	↓			↓		
PHl	*C-m	→	C-m > m	*C-n	→	C-n > n

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
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:n^5	bamboo shoot	*C-nɯ:ŋ	na:ŋ^1
hand	*C-mɯ:	ma:^{1}	water	*C-nəm?	na:m^1
foreigner	*C-mə:y	muəy^1	thick	*C-na:	now^1

(c)	PHl	Jiamao	(d)	PHl	Jiamao
year before last	*C-ɲɯ:	na:^{1}	tattoo face	*C-ŋu:	ŋaw^5
cow	*C-ɲiw	naw^1	cry	*C-ŋi:?	ŋa:y^1
moon	*C-ɲa:n	nuən^1	liver	*C-ŋa:n	ŋuən^1

(e)	PHl	Jiamao
wild potato	*Cuŋa:	ŋow^1
rest head	*Cuŋa:n	ŋuən^1

There are two kinds of exceptional correspondences in this category:

(29)

	Gloss	Pre-Hlai	Jiamao
(a)	bear	*C-muy	muy^4
	shake	*C-ɲɔŋɦ	ɲuəŋ^4
	salt	*C-ɲa:w?	nɔ:w^4
	alcohol	*C-ŋa:wɦ	ŋə:w^2
	branch (tree)	*C-ŋa:mɦ	ŋəm^2
(b)	wear (hat)	*Cuŋəw?	ɲiaw^1

In (29a), the 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) palatalized under the influence of the following rime.

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
        *lj   *lj   **ts**
        *C-l   *C-l   l
        *p-l   *p-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 before 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 *lj, or (2) by undergoing unconditioned spontaneous aspiration.

(31)   Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *l   →   l > ɮ > ɬ   *lj   →   lj > dʑ > **ts**
                        ↓   ↓
        PHl   *hl   →   l > ɮ > ɬ   *lj   →   lj > dʑ > **ts**

                        Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *C-l   →   C-l > l   *p-l   →   p-l > l
                        ↓   ↓
        PHl   *C-l   →   C-l > l   *p-l   →   p-l > l

Examples are given below:

(32) (a)   PHl   Jiamao   (b)   PHl   Jiamao

      tongue   *hli:nʔ   ɬi:n^4 leech   *ljiŋ   tsi:ŋ^4
      brain   *hlu:k   ɬu:ʔ^8 neck   *ljoŋʔ   tsaŋ^2
      fish   *hla: ɬow^4 steal   *ljok   tsa:k^8

      (c)   PHl   Jiamao   (d)   PHl   Jiamao

      fingernail   *C-li:p   lep^7 bamboo   *p-lɯ:yɦ   luəy^5
      change clothes *C-ləw   law^1 termite   *p-lu:k   lua^5
      uncover   *C-la:k   lɯa^5 near   *p-lɯ:ʔ   la:^{1}

There are several kinds of exceptional correspondences in this category, for reasons which are
largely unclear (although the word in (33d) is probably a later borrowing from Ha Em *za:w²*):

(33) Gloss   PHl   Jiamao

(a)   warm   *hlunɦ   tʰu:n^5
      not know   *hlɯmʔ   tʰum^4

(b)   heart   *hla:wʔ   tsʰiaw^1

(c)   choose   *hləɲ   tsɔn^4

(d)   spade   *lja:wɦ   za:w^4

(e)   measure (rice) *C-lɯ:ŋʔ   ɬɔ:ŋ^4

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**
        *ɾj   *ɾj   **ts**
        *Cuɾ   *Cuɾ   **l**
        *r   *r   k
        *Cur   *Cur   k

Developments of these initials are 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 *Cur initials. The

reflex of *r must have velarized very early to a velar fricative, devoicing before registrogenesis, and finally

undergoing fortition to a stop, in the same manner as *f > p* and *s > t*.

(35)   Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *C-ʋ   →   ʋ > **v**   *ɾj   →   ɾj > dʐ > **ts**
                        ↓   ↓
        PHl   *ʋ   →   ʋ > **v**   *ɾj   →   ɾj > dʐ > **ts**

                        Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *C-ɾ   →   ɾ > **l**   *Cuɾ   →   ɾ > **l**
                        ↓   ↓
        PHl   *ɾ   →   ɾ > **l**   *Cuɾ   →   ɾ > **l**

                        Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *r   →   ɣ > x > k   *Cur   →   ɣ > x > k
                        ↓   ↓
        PHl   *r   →   ɣ > x > k   *Cur   →   ɣ > x > 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 viən⁴ calf *ɾjinʔ tsin⁴
master *ʋaːŋ vɯː⁴ sift *ɾjəw tsiːw⁴
clothes *ʋaːŋʔ voː⁴ laugh *ɾjaːw tsu⁴

(c) PHl Jiamao (d) PHl Jiamao

skirt *ɾiːnʔ liən² bone *Cuɾɯːk liək¹⁰
mortar *ɾəw luː⁴ earth *Cuɾən len⁴
intestine *ɾaːyʔ lɯy⁴ boat *Cuɾaː lɔː⁴

(e) PHl Jiamao (f) PHl Jiamao

sell *ɾiːwʔ kiːw¹ pus *Cuɾiwʔ kuː¹
cicada *ɾəːy kuy¹ head *Cuɾəwʔ kiːw¹
taro *ɾaːk kɯː⁵ 100 *Cuɾaːn kɯːn¹

There are several kinds of exceptional correspondences in this category:

(37) Gloss PHl Jiamao

(a) poor *ʋaːt fɯːt⁸

(b) lizard *ɾjɯːŋ liəŋ⁴
     magpie *ɾjuːt luət⁸

(c) day bfr last *ɾuːʔ tsaːw⁴

(d) row *ɾəːyɦ tuy⁵
     to lead *ɾuyʔ luəy²
     red *ɾaːnʔ ɬɯːn⁴

(e) accumulate *ʋɯːmʔ vɯam¹
     cricket *Cuɾuːŋʔ fuəŋ⁴
     not *ɾuːy vay¹
     curse *ɾaːʔ haː⁴

Many of these exceptional reflexes remain mysterious. The two words in (37b) seem to have been

borrowed as plain *ɾ as opposed to palatalized *ɾj, and the last four words (37e) can all be considered

recent loans from Baoting, as all of them are very close or exact matches of Qi reflexes.

5.1.10 Glottals

The Jiamao reflexes of Hlai glottal fricatives and stops are given below:

(38) <u>Pre-Hlai</u>   <u>PHl</u>   <u>Jiamao</u>

    *ɦ   *ɦ   **h**
    *Ciɦ   *Ciɦ   **h/z**
    *Cuɦ   *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 to be very tentative.

(39)   <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

    Pre-Hlai   *ɦ   → ɦ > **h/z**   *ʔ → ʔ
                ↓   ↓
    PHl   *ɦ   → ɦ > **h/z**   *ʔ → ʔ

              <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

    Pre-Hlai   *Ciɦ → ɦ(j) > **h/z**   *Ciʔ → ---
                ↓   ↓
    PHl   *Ciɦ → ɦ(j) > **h/z**   *Ciʔ → (ʔj > ts)

              <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

    Pre-Hlai   *Cuɦ → ɦ > **h**   *Cuʔ → ʔ
                ↓   ↓
    PHl   *Cuɦ → ɦ > **h**   *Cuʔ → ʔ

Examples are given below:

(40)　(a)　　　PHl　　　Jiamao　　　(b)　　　　　PHl　　　　Jiamao

horn　　　*ɦəw　　　haw⁴　　　field ridge　*Ciɦə:n　　huɯan⁴
shit　　　*ɦa:yʔ　　huɯay²　　leak　　　　*Ciɦəp　　　hɔ:p⁹
step　　　*ɦa:mɦ　　hɔ:m²　　crippled　　*Ciɦa:ŋɦ　　he:ŋ²

　　　(c)　　　PHl　　　Jiamao　　　(d)　　　　　PHl　　　　Jiamao

spirit　　*Cuɦɯ:　　ha:⁴　　　thatch grass　*Ciɦa:　　zow⁴
gourd　　*Cuɦɯ:p　　huəp⁸　　step　　　　*Ciɦa:mɦ　　za:m⁵
bite　　　*Cuɦə:t　　huɯət¹⁰　　bitter　　　*ɦə:m　　　ziam⁴

　　　(e)　　　PHl　　　Jiamao　　　(f)　　　　　PHl　　　　Jiamao

wash　　*ʔu:t　　ʔuət⁹　　　steam　　　*Ciʔunɦ　　tsun¹
dense　　*ʔə:t　　ʔuɯət⁷
bathe　　*ʔa:p　　ʔuɯp⁹

　　　(g)　　　PHl　　　Jiamao

get up　*Cuʔɯ:ɦ　　ʔa:¹
open　　*Cuʔa:ɦ　　ʔow¹

There are several kinds of exceptional correspondences in this category:

(41)　　Gloss　　　　Pre-Hlai　　Jiamao

(a)　　I　　　　　　*ɦu:　　　kaw¹
　　　pluck/scratch　*ɦɯ:t　　　kuɯat⁷
　　　hunchback^MR　*ɦɔmɦ　　　kɔ:m¹

(b)　　go　　　　　*ɦi:　　　hay¹

(c)　　earthworm (lg)　*Cuɦən　　van¹

(d)　　pond　　　　*Ciɦu:ŋɦ　　ʔjɔŋ⁵
　　　tree heart　　*Cuɦəc　　　ʔiət⁷

(e)　　swollen　　　*ʔun　　　fun⁴

Thurgood (p.c.) suggests that the first person pronoun in (41a) may be a loan from Utsat. The word in (41c) is a late loan, most likely from Baoting *hwan[1]*. Finally, the word in (41e) seems to have developed an excrescent fricative in initial position, which later devoiced.

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

The only difference between the Pre-Hlai and PHl 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 preaspirated glides borrowed later.

(43)   Hlai   Jiamao   Hlai   Jiamao

        Pre-Hlai   *j   →   j > hj > dʑ > ts   *w   →   w > hw > v
                            ↓   ↓
        PHl   *hj   →   hj > dʑ > ts   *hw   →   hw > v

Examples are given below:

(43)   PHl   Jiamao   PHl   Jiamao

        egg   *hjɯ:m   tsum[1]   a bundle of rice   *hwiw   vew[1]
        elder male inlaw   *hjəwʔ   tsi:w[1]   ghost   *hwə:t   vɯat[9]
        old   *hja: tso:[1]   plantain   *hwa:k   vɯa[5]

There are two exceptional correspondences in this category:

(45)	Gloss	PHl	Jiamao
(a)	corner	*hju:ŋ	tshuəŋ[1]
(b)	stretch	*hja:ʔ	tsɔ:[4]

The word in (45b) is irregular in register, and may represent a recently borrowed form.

5.1.12 Summary

In examining the initial consonants of Proto-Hlai and Jiamao, the largest complications in correspondences between the two can be explained in terms of a model in which there were two periods of borrowing from Hlai by Jiamao. The first period was in the latter part of the Pre-Hlai period, but before initial aspiration. The second period was around the time of reconstructed Proto-Hlai, and possibly extending into the early period of Proto-Hlai disintegration. When there is only a single Jiamao reflex for a particular Hlai initial, it is assumed that there was no change in Hlai between the two periods of Jiamao borrowing. When there are at least two Jiamao reflexes, the additional witness of Jiamao as external evidence for the various stages of Hlai is 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; 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 initials, the Jiamao rimes 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 provided 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 at least 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 laid out 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 Lingao to the north. 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 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 ɔC, 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), it is noticeably 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		Low	
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 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)   <u>Gloss</u>   <u>PHl</u>   <u>Jiamao</u>

       shoulder pole   fiːk pia^5
       termite   p-luːk lua^5
       gill   C-ŋaːk $ŋɯa^5$

Examples of Jiamao category X in correlation with other Hlai tone categories are given below:

(52)   <u>Gloss</u>   <u>PHl</u>   <u>Jiamao</u>

(a)   mountain valley kʰəːŋ $kʰɔːŋ^5$
       burn   ɓəŋ $ɓɔŋ^5$
       pickle   C-məːŋ $mɔːŋ^5$

(b)   cockscomb   fiːwɦ $piːw^5$
       drink   ruːnɦ $kuːn^5$
       branch (tree)   C-ŋaːmɦ $ŋəm^2$

(c)   partridge   tʰaːnʔ $ɗaːn^5$
       beard   hmɯːmʔ mum^2
       neck   ljoŋʔ $tsaŋ^2$

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   *tɕʰi:ʔ   tsʰa:y[1]

small sore   *C-ni:ʔ   na:y[1]

cry   *C-ŋi:ʔ   ŋa:y[1]

(c) get up   *Cuʔɯ:ɦ   ʔa:[1]   (d) short   *tʰɯ:ʔ   tʰa:[1]

near   *p-lɯ:ʔ   la:[1]

(e) blow   *ʔu:ɦ   ʔa:w[1]   (f) ash   *su:ʔ   tsʰa:w[1]

power   *kʰu:ɦ   kʰa:w[1]   memorial   *C-mu:ʔ   ma:w[1]

turtle   *tʰu:ɦ   ɗa:w[1]   three   *tʃʰuʔ   ta:w[1]

(g) fall down   *ɗəwɦ   ɗa:w[1]   (h) Fas y. sis husb   *hjəwʔ   tsi:w[1]

tomorrow   *ɦəwɦ   ziaw[4]   head   *Curəwʔ   ki:w[1]

fill w/ rice   *kʰəwʔ   hi:w[1]

(i) water   *C-nəmʔ   na:m[1]   (j) meat   *rəmʔ   kə:m[1]

clothing clsfr   *fənʔ   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 (*initial 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 which could have been used this way).

An example illustrating this point is the following:

(54) | Gloss | Pre-Hlai | Proto-Hlai | Jiamao

(a) sap   *tə:ŋ   *tʰə:ŋ   ɗa:[1]

together   *tə:ŋʔ   *tʰə:ŋʔ   tʰa:[1]

(b) jar   *C-gə:ŋʔ   *kə:ŋʔ   kɔ:ŋ[1]

pickle   *C-mə:ŋ   *C-mə:ŋ   mɔ:ŋ[5]

It is argued below that the change *əːŋ > *a:* preceded the change *əːŋ > *ɔːŋ* 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 initial aspiration, whereas the initial of

together indicates that it was borrowed after initial 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 (54b) did not, indicating that they were borrowed yet later.

The only logical conclusion is that *sap* was borrowed first, followed by *together*, followed finally 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 for the initials and that for 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)   Correspondences between Proto-Hlai stops and Jiamao open vowels

Proto-Hlai	Jiamao
*iː	iː, ay
*ɯː	iː, aː
*uː	uː, aw
*iːɦ/ʔ	aːy, ay
*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	*əy	→	əy > ay	*əyɦ/ʔ	→	əːy > aːy

	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				*aː	→	aː > ɔː/ɤː > ɔː/ɯː
				↓		
Stratum 2	*eː	→	eː > ɛː	*aː	→	aː > oː/uː > oː/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 (*əy and *əw) by lowering only to mid-vowels; in Jiamao, they lowered completely, allowing the two series to merge:

(57)

*iː	>	*əy	>	ay
*ɯː	>	*əɰ	>	aː
*uː	>	*əw	>	aw
*əy	>	*əy	>	ay
*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 →   əɥ   >   ɤɥ   >   ə:

                          *u:ɦ/ʔ →   əw   >   ɔw   >   ɔ:

      Stratum 2   *əyɦ/ʔ →   ə:y   >   a:y

                          *əɥɦ/ʔ →   ə:ɥ   >   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

stayed if preceded by a palatal glide; otherwise it finally dipthongized to *əw* with subsequent coloring of

the nucleus:

(59)   Stratum 1   a: >   ɔ: >   ɔ: >   ɔ:

                          uCa: >   uCɤ: >   ɤ: >   ɯ:

      Stratum 2   a: >   o: >   əw   >   ow

                          hja: >   hjo: >   hjo:

Examples are given below; exceptions are listed and discussed at the end:

(60)

(a)	PHl	Jiamao	(b)	PHl	Jiamao
mos y. bros wife	*hmi:	mi:[4]	mollusk	*tɕʰi:	tsʰay[1]
			go	*fi:	pay[1]
			fire	*fi:	pay[1]

(c)	PHl	Jiamao	(d)	PHl	Jiamao
leaf	*ɓɯ:	pi:[1]	ladder	*pʰɯ:	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	*ru:	ku:^{1}	seven	*tʰu:	ɗaw^1
knee	*C-ɾu:	lu:^{4}	head louse	*tʃʰwu:	taw^1
o. bros wife	*tɕu:	tsʰu:^{1}	I	*ɦu:	kaw^1

			(g)	Pre-Hlai	Jiamao
			uncle	*tɕʰi:ʔ	tsʰa:y^1
			small sore	*C-ni:ʔ	na:y^1
			cry	*C-ŋi:ʔ	ŋa:y^1

(h)	PHl	Jiamao	(i)	PHl	Jiamao
nine	*C-βɯ:ʔ	fə:^{1}	short	*tʰɯ:ʔ	tʰa:^{1}
grandma	*tɕɯ:ʔ	tsə:^{2}	near	*p-lɯ:ʔ	la:^{1}
			get up	*Cuʔɯ:ɦ	ʔa:^{1}

(j)	PHl	Jiamao	(k)	PHl	Jiamao
sleep (lie)	*hŋu:ɦ	ŋɔ:^{4}	turtle	*tʰu:ɦ	ɗa:w^1
distribute	*ku:ɦ	kɔ:^{1}	power	*kʰu:ɦ	kʰa:w^1
run	*Curu:ɦ	kɔ:^{1}	blow	*ʔu:ɦ	ʔa:w^1

(l)	PHl	Jiamao
ash	*su:ʔ	tsʰa:w^1
memorial	*C-mu:ʔ	ma:w^1
three	*tʃʰwuʔ	ta:w^1

(m)	PHl	Jiamao
rice cake	*C-ɲe:ɦ	ɲe:^{2}

(n)	PHl	Jiamao	(o)	PHl	Jiamao
boat	*Cuɾa:	lɔ:^{4}	branch (road)	*pʰa:	ɓow^1
overflow	*ɓa:ɦ	pɔ:^{1}	dog	*hma:	pow^4
grandpa	*na:ʔ	nɔ:^{4}	field	*hna:ɦ	tow^4

(p)	PHl	Jiamao	(q)	PHl	Jiamao
to plant	*Cuɾa:	kɯ:^{1}	old	*hja:	tso:^{1}
			smoke	*hja:	tso:^{1}
			medicine	*hja:	tso:^{1}

There are a number of exceptions in this category, given below:

(61)   Gloss   PHl   Jiamao

(a)   this   *C-ni:ɦ   nɛ:[5]

(b)   navel   *Cuɾɯ: lo:[2]
         return   *hmɯ: pə:[4]

(c)   thin   *rɯ: kay[1]
         you   *C-mɯ: məy[1]
         look up at   *hŋɯ:ʔ   ŋəy[4]
         frog (inedible) *hŋɯ:ɦ   ŋay[1]

(d)   year   *hmu:ɦ   ma:[1]
         feed   *ɓu:ɦ   fo:[4]

(e)   two   *hlu:ʔ   ɬiaw[4]

(f)   five   *hma: pu:[4]
         mat. grandfather *tʃʰa:ʔ   tə:[1]

The Jiamao reflex of the word in (61e) is what would normally be expected for PHl *əwh/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	*hŋi:w	kew^4			
plug up	*tɕʰi:m	tsʰem^1			
bear fruit	*tɕi:ŋ	tseŋ^1	hang	*ɾi:ŋʔ	lin^4
stick into	*C-ŋi: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	*si:t	tsʰit^7
underwear	*fi:nɦ	piən^1	money	*tɕi:n	tsin^1
skirt	*ɾi:nʔ	liən^2	roll (child)	*p-li:n	lin^1
decorate	*ɓi:nɦ	ɓiən^5			
finger	*lji:ŋɦ	tsia^4			
slap	*pʰi:k	ɓia^5	to tear	*C-ɲi:k	ɲit^7
full	*tʰi:k	tsʰia^5			
shoulder pole	*fi:k	pia^5			

(b)

	PHl	Jiamao		PHl	Jiamao
cockscomb	*fi:wɦ	pi:w^5			
wild	*lji:w	tsi:w^4			
sell	*ri:wʔ	ki:w^1			
wear (lower)	*pʰi:n	pʰi:n^1	be cheap	*kʰi:t	kʰi:t^9
tongue	*hli:nʔ	ɬi:n^4			
ill omen	*hwi:n	vi:n^1			
make way	*pʰi:ŋʔ	pʰi:^{1}	wing	*pʰi:k	pʰi:^{5}
rice wine	*ɓi:ŋɦ	ɓi:ŋ^5	carry	*ɓi:k	fi:^{2}
slant	*ki:ŋ	ki:ŋ^1	thick smoke	*ɗi:k	ti:^{2}

(c)	PHl	Jiamao	(d)	PHl	Jiamao
a bundle of rice	*hwiw	vew^1	escape	*pʰiw	pʰiw^1
mouse	*hniw	kew^4			
taste	*tɕʰim	tsem^4	poison	*kimʔ	kim^1
			a pinch	*C-ɲimʔ	ɲim^1
			calf	*rjinʔ	tsin^4
			fly	*ɓin	fin^4
			bright	*ɗinʔ	ɗin^1
dogbean	*tɕʰip	tsʰep^7	lightning	*ljip	lip^7
duck	*ɓit	ɓet^7	throw away	*fit	fit^7
wrinkle	*C-ɲit	ɲet^7			
grasshopper	*[g/hŋ]it	ʔet^7			
			leech	*ljiŋ	tsi:ŋ^4
sweep	*rjik	tset^{10}	solemn silence	*ʔik	ʔi:k^9

There are a handful of exceptions in this category:

(67)	Gloss	PHl	Jiamao
(a)	polished rice	*tɕi:mʔ	tsiam[1]
	hemp	*hmi:n	mian[1]
(b)	clean	*tɕʰi:ŋɦ	tsʰiəŋ[5]
(c)	pus	*Curiwʔ	ku:[1]
	cow	*C-ɲiw	naw[1]
(d)	splash	*tɕʰinɦ	tsʰit[7]

The word in (67d) 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.

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:y	uəy	(b)		
	*ɯ:m	um, ɔm, ɔ:m		*ɯm	um
	*ɯ:p	up, uəp		*ɯp	ɔ:p
	*ɯ:n	ɯŋ		*ɯn	aŋ, ɔ:n
				*ɯt	uət
	*ɯ:ŋ	ɔŋ, a:ŋ		*ɯŋ	ɯŋ
	*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)   <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ɯ:y   →   əy > oy > uəy

            <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

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   →   ---

            <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ɯ:n   →   ɯ:ŋ > ɯŋ
                    ↘
                           əŋ > aŋ

            <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

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)   <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ɯm   →   --   *ɯp   →   ə:p > ɔ:p
            ↓   ↓
Stratum 2   *ɯm   →   um   *ɯp   →   --

            <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ɯn   →   ə:n > ɔ:n   *ɯt   →   ət > ot > uət
            ↓   ↓
Stratum 2   *ɯn   →   əŋ > aŋ   *ɯt   →   --

            <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ɯŋ   →   --
            ↓
Stratum 2   *ɯŋ   →   ɯŋ

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). Statum one borrowings corresponding to short rimes are given in (71c), and stratum two in (71d):

(71)

(a)	PHl	Jiamao	(b)	PHl	Jiamao
bamboo	*p-lɯːyɦ	luəy^{5}			
beard	*hmɯːmʔ	mum^{2}	crawl	*Cuɦɯːm	hɔːm^{4}
egg	*hjɯːm	tsum^{1}	cheat	*pʰɯːm	pʰɔːm^{1}
rice knife	*kʰɯːp	hup^{7}			
rotten	*tʰɯːm	ɗɔm^{1}			
full	*kʰɯːm	kʰɔm^{1}			
wash	*fjɯːp	tsʰuəp^{9}			
pt nosed turtle	*tʰɯːp	ɗuəp^{9}			
pumpkin	*Cuɦɯːp	huəp^{8}			
come	*hmɯːn	mɯŋ^{4}	shallow	*tʰɯ[ː]nʔ	ɗaŋ^{1}
castrate	*ɗɯːn	ɬɯŋ^{4}			
pheasant	*ɗɯːn	tʰɯŋ^{4}			
let go	*pʰɯːŋʔ	ɓɔŋ^{5}	poke a hole	*sɯːŋʔ	tsʰaːŋ^{5}
			clear (sky)	*hlɯːŋʔ	ɬaːŋ^{2}
			bamboo shoot	*C-nɯːŋ	naːŋ^{1}
child	*hlɯːk	ɬiək^{8}	ripe	*sɯːk	tsʰaːk^{9}
bone	*Curɯːk	liək^{10}	weave (fabric)	*tʃʰwɯːk	taːk^{9}

(c)	PHl	Jiamao	(d)	PHl	Jiamao
			not know	*hlɯmʔ	tʰum^{4}
handlength	*Cuɦɯp	hɔːp^{8}			
heavy	*kʰɯn	kʰɔːn^{1}	thorn	*Cuɦɯnʔ	haŋ^{4}
			astringent	*hmɯnʔ	paŋ^{4}
break (pull)	*tʰɯt	ɗuət^{9}			
			pull tight	*kɯŋ	kɯŋ^{5}

There are various exceptions in this category:

(72)   Gloss   PHl   Jiamao

(a)   accumulate   *ʋɯ:mʔ   vɯam¹
        slip(pery)   *hɲɯ:n   ɲɯan⁵
        dirt & filth   *C-nɯnɦ   nɯa¹

(b)   two   *C-lɯ:ŋɦ   lɯaŋ⁵
        ginger   *kʰɯ:ŋ   kʰɯəŋ⁵
        measure (rice)   *C-lɯ:ŋʔ   ɬɔ:ŋ⁴

These words in (72b) are borrowings of Chinese 兩, 薑 and 量 (Mandarin *liang³*, *jiang¹* and *liang²*), and

may have been independently borrowed from Chinese instead of via Hlai.

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:y   uy, u:y   (b)   *uy   ey, uəy, uy
        *u:n   uən, u:n   *un   ɔŋ, uŋ, un
        *u:t   uət   *ut   ɔk, ut
                                                     *uŋ   ɔn
        *u:c   (uət)   *uc   uət, ut
        *u:ŋ   ua, u:ŋ
        *u:k   uaˣ, 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　　*uːy　→　uy
　　　　　　　　↓
Stratum 2　　*uːy　→　uːy

	Hlai		Jiamao	Hlai		Jiamao
Stratum 1	*uːn	→	on > uən	*uːt	→	ot > uət
	↓			↓		
Stratum 2	*uːn	→	uːn	*uːt	→	---

	Hlai		Jiamao	Hlai		Jiamao
Stratum 1	*uːɲ	→	---	*uːc	→	(ot > uət)
	↓			↓		
Stratum 2	*uːɲ	→	---	*uːc	→	

	Hlai		Jiamao	Hlai		Jiamao
Stratum 1	*uːŋ	→	uəŋ > ua	*uːk	→	uəʔ > ua^X
	↓			↓		
Stratum 2	*uːŋ	→	uːŋ	*uːk	→	uːk > uːʔ

(b)　　　　Hlai　　　　　Jiamao

Stratum 1　　*uy　→　uːy > uy
　　　　　　　　　　↘
　　　　　　　　↓　　　əy > ey

Stratum 2　　*uy　→　oy > uəy

	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). Statum one borrowings corresponding to short rimes are given in (76c),

and stratum two in (76d):

(76)	(a)	PHl	Jiamao	(b)	PHl	Jiamao
	fat	*ru:yʔ	kuy^1	plum tree	*C-mu:y	mu:y^1
	wild	*su:n	tsʰuən^1	drink	*ru:nɦ	ku:n^5
	tree clsfr	*tʰu:nʔ	ɗuən^1	sow (seed)	*C-mu:nʔ	mu:n^1
	body	*Cuɦu:n	huən^4	stand	*tɕu:n	tsʰu:n^1
	fart	*tʰu:t	ɗuət^9			
	ten	*fu:t	puət^9			
	wash	*ʔu:t	ʔuət^9			
	hole	*tɕʰu: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	*p-lu:k	lua^5	brain	*hlu:k	ɬu:ʔ^8
				nest	*ru:k	lu:ʔ^8

(c)	PHl	Jiamao	(d)	PHl	Jiamao
water buffalo	*suyʔ	tsʰey^1			
burn	*tɕʰuyʔ	tsey^1			
dissect	*ɓuyɦ	puy^1	drunk	*hmuy	puəy^4
thief	*ɓuy	fuy^4	done	*C-βuy	fuəy^1
bear	*C-muy	muy^4	lead	*ruyʔ	luəy^2
rain	*fun	pɔŋ^1	household clsfr	*ɗun	tuŋ^1
rainbow	*tʃʰun	tɔŋ^1	lips (upper)	*sunʔ	tsʰuŋ^1
lead	*tʃʰwun	tɔŋ^1	a ten	*hmun	puŋ^4
nod	*C-ŋut	ŋɔk^7			
return	*sut	tsɔk^7			
get away	*C-luŋʔ	lɔn^1			
			tail	*tɕʰuc	tsʰuət^9
			ant	*hmuc	puət^8
			needle	*hŋuc	kuət^8

Various kinds of exceptions are given below:

(77)   <u>Gloss</u>   <u>PHl</u>   <u>Jiamao</u>

(a)   rotten   *tʰʉy   tʰɯy⁵

(b)   door   *C-muːn   muan¹
        fold   *C-muːn   maːn¹
        parrot (black) *tɕuːŋɦ   tsuaŋ⁵
        vine basket   *kuːŋʔ   kuaŋ¹

(c)   pond   *Ciɦuːŋɦ   ʔjɔŋ⁵
        have   *ɗuːk   tɔk⁹

(d)   dust   *fuːŋʔ   puəŋ⁵
        cricket   *Cuɾuːŋʔ   fuəŋ⁴

(e)   swell   *ʔun   fun⁴
        steam   *Ciʔunɦ   tsun¹
        blackhead   *Cuɾut   lup⁸
        worship   *pʰuc   pʰut⁷

(f)   big   *C-luŋ   loː¹

(g)   fur   *Cuɦun   hɔːŋ⁴

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)   <u>Proto-Hlai</u>   <u>Jiamao</u>

        *eːm   eːm
        *eːp   eːp
        *eːn   eːn

(79)   <u>Hlai</u>   <u>Jiamao</u>   <u>Hlai</u>   <u>Jiamao</u>

        Stratum 2   *eːm   >   eːm   eːp   >   eːp

                        <u>Hlai</u>   <u>Jiamao</u>

        Stratum 2   *eːn   >   eːn

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 indicates 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

(a)   *ə:y   ey, ɯy, uy, uəy, a:y (b)   *əy   i:, ay, a:y
                                                 *əɥ   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)   <u>Hlai</u>   <u>Jiamao</u>

Stratum 1   *ə:y   →   ɯy, əy > ey
                  ↘
             ↓   uy, oy > uəy

Stratum 2   *ə:y   →   ə:y > a:y

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
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	→	---

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
Stratum 1	*ə:n	→	---	*ə:t	→	ɤt > ɯət
	↓			↓		
Stratum 2	*ə:n	→	ʌ:n > ɯan	*ə:t	→	ʌ:t > ɯat

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
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)	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
Stratum 1	*əy	→	əy > i:	*əɰ	→	əɰ > ə:
	↓			↓		
Stratum 2	*əy	→	əy > ay/a:y	*əɰ	→	ə: > a:

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
Stratum 1	*əw	→	əw > u:	*əwɦ/ʔ	→	ɛ:w > iaw
	↓			↓		
Stratum 2	*əw	→	əw > aw/a:w	*əwɦ/ʔ	→	e:w > i:w

	<u>Hlai</u>		<u>Jiamao</u>	<u>Hlai</u>		<u>Jiamao</u>
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:y appear to be conditioned by the preceding initial, according to whether or not it is bilabial (*uəy*), alveolar (*ɯy*), lateral (*ey*), or rhotic (*uy*) (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)   əy > i:
                 əw > u:

The nucleus of Hlai *əwɦ/ʔ seems to have been prone to fronting in Jiamao. It fronted in Jiamao to *ɛ:w*, in the first stratum, and ultimately diphthongized. It fronted to *e:w* in the the second stratum, undergoing raising:

(85)   Stratum 1   *əwɦ/ʔ >   ɛ:w   >   iaw

        Stratum 2   *əwɦ/ʔ >   e:w   >   i:w

Excluding 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
                   ən > 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). Statum one borrowings corresponding to short rimes are given in (88c), and stratum two in (88d):

(88)

(a)	PHl	Jiamao	(b)	PHl	Jiamao
rope	*ɗə:y	tɯɯy^1	hen	*rə:y	ka:y^5
saliva	*hlə:y	ɬɯɯy^4			
muntjac	*C-lə:y	ley^1			
many	*hlə:y	ɬey^4			
cicada	*rə:y	kuy^1	spouseless	*hmə:yʔ	puəy^4
iron	*rə:y	kuy^1	times (hit)	*C-βə:y	fuəy^1
			foreigner	*C-mə:y	muəy^1
kidney	*C-nə:m	nam^1	sharp	*tɕʰə:m	tsʰiam^1
			redeem	*tʃʰə:mʔ	tiam^1
solid	*tʰə:mɦ	tʰɔ:m^5	bitter	*C-ɦə:m	ziam^4
close (eyes)	*hɲə:p	ɲap^7	pile up	*rə:p	kəp^7
break	*pʰə:nʔ	ɓɯan^1			
stay	*tʃʰə:nɦ	tɯan^1			
to smoke	*Cuɦə:n	hɯan^4			
arrow	*C-ŋə: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	*tɕʰə:ŋ	tsʰɔŋ^5
wash	*sə: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	*ɗəy	ti:^{1}	chicken	*kəy	kʰay^1
gall bladder	*ɗəy	ti:^{1}	Hlai	*ləy	ɬay^4
			far	*C-ləy	lay^1
float	*ɓəw	fu:^{4}	you (pl)	*səw	tsʰaw^1
mortar	*rəw	lu:^{4}	pot	*təw	ɗaw^1
			horn	*ɦəw	haw^4
tomorrow	*ɦəwɦ	ziaw^4	Fas y. sis husb	*hjəwʔ	tsi:w^1
wear	*Cuŋəwʔ	ɲiaw^1	head	*Curəwʔ	ki:w^1
banyan	*tʰəwʔ	ɗiaw^1	fill w/ rice	*kʰəwʔ	hi:w^1
water	*C-nəmʔ	na:m^1	meat/wild pig	*rəmʔ	kə:m^1
evening	*tɕʰəp	tsʰɔ:p^9	care for (sprout)	*ɗəp	ɗep^7
sew	*C-ɲəp	ɲɔ:p^9	extinguish	*tɕəp	tsep^7
leak	*Ciɦəp	hɔ:p^9			
cloth	*ɗəp	təp^7	hang up	*hŋəp	kap^8
rice	*Curəp	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	*tʰən	ten^1	take turns	*tɕʰən	tsʰan^1
hungry	*C-rən	len^4	seed	*fən	tsʰan^1
earth	*Curən	len^4	move	*ɦənɦ	han^2
tooth	*fjən	tsʰaŋ^1			
feed (n.)	*kʰən	haŋ^1			
rub (rope)	*pʰən	ɓɔ:n^1	clothing clsfr	*fənʔ	pa:n^1
dream	*fən	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	*tɕʰət	tsʰɔ:t^9	close	*C-ŋət	ŋat^7
gnat	*C-mət	mɔ:t^9			
nose	*kʰət	hɔ:t^9			
sneeze	*ɗəɲ	tɯən^1	choose	*hləɲ	tsɔn^4
pinch	*ɗəɲʔ	tɯən^1			

	PHl	Jiamao	(d)	PHl	Jiamao
sparrow	*pʰəc	ɓat[7]	clear land	*hməc	pet[8]
strangle	*ɾəc	lat[10]			
tree core	*Cuɦəc	ʔiət[7]	buy	*tʃʰəc	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	*kʰəŋɦ	kʰaŋ[1]	dragon	*hnəŋ	tə:ŋ[4]
be	*tɕəŋʔ	tsaŋ[1]	open eyes	*C-ləŋʔ	lə:ŋ[1]
finger	*tɕək	tsɔk[7]	stick to	*pʰək	pʰak[7]

There are several classes of exceptions in this group, as follows:

(89)	Gloss	PHl	Jiamao
(a)	soak	*ɗə:mʔ	tsiəm[4]
	sink	*tɕə:n	tsen[4]
(b)	mound	*Ciɦə:n	huən[3]
	betelnut	*C-lə:ŋʔ	luəŋ[1]
(c)	lid	*hŋə:t	ŋɯt[8]
(d)	sift	*Ciɾəw	tsi:w[4]
	four	*tʃʰəwʔ	tiəw[1]
(e)	below	*tʃʰwəw	ta:w[1]
	to hoe	*ɓəwɦ	ɓɔ:w[5]
	fall down	*ɗəwɦ	ɗa:w[1]
(f)	mouth	*hməmʔ	muəŋ[4]
(g)	bug	*Ciɦənɦ	zɔ:t[8]
(h)	groan	*kəŋ	kiəŋ[1]
(i)	greedy	*ɓət	ɓɯt[7]

The form in (89f) shows the same dissimilation between the initial and coda which occurred in Cunhua: mom > moŋ > muəŋ[4]. The form in (89g) 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.

5.2.8 Mid Back Rimes

The reflexes of the *oC rimes are given below:

(90) Proto-Hlai   Jiamao

    *om   um, əm, ɔːm, aːm, am
    *op   up, ɔp

    *oŋ   uŋ, əŋ, ɔŋ, aːŋ, aŋ, uəŋ
    *ok   ɔːk, aːk

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 ɔːC or əC 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	→	ɔːm, om > əm	*ɔp	→	ɔp
		↘				
	↓		ə[ː]m > a[ː]m	↓		
Stratum 2	*om	→	um	*op	→	up

	Hlai		Jiamao	Hlai		Jiamao
Stratum 1	*ɔŋ	→	ɔŋ, oŋ > əŋ	*ɔk	→	--
		↘			↘	
	↓		ə[ː]ŋ > a[ː]ŋ	↓		əːk > aːk
Stratum 2	*oŋ	→	uŋ	*ok	→	ɔːk

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   təm¹   bamboo (big)   *ɗom   ɗum⁵
      husk   *rom   kəm¹   bury   *hlomɦ   ɬum⁴
      six   *hnom   nəm⁴   simmer   *p-lomʔ   tʰum⁴

      thing clsfr   *ɦom   kɔ:m⁴   ambush   *tʰomʔ   tʰam¹
      mute   *C-ŋom   ŋɔ:m¹   itch   *kʰom   kʰam¹
      wine medicine   *Cuɦom   hɔ:m⁴

      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   *ljoŋʔ   tsaŋ²   vine basket   *C-boŋ   puŋ¹
      resemble[same] *ɗoŋ   ɗaŋ¹   messy   *C-ɲoŋʔ   ɲuŋ¹
      to fish   *roŋʔ   ləŋ²   insert forcefully *tɕʰoŋʔ   tsʰa:ŋ⁵

      fall   *tʰok   ɗɔ:k⁹   sick   *tʃʰok   ta:k⁹
      monkey   *C-nok   nɔ:k⁹   steal   *ljok   tsa:k⁸
      leg   *kʰok   hɔ:k⁹

There are a small number of exceptions in this category:

(95)   Gloss   PHl   Jiamao

(a)   sit   *tɕoŋʔ   tsiəŋ[1]
        dive   *tɕom   tsem[1]

(b)   rice husk   *hmok   pə:k[8]

(c)   pomelo   *ɓom   ɓuəŋ[5]

The nucleus of the two words in (95a) seems to have been fronted under the influence of the preceding

initials. (95c) appears to be another case of dissimilation, as in the case of *mouth* above: ɓom > ɓoŋ >

ɓuəŋ[5].

5.2.9 Low Rimes

The *a:C rimes, like the rimes at the other point 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:y   ɰy, ɰay, a:y
        *a:w   u:, ɰ:w, ə:w, ɔ:w, a:w

        *a:m   əm, ɔm, ɔ:m, a:m
        *a:p   ɰp, ɔ:p

        *a:n   ɰ:n, uən, ɔ:n, a:n
        *a:t   (ɰ:t)

        *a:c   uət, a:t

        *a:ŋ   ɰ:, ɰa, e:ŋ
        *a:k   ɰ:, ɰa

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)   *aːw → əw > uː

        There seems to have been a strong tendency towards raising in the first stratum of *aːC loans, which followed this progression:

(98)   *aːC > ɤːC > ɯːC

This was the first change which apparently led to the creation of a *ɯːC category in Jiamao, where none

had existed before when Hlai *ɯ[ː]C rimes were in the process of being borrowed (generally mixing with

the Hlai *ə[ː]C category).

        The outcome of the second raising which occurred in the *aːC category at a later point in time

depended on the codas:

(99)   aːy > ʌːy > ɯay
                       aːw > ɔːw
                       aːP > ɔːP
                       aːT > oT > uəT
                       aːŋ > ɛːŋ > eːŋ
                       aːk > ʌːʔ > ɯaᴮ

The tendency for long rimes with bilabial codas to be shortened can be observed here as well:

(100)   aːm > om > əm
                       aːm > əm > ɔm
                       aːp > ɯp

A schema of borrowing and subsequent changes is given below:

(101)

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*aːy	→	ɣːy > ɯy	*aːw	→	əw > uː, ɣːw > ɯːw
		↘			↘	
	↓		ʌːy > ɯay	↓		ɔːw
PHl	*aːy	→	aːy	*aːw	→	əːw, aːw

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*aːm	→	om > əm	*aːp	→	ɣːp > ɯp
		↘			↘	
	↓		ɔːm, əm > ɔm	↓		ɔːp
PHl	*aːm	→	aːm	*aːp	→	---

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*aːn	→	ɣːw > ɯːn	*aːt/aːc	→	ɣːt > ɯːt
		↘			↘	
	↓		on > uən	↓		ot > uət
PHl	*aːn	→	aːn	*aːt/aːc	→	aːt

	Hlai		Jiamao	Hlai		Jiamao
Pre-Hlai	*aːŋ	→	ɣ̃ː > ɯː~ɯʔ	*aːk	→	ɣːʔ > ɯːᴮ
	↓			↓		
PHl	*aːŋ	→	ɛːŋ > eːŋ	*aːk	→	ʌːʔ > ɯaᴮ

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	*ɓaːyʔ	puɯy^5	service	*ɗaːyɦ	ɗaːy^5
intestine	*raːyʔ	luɯy^4	envy	*C-ŋaːyɦ	ŋaːy^1
cold	*kʰaːyɦ	kʰɯay^1			
sugarcane	*C-maːyʔ	muɯay^1			
shit	*ɦaːyʔ	huɯay^2			
forehead	*ɗaːw	tuː^1	fog	*hŋaːwʔ	kɔːw^4
laugh	*Ciraːw	tsuː^4	salt	*C-ɲaːwʔ	nɔːw^4
fishy	*kʰaːw	huː^1	cotton	*ɦaːwʔ	hɔːw^4
surround	*hɲaːwʔ	nəːw^2	stew	*C-ŋaːwɦ	ŋaːw^5
alcohol	*C-ŋaːwɦ	ŋəːw^2	spade	*ljaːwɦ	zaːw^4
mountain forest	*ɗaːwʔ	tɯːw^1			
lift (2)	*tʃʰaːm	tɔm^1	step	*C-ɦaːmɦ	hɔːm^2
branch (tree)	*C-ŋaːmɦ	ŋəm^2	step	*Ciɦaːmɦ	zaːm^5
carry on shoulder	*tʃʰaːp	tɔːp^9	bathe	*ʔaːp	ʔɯp^9
yawn	*hŋaːp	hɔːp^8			
partridge	*tʰaːnʔ	ɗaːn^5			
grind (rice)	*kaːnɦ	kaːn^5			
red	*raːnʔ	ɬɯːn^4	remainders	*ɗaːn	ɗuən^1
100	*Curaːn	kɯːn^1	village	*C-βaːn	fuən^1
snore	*Curaːn	luːn^4	moon	*C-ɲaːn	nuən^1
poor	*vaːt	fɯːt^8			
blood	*hlaːc	ɬuət^8	stop (turn off)	*C-ŋaːc	ŋaːt^9
name	*pʰaːŋ	pʰɯː^1	ribs	*kʰaːŋʔ	kʰeːŋ^1
master	*vaːŋ	vɯː^4	crippled	*Ciɦaːŋɦ	heːŋ^2
			big brother	*ʔaːŋʔ	ʔeːŋ^1
sweet	*ɗaːŋ	tɯːʔ^7			
sheep	*hjaːŋ	tsɯːʔ^7			
high	*pʰaːk	pʰɯː^5	land leech	*tʰaːk	ɗuɑ^5
dregs	*ɗaːk	tɯː^5	gill	*C-ŋaːk	ŋuɑ^5
otter	*hnaːk	nuː^2	plantain	*hwaːk	vuɑ^5

The following exceptions exist in this series of rimes:

(103)	Gloss	PHl	Jiamao
(a)	smell	*ɦa:y	huəy^4
(b)	yawn	*ka:w	hɔ:^{5}
(c)	white	*kʰa:w	kʰow^1
	long	*hna:wʔ	tow^4
	steer	*C-na:w	now^1
(d)	clothes	*ʋa:ŋʔ	vo:^{4}
(e)	testicle	*hma:nʔ	pɔ:n^2
(f)	millet	*fa:ŋʔ	pɯa^1
	skin (of fruit)	*fa:k	pua^5
(g)	phlegm	*ɦa:k	ha:k^8
	toad	*ɾa:k	la:p^8

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: depending on the stratum in which they were borrowed.

5.2.10 Summary

The Jiamao to Hlai rime correspondences are significantly more complex than those of the initials, which may imply 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, and there may have been overlap. 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 two-fold 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:	kaw[1]	2sg	*C-mɯ:	məy[1]
1pl excl	*fəw	ʔaw[1]	2pl	*səw	tshaw[1]
1pl incl	*rəw	tey[1]			
3sg	*C-na:	ney[5]	this (proximal)	*C-ni:ɦ	nɛ:[5]
3pl	*ɽu:ɦ	mow[5]	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 Tai 1sg pronouns which are usually of the shape *ku:* or *kaw*), the resemblance may be deceptive, as the initial *k* in Jiamao is normally a reflex of either PHl *g or *r (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	nəm^4
two	*hlu:ʔ	ɬiaw^4	seven	*tʰu:	ɗaw^1
three	*tʃʰwuʔ	ta:w^1	eight	*ru:	ku:^{1}
four	*tʃʰəwʔ	tiəw^1	nine	*C-βɯ:ʔ	fə:^{1}
five	*hma:	pu:^{4}	ten	*fu:t	puət^9

100	*Cura:n	kɯ:n^1

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, in the same stratum. 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	*lɯ:k C-lik	ɬiək⁸ lat⁷
Father's y. sister	*fɯ:ʔ	fi:⁴	younger sibling	*ru:ŋ	nuəy⁵

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:

(107)	PHl	Jiamao		PHl	Jiamao
face	*ɗəŋ	pʰan¹	chin	*ɦa:ŋ	tsʰɔ:ŋ¹
ear	*ljəy	kɔ:¹	throat	*kʰə:k	lɔ:k⁸
shoulder	*ʋa:ɦ	vet¹⁰	breast	*tɕi:ɦ	ɲen⁵
arm	*kʰi:n	tɯ:n¹	lung	*kəwɦ	vuəŋ⁴
sweat	*Cuʔən	ʔɯat⁷	urine	*ɗu:	tsem⁵

Of these, the words for *face*, *shoulder*, *arm*, and *chin* are particularly diagnostic of Southern Kra-Dai 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)   <u>PHl</u>   <u>Jiamao</u>   <u>PHl</u>   <u>Jiamao</u>

	PHl	Jiamao		PHl	Jiamao
horse	*hŋa:ʔ	pə:^{5}	*pig	*hməw	pəy^4
cat	*C-mi:wɦ	ɲa:w^5	*monkey	*C-nok	nɔ:k^9 tsʰa:ŋ^1
pangolin	*C-mɯnʔ	tsa:^{4}	*porcupine	*tɕʰinʔ	lu:^{4} low^2
squirrel	*C-ɲa:t	lə:n^5	*bat	*Cuɾɯ:k	tʰiək^7
crab	*ɓu:ɦ	tsʰa:k^9	*shrimp	*Cuɾa:ŋ	ʔɔ:^{5}
bird	*səc	nɔ:k^9	*snake	*lja:ɦ	ɓuət^7
(fish) scale	*C-lə:p	li:t^9			

          (b)   <u>PHl</u>   <u>Jiamao</u>   <u>PHl</u>   <u>Jiamao</u>

	PHl	Jiamao		PHl	Jiamao
gadfly	*lja:k	nɯa^5	bee	*kə:y	tey^1
mosquito	*C-ɲu:ŋ	tsʰak^7	蛀	*tʰəmʔ	tsi:w^4
beetle	*ɾa:p	pa:p^8	stinkbug	*kɯp	ɗɔ:p^9

          (c)   <u>PHl</u>   <u>Jiamao</u>   <u>PHl</u>   <u>Jiamao</u>

	PHl	Jiamao		PHl	Jiamao
bamboo (thin)	*C-la:w	ɓa:^{1}	white vine (sm)	*kəc	ley^1
wt sesame hemp	*kʰa:n	ven^4	mat grass	*ɾji:wʔ	lə:p^7
muskmelon	*ʔəy	haŋ^1	coconut	*Ciʔunɦ	pɔ:^{5} tshuək^7
mushroom	*ɗit	tsʰaŋ^1	flower	*tʃʰa:ŋ	ŋɯa^1
cotton	*ɦa:wʔ	ɓɔk^7 hɔ:w^4	fruit	*tʃʰə:m	mɯat^7
pit (fruit)	*ʔu:k	hɯət^7	chaff	*hli:p	vu:^{4} vit^8
sesame	*hŋɯ:	tiaw^4			

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 PB *no:k and PSWT *nok), whereas Hlai has an unrelated word. The Hlai word for *monkey* is close to what would be expected (albeit in high register), but it is unclear whether this is evidence of a bizarre semantic shift (*bird* to *monkey*) or just a chance resemblance. The word for *scale* is likewise similar to forms found in other branches of Kra-Dai (compare PB *lic and PSWT *klet).

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   *fa:ʔ   vuəy^{1} star   *ɾa:w   tsap^{7}tsin^{5}
hail   *sinɦ   tsʰa:^{5} frost   *ljin   nɔ:w^{4} vuəy^{1}
wild land   *hmu:ŋ   fa:^{2} forest   *rəŋ   ŋuən^{5}
mountain   *Cuɦəwʔ   tsow^{1} typhoon   *hwənɦ   pʰa:ŋ^{1}
ash   *su:ʔ   fa:^{1} sand   *pʰu:ɦ   ɗey^{1}

5.3.7 Man-made/Household Items

The following words relate to material culture, and are generally well-represented within the Hlai languages proper:

(110)   PHl   Jiamao   PHl   Jiamao

house   *rɯ:n/*p-loŋʔ   ɬɯ:^{2} child's house   *kuyʔ   ɗɔ:^{1}
animal pen   *su:nɦ   ŋat^{7} trough   *[tʃ]ʰu: tɔ:ŋ^{1}
single bench   *tʰimɦ   ŋuən^{1} mat   *tʰɯ:k   tsiək^{8}
cradle   *ʔu: ʔə:y^{1} road   *ku:n   tin^{1}
bamboo hat   *hla:ŋʔ   kuən^{3} lɔ:y^{5} earring   *hwi:ŋɦ   tsʰiaw^{1}
shoes   *kə:mʔ   ləm^{5} arrow   *si:p   pe:^{1}
net (small)   *rə:yʔ   piw^{1} fish basket   *C-li:k   ɓa:w^{1}
fan   *hwoŋʔ   pʰaŋ^{5} vine basket   *tɕʰəwɦ   ɓi:n^{1} lɔ:^{1}
jar   *kəy   ley^{5} bowl/basin   *Cuʔa:w   la:k^{9}
sharp knife   *ljiwʔ   ɬiək^{8} kʰua^{1} a handle (knife) *fi:nʔ   ɓuən^{1}

5.3.8 Adjectives and Verbs

The following long 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:

(111)

	PHl	Jiamao		PHl	Jiamao
black	*ɗəmʔ	tsʰey^1	grey	*hma:wɦ	pʰu:^{1}
yellow	*lja:ŋ	tsay^4	indigo	*tɕʰi:ŋ	ta:^{1}
salty	*Cuɦa:nʔ	taŋ^2	spicy	*rit	kəŋ^5
good	*hlin	maŋ^1	bad	*rja:k	ʔay^1
old (thing)	*ka:wʔ	ʔjɔ:t^9	new	*hma:n	ɬaw^4
early	*ka:wʔ	puət^8	late	*fəŋ	liaw^1
fast	*hjinʔ	tsʰiaŋ^5	slow	*si:ʔ	tsəŋ^2
wide	*ɓa:ŋ	vi:^{4}	narrow	*ɓi:p	vi:n^5
hard	*tɕʰə:nʔ	lə:w^4	soft	*hmu:t	puək^7
dense	*tʰi:t	ni:t^9	sparse	*hŋwa:nʔ	fuən^1
live, fresh	*Cuɾi:p	ɬuət^8	rotten	*ʔɯ:nʔ	ɲɯ:t^8
horizontal	*ɾinɦ	ləŋ^4	vertical	*ɦən	tiam^1
blind	*p-la:w	kʰiw^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	*tʃʰwəwʔ	ʔjuŋ^1	cool (water)	*rən	ɓe:k^7
afraid	*ɗa:ʔ	ɬɔ:^{4}	thin	*C-li:ʔ	ŋa:w^1
dry	*ɾa:nɦ	kʰa:^{1}	sterile (egg)	*Cuɾa:wʔ	tsum^1 luəŋ^2
round	*Curom	la:w^1	few	*rjəwɦ	tə:k^8
empty	*Cuɾayɦ	kʰaŋ^1	straight	*C-mu:c	kɯŋ^5
fine	*ʔu:t	ɲə:p^8			

(112)

	PHl	Jiamao		PHl	Jiamao
do	*ʋu:k	leŋ^1	understand	*kʰu:ŋ	min^4 tay^2
listen	*p-lɯ:	ŋey^2	look	*kiw	may^1
eat	*C-lu:ɦ	tey^5	swallow	*Ciʔə:mɦ	kuat^{10}
vomit	*fa:k	ʔɔŋ^1	lick	*lji:mɦ	ɬe:p^8
bite	*hŋa:ɲʔ	ɗa:n^1	hold in mouth	*fə:m	tɔm^5
hit	*tʰa:yɦ	təp^8	cast (seed)	*fə:nɦ	ʔia^1
cut rice	*tʰun	pʰɯ:w^1	winnow	*fənɦ	vat^7
light fire	*ʔɯmɦ	tu:^{5}	boil	*ɗa:n	puət^8
flow	*C-ma:w	lɔ:t^8	swim	*p-li:	lɔn^1
take	*hmət	mi:^{2}	pick up	*tɕʰi:wʔ	kʰɛ:^{5} lə:w^4
kill	*ɦu:ʔ	tse:^{2}	call	*tɕa:n	kow^4
play	*rjɯ:k	liaw^1	arrive	*ɗa:nʔ	vow^1
get	*C-ma:k	mɯən^1	give	*ɗɯ:	mɯan^1
answer	*tʰin	hɔ:n^4	die	*la:wɦ; *lju:y	lɔ:t^9
fall	*hla:ɦ	ʔa:^{5}	braid (lg)	*p-li:	ta:^{1}
weave (net)	*kʰu:t	tsʰa:^{1}	weave (fabric)	*hwi:	tsʰup^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 is locatives (113a), the second time words (113b), and the final one classifiers (113c):

(113)　(a)

	PHl	Jiamao		PHl	Jiamao
top	*pʰi:ʔ hnɯ:	law¹law¹	inside	*pʰi:ʔ ʔu:k	tsʰu:¹ ke:⁴
front	*pʰi:ʔ ɗən	pʰa:y⁵ tʰiən⁴	outside	*ljɯ:n	lɔ:w⁴
side	*fa:ŋ	pʰa:y⁵	opposite side	*hlɯnɦ	ʔe:k⁹
left	*pʰi:ʔ hwi:ŋ	hay² huəy⁴	right	*pʰi:ʔ hninɦ	pʰa:y⁵ pet¹⁰
everywhere	*hŋom hŋa:yʔ	vow¹ la:y⁴			

(b)

	PHl	Jiamao		PHl	Jiamao
2 years ago	*hmu:ɦ ɾɯ:	mɯ² lut¹⁰	3 days later	*hwən Cuɦa:t	kɯ² kut¹⁰
2 days ago	*hwən ɾɯ:	vɔ:n¹ tsu:n⁴	2 days later	*hwən Cuɦɯ:	kɯ² ka:²
from before	*tɕʰi kʰu:nɦ	tsʰi¹ vɔ:n¹ mɔ:⁵	morning	*ka:wʔ ɗom	ziaw⁴ hɔm⁴
last year	*hmu:ɦ pʰənʔ	mɯ² lə:y⁴	noon	*tʃʰa: hŋwən	kɯ² ɗuən⁵
next year	*hmu:ɦ ɗəŋ	ma:¹ tʰiəŋ⁴			

(c)

	PHl	Jiamao		PHl	Jiamao
trip clsfr	*ku:n	lem¹	tree clsfr	*kʰɯ:ŋɦ	nɔ:w⁵
pile clfr	*C-lɛ:p	ɓa:k⁹	needle clsfr	*tɕʰu:ŋ	tsʰin⁵
land measure	*tɕʰa:n	hɯan¹	pile clsfr	*pʰəwʔ	tsu:n⁵
person clsfr	*tɕu:n	ŋuən¹	speech clsfr	*fa:k	tuəŋ⁵
bundle clsfr	*ɓi:k	puək⁹	long thing clsfr	*Ciɦa:ɦ	tɯy¹
layer	*hlɯt	fɯ:n⁴	pair (of)	*hlɯ:mᶜ	ʔum¹
piece (of)	*tʰun	ɗat⁷			

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 initial 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.

Concerning the origin of Jiamao, Thurgood (1991) mentions a comment made by Ni Dabai, where Ni says that:

'[T]he Jiamao were Hui, that is, Muslims, who originally came to Hainan in two waves, the first in 986 A.D. and 988 A.D. and the second in 1486.'

Thurgood then suggests, based on Jiamao register data, that this original Jiamao population was Austroasiatic. While there does not seem to be lexical evidence (as far as I am aware) to confirm this, Thurgood is the first person to draw attention to the fact that the Jiamao vocabulary represents (at least) two layers of borrowing. If the time frame suggested by Ni is correct (which only further research might be able to confirm), then the approximate 500 years between the two waves of immigration would serve as very convenient points with which to date Hlai itself to a certain extent, since the first dates (986-988 A.D.) would have placed the latter part of Pre-Hlai at about 1000 A.D., and the second date (1486 A.D.) would

place the breakup of Proto-Hlai at a point not long before 1500 A.D. This approximately 500-year-long

period encapsulates a number of sound changes which have been proposed in this latter period of Pre-Hlai

and at the beginning of the Proto-Hlai disintegration, but not an unreasonable number. It may also be

conjectured that sound change in Hlai accelerated in proportion to the amount of language contact into

which its speakers entered into, which may have been minimal in the first millennia of the Hlai occupation

of Hainan, but probably began to intensify during the time in question, and certainly becoming more

intense by the time of Chinese involvement in the island.

At this point, there are only two words which may be traceable to another language phylum:

(114) | Gloss | Jiamao | Pre-Jiamao |
|-------|--------|------------|
| butterfly | ɓaŋ⁵ ɓɯa¹ | *ɓəŋ^X ɓʌːŋ |
| pig | pəy⁴ | *mb[o]y |

These are very reminiscent of Proto-Austronesian *qari-baŋbaŋ[57] and *babuy respectively, but without

other comparisons they remain only chance resemblances at this point. It may be possible that they are

borrowings from Utsat, a Chamic language spoken in southern Hainan. The Utsat word for *pig* is p^huy^{11},

from an earlier *buy; the word for *butterfly* is presently unknown to me.

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 initial 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.

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[57] See the next chapter for the conventions used when citing Proto-Austronesian forms.

CHAPTER SIX: CONCLUSION

This final chapter is divided into four sections. The first section places Hlai within the context of the Southeast Asian language area, and shared vocabulary (whether borrowed or potentially inherited from a common ancestor) will be examined and analyzed. The second section presents a summary of findings throughout the various parts of this dissertation. The third provides an overview of the empirical and theoretical contributions of this dissertation. The final section provides a brief discussion of future research.

6.1   The Relationship between Hlai and Other Language Families of Southeast Asia

There are five language phyla extant in Southeast Asia at present: Sino-Tibetan, Mon-Khmer, Hmong-Mien, Kra-Dai, and Austronesian. At present, there is no consensus view that any two or more of these phyla are genetically related, although relationships have been proposed in all directions, and some proposals have met with greater success (both in terms of acceptance as well as in quality of supporting data) than others. It is not the purpose of this section to argue for a genetic relationship between Kra-Dai and any other phylum. However, with a reconstruction of Proto-Hlai in hand, each potential relationship can be observed from the perspective of Hlai and the circumstantial evidence presented in such a way as to provide clues for future research. That is the purpose of this section, and each of the four non-Kra-Dai phyla will be treated individually with an eye to increasing the resolution of the prehistoric picture which involved Hlai, either individually or as part of Kra-Dai.

The place of Hlai in the Southeast Asian interphyletic picture is somewhat unique, given its presumed 3,500 year isolation on Hainan after moving from the mainland. Lexical connections with other phyla can be inferred in a number of ways, all of them interesting from a prehistoric perspective. First, shared words may have been inherited from the immediate ancestor of Hlai, Southern Kra-Dai, in which case they are of interest because of the antiquity of the contact they imply. If these words are unique to Hlai within Kra-Dai, on the other hand, the implication is that there was either contact with Hlai before speakers moved to Hainan, that there have been incursions from the mainland into Hainan, or (probably

least likely) that Hlai has been carried back to the mainland at some time subsequent to the original

migration of Hlai speakers to Hainan.

Before treating each phylum on an individual basis, it should be noted that Chinese plays a special

role in this section due to its cultural prominence in Southeast Asia. While it would be much too hasty to

presume that all loan relationships have been unidirectional when Chinese is involved in examples across

multiple phyla, it is nevertheless probably safe to target Chinese as a donor in the majority of cases. The

following examples[58] include Tibeto-Burman because, although it is related to Chinese within Sino-Tibetan,

it has been shown (see Sagart (1999)) that it (or its daughter branches) has also been the recipient of loans

from Chinese:

(1)	PHl	Old Chinese	Viet-Muong	Tibeto-Burman	Hmong-Mien
old	*kʰəwɦ	*gwəʔ	*guᶜ	---	---
duck	*ɓit	*pʰit	*wit	---	---
belt; rope	*ɗəːy	*tas	*tjəy	*m/s-taːy	---
work	*koŋ	*koŋ	*koŋ	---	---
pass, beyond	*kuaʔ	*kuayh	*kwa	---	(*qlwAːy)
bee	*kəːy	---	*kʰwayᴮ	*[k/g]waːy	---
vegetable	*saːyʔ	*tsʰəʔ	---	*t(s)aːy	---
goose	*C-ŋaːnɦ	*ŋrans	*hŋan	---	---
sheep	*hjaːŋ	*[l/j]aŋ	---	*jaŋ	*ʑwɒəːŋ

Finally, the last several examples do not include Chinese, but are notable items which are

widespread in Southeast Asia:

(2)	PHl	TB	VM	WB	HM
fly (v.)[59]	*ɓin	*bjer	*pʙl	*par	---
this	*C-niːɦ	---	*əni	*nɛʔ	*ʔneːy
flash (lightning)	*[C-]ljip	*ljap	---	*liap	---
forest	*rəŋ	---	*rəŋ	---	*ŋklaŋ

---

[58] Sources for each of these reconstructions can be found in the sections below.
[59] As evidence for a final liquid for *fly* in Kra-Dai, see Saek *bɯl¹*.

Of all of the items listed above, there are equivalent forms found in Proto-Be and/or Proto-SWT in all except one case, representing either a PSKD etymology or otherwise indicating that early borrowing occurred separately after the break-up of PSKD, but probably before Hlai speakers entered Hainan. The one form which occurs only in Hlai is *bee*, a potential loan from Tibeto-Burman.

6.1.1 Sino-Tibetan

The following list of items are part of PSKD etymologies, most of which appear to be loans from Chinese, although it is possible that one or more may have gone in the other direction. Based on the progression from OC to MC, it is likely that the TB word for *ginger* is also a borrowing:

(3)	PSKD	PHl	OC	MC	TB
put down, let go	*pɯaŋ^C	*pʰɯ:ŋʔ	*paŋh	*puɑŋ^C	---
weave (fabric)	*ʈu:k	*tʃʰwɯ:k	*tək	*tɕɨk	*t(r)ak
carry (on pole)	*ʈa:m	*tʃʰa:m	*tlam	*tɑm	---
chicken	*kəy$^{(B)}$	*kʰəy	*ke	*ke	---
ginger	*qɯaŋ	*kʰɯ:ŋ	*kaŋ	*kɨɑŋ	*kjaŋ
arm~shoulder	*qe:n	*kʰi:n	*ken	*ken	---
dig hole	*Ciɢut	*Cifiut	*gut	*gut	---
buffalo	*suy^C	*suyʔ	*s-jəyʔ	*zi^B	---
silver	*ŋən	*hŋən	*ŋrən	*ŋɨn	*ŋul
many, much	*H-la:y	*hlə:y	*t-lay	*tɑy	---
remainder	*Cila:	*lja:	*la	*jɑ	---
head	*kurəw^C	*Curəwʔ	*hluʔ	*çu^B	---

The following three words are similar to TB in rime; since there is a three way correspondence with a single TB initial cluster, it is likely that only one, if any, of the following words has a true relationship:

(4)	PSKD	PHl	TB
shellfish	*ʈo:y	*tʃʰi:	*k-roy
gall~bile	*C-təy	*ɗəy	*k-rəy
horn	*C-qəw	*fiəw	*k-rəw

The next Hlai examples have no PSKD ancestor, and it is likely that they represent loans from Chinese. Potential Pre-Hlai examples are given in place of PSKD:

(5)	Pre-Hl	PHl	OC	MC	TB
man	*pa:ʔ	*pʰa:ʔ	*pa	*puɑ	*pwa
vehicle	*cia	*tɕʰia	*k-hla	*tɕʰja	---
lacquer	*cit	*tɕʰ[i/ə]t	*tsʰit	*tsʰit	---
group	*gun	*kʰun	*gun	*gun	---
axe	*C-puafi	*ɓuafi	*paʔ	*puɑᴮ	*pwa
float	*C-pəw	*ɓəw	*bu	*bu	---
same~together	*C-toŋ	*ɗoŋ	*doŋ	*doŋ	---
wade	*C-cəm	*tɕəm	*dzam	*dziam	---
sword	*C-kɯamfi	*kɯ:mfi	*kams	*kɨamᶜ	---
work	*C-koŋ	*koŋ	*koŋ	*koŋ	---
look up at	*ŋɯaʔ	*hŋɯ:ʔ	*ŋaŋʔ	*ŋɨaŋᴮ	---
horse~7ᵗʰ branch	*ŋa:ʔ	*hŋa:ʔ	*ŋaʔ	*ŋɑᴮ	---
hear (said)	*(h)le:ŋ	*hli:ŋ	*hleŋ	*tʰeŋ	---
measure (rice)	*C-lɯaŋʔ	*C-lɯ:ŋʔ	*raŋh	*liɑŋᶜ	*[g/k]-raŋ
boar (wild)	*d-ləc	*C-ləc	*d-lats	*ɖas	---
pair	*C-lɯaŋfi	*C-lɯ:ŋfi	*raŋʔ	*liɑŋᴮ	---

The cases below are less more problematic, but still possibly related:

(6)	Pre-Hl	PHl	OC	MC
mat	*dɯak	*tʰɯ:k	*s-lak	*ziak
rest	*çɯ:k	*tɕʰɯ:k	*sək	*sɨk
dragon	*nəŋ	*hnəŋ	*roŋ	*lioŋ
snake	*Cila:fi	*lja:fi	*m-lay	*ʐa
swallow~drink	*Ciʔə:mfi	*Ciʔə:mfi	*ʔəmʔ	*ʔimᴮ

Finally, the following are potential examples of possible loans between Hlai and TB:

(7)	Pre-Hl	PHl	TB
rice	*da:fi	*tʰa:fi	*dzja
bee	*C-ka:y	*kə:y	*[k/g]wa:y
brain	*lu:k	*hlu:k	*nuk
fall	*la:fi	*hla:fi	*[g/k]-la
exchange	*p-ləy	*p-ləy	*l[a/e]y
iron~copper	*rə:y	*rə:y	*g-rəy

It can be noted in the above example sets that there is a very patterned correspondence between the Chinese and Hlai tone categories. Category A in Hlai (the unmarked category) always corresponds to the same in Chinese, whereas the marked categories B and C correspond to marked categories in Chinese[60]. However, there are mixed correspondences between these two categories, which I interpret to indicate two layers of loanwords. The reason for this confusion may involve, at least partly, the beginning of a transition from final glottal segments to a phonation difference in one or both families. The older layer includes the following:

(8)

Gloss	Pre-Hl	PHl	Old Chinese	Late Han
head	*kurəwʔ	*Curəwʔ	*hluʔ	*çu^B
buffalo	*suyʔ	*suyʔ	*s-jəyʔ	*zi^B
horse[61]	*ŋa:ʔ	*hŋa:ʔ	*ŋaʔ	*ŋɑ^B
look up at	*ŋɯaʔ	*hŋɯ:ʔ	*ŋaŋʔ	*ŋɨɑŋ^B
sword	*C-kɯamɦ	*kɯ:mɦ	*kams	*kɨam^C
goose	*C-ŋa:nɦ	*C-ŋa:nɦ	*ŋrans	*ŋan^C

What I interpret as a more recent layer, with 'reversed' tone category correspondences, includes the following:

(9)

Gloss	Pre-Hl	PHl	Old Chinese	Late Han
axe	*C-puaɦ	*ɓuaɦ	*paʔ	*puɑ^B
pair	*C-lɯaŋɦ	*C-lɯ:ŋɦ	*raŋʔ	*liaŋ^B
swallow ~drink	*Ciʔə:mɦ	*Ciʔə:mɦ	*ʔəmʔ	*ʔim^B
put down, let go	*pɯaŋʔ	*pʰɯ:ŋʔ	*panh	*puɑŋ^C
pass, beyond	*C-kuaʔ	*kuaʔ	*kuayh	*kuɑɣ^C

The following two examples are interesting, in that they both show evidence of OC medial *-l- correlating with retroflexion, in Hlai in the first case, and in Chinese itself in the second:

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[60] It should be noted that, due to what amounts to more or less a historical accident, Kra-Dai category B is usually taken to be associated with spread glottis as is Chinese category C, whereas Kra-Dai category C and Chinese category B are both associated with constricted glottis.

[61] It is interesting that the Hlai word *horse* does not correspond to the commonly used term OC *mraʔ, but rather to the 7th earthly branch of the Chinese zodiac which is associated with the horse.

(10)	Pre-Hl	PHl	OC	MC
carry (on pole)	*ʈaːm	*tʃʰaːm	*tlam	*tɑm
boar (wild)	*C-ləc	*C-ləc	*d-lats	*ɗas

There are several cases where a Hlai form is reconstructed as originally sesquisyllabic, yet is comparable to monosyllabic Chinese forms. The following cases show exact identity in the initials of the main syllable:

(11)	Pre-Hl	PHl	OC	MC	TB
axe	*C-puaɦ	*ɓuaɦ	*paʔ	*puɑ^B	*pwa
belt; rope	*C-taːy	*ɗəːy	*tas	*tɑs	*m/s-taːy
work	*C-koŋ	*koŋ	*koŋ	*koŋ	---
sword	*C-kɯamɦ	*kɯːmɦ	*kams	*kɨam^C	---
pass, beyond	*C-kuaʔ	*kuaʔ	*kuayh	*kuɑy^C	---
swallow ~drink	*Ciʔəːmɦ	*Ciʔəːmɦ	*ʔəmʔ	*ʔim^B	---
goose	*C-ŋaːnɦ	*C-ŋaːnɦ	*ŋrans	*ŋan^C	---
measure (rice)	*C-lɯaŋʔ	*C-lɯːŋʔ	*raŋh	*liɑŋ^C	*[g/k]-raŋ
pair	*C-lɯaŋɦ	*C-lɯːŋɦ	*raŋʔ	*liɑŋ^B	---

The words below correspond to Chinese words with voiced initials; in addition to these, there is one TB comparison for *bee* which is indeterminate for voicing:

(12)	Pre-Hl	PHl	OC	MC	TB
float	*C-pəw	*ɓəw	*bu	*bu	---
same~together	*C-toŋ	*ɗoŋ	*doŋ	*doŋ	---
wade	*C-cəm	*tɕəm	*dzam	*dziam	---

Finally, the following sesquisyllabic form corresponds to a voiceless aspirated initial:

(13)	Pre-Hl	PHl	OC	MC
duck	*C-pet	*ɓit	*pʰit	*pʰit

6.1.2 Mon-Khmer

Much to the chagrin of Southeast Asian scholars, a full reconstruction of Mon-Khmer has yet to be achieved. However, even if it were available, it would likely represent a family of such antiquity that comparison with Hlai would be rather anachronistic in the context of a contact relationship. For the purposes of this chapter, reconstructions of three different Mon-Khmer subfamilies have been used: Viet-Muong (Thompson (1976)), West Bahnaric (Sidwell & Jacq (2003)), and South Bahnaric (Sidwell (2000)).

The comparisons below involve only Viet-Muong. Of these, the following are particularly similar:

(14)	Pre-Hl	PHl	VM
deer	*C-də:yʔ	*rə:yʔ	*ʔday
hoe	*C-kwa:k	*kwa:k	*kuək
mouth	*məmʔ	*hməmʔ	*mom
good	*len	*hlin	*leɲ
drum[62]	*C-ləŋ	*C-ləŋ	*hədloŋ^B
fast	*j[e]nʔ	*hj[i]nʔ	*hɲɛɲ

The set of vocabulary below may also be related, although the resemblance is not as direct:

(15)	Pre-Hl	PHl	VM
insipid	*C-təc	*ɗəc	*m-lac
dry	*C-ta:w	*ɗa:w	*t-raw^B
fall	*la:ɦ	*hla:ɦ	*hlɜ^C
old	*ja:	*hja:	*əg^{ɦ}ja

The following vocabulary items are found in West and/or South Bahnaric, and occasionally in Viet-Muong. The first set is made up of Hlai forms which are included in the PSKD reconstruction in chapter four:

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[62] This word is hypothesized in chapter 4 to descend from PSKD *k-l[ɔ]ŋ.

(16)	PSKD	PHl	WB	SB	VM
cover	*xəp	*kʰəp	*kəp	---	---
scratch~scrape	*x[ɯ/u]:t	*kʰɯ:t	*krɯ:t	---	---
crow	*ʔa:k	*ʔa:k	*k-ʔa:k	*kənʔa:k	---
board	*(C-)pɛ:n$^{B/C}$	*ɓe:nɦ	*[t]paɲ	---	---
winnowing fan	*C-tɔŋ^{C}	*ɗoŋʔ	---	*gədo:ŋ	---
centipede	*q-ɖe[:]p	*ɽi:p	*kʔɟep	*kərʔip	---
mother, female	*me:$^{B/C}$	*hmi:ʔ	*me:ʔ	*me:	*həmay^{B}
ant~termite	*moc	*hmuc	*s-mo:c	*mo:c	*mɔc
sesame	*ŋɯa	*hŋɯ:	*r-ŋa:	*[r/l]əŋa:	---
widow(er)	*H-ma:y^{C}	*hmə:yʔ	*k-ma:y	---	---
cat	*C^{V}-me:w$^{(B)}$	*C-mi:wɦ	*me:w	---	---

The following items lack PSKD etymologies, and may therefore be loans into Hlai:

(17)	Pre-Hl	PHl	WB	SB	VM
throw	*pa:ŋʔ	*pʰa:ŋʔ	*pɔŋ	---	*pʰɔŋ^{B}
close (mouth)	*dəp	*tʰəp	*dap	---	---
dry in sun	*ʈi:ŋʔ	*tʃʰi:ŋʔ	*tɯ:ŋ	---	---
blow	*ʔu:ɦ	*ʔu:ɦ	---	*ʔuh	---
mushroom	*C-tet	*ɗit	*p-se:t	*nəse:t	---
hawk	*C-ci:wʔ	*tɕi:wʔ^{63}	*cɯw	---	---
phlegm	*C-ga:k	*ɦa:k	*kəha:k	---	---
aunt	*mi:	*hmi:	*mih	---	---
year	*mo:ɦ	*hmu:ɦ	*k-mɔ:	---	---
yawn~gasp	*ŋa:p	*hŋa:p	*ha:p	*nəga:p	---
loose	*lo:ŋʔ	*hlu:ŋʔ	*r-lɔ:ŋ	---	---
banyan	*ri:	*ri:	*ɹ-rəy	*ɟəri:	---
pinch	*C-me:t	*C-mi:t	*cʔbe:t	---	---
flash; open eyes	*C-ləŋʔ	*C-ləŋʔ	*b-la:ŋ	---	---

The following forms are more problematic, but still represent possible cognates. The set (18) has

PSKD etymologies, and the set in (19) does not and Pre-Hlai reconstructions are therefore given:

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[63] This form is inferred from Lauhut (Ouyang (1992)), and it is unknown to what extent it is found in the
other Hlai languages.

(18)	PSKD	PHl	WB	SB	
soak	*(C-)[t/c]ə:m^C	*ɗə:mʔ	*t-ram	*təram	---
black, dark	*C-[t/d]əm$^{(C)}$	*ɗəmʔ	*kəlam	---	---
chin~jaw	*C-ga:ŋ	*ɦa:ŋ	*ka:ŋ	*ka:ŋ	---
thatch grass	*Ciga:	*Ciɦa:	---	*gəja:	---
stinger	*C^V-nəy	*C-nəy	*kəlay	---	---

(19)	Pre-Hl	PHl	WB	SB	VM
descend	*ʈu:ʔ	*tʃʰu:ʔ	*c-ruh	---	---
beetle~termite	*C-da:p	*ɾa:p	---	*kəla:p	---
muntjac	*C-lə:y	*C-lə:y	*k-ro:y	---	---
tin	*la:k	*hla:k	*t-ra:k	---	---

Based on the above comparisons, it appears that Hlai (as well as its ancestor PSKD) has been in contact with certain Mon-Khmer subgroups. The above examples suggest that one of these has been Viet-Muong, and there is a surprising amount of suggestive evidence that there has been at least as much with Bahnaric. This latter connection is especially important for the prehistory of Hlai, in that it suggests that Hlai must have once existed far enough south to engage in this contact, the alternative being that a group of Bahnaric speakers migrated at some point to Hainan.

6.1.3 Hmong-Mien

A relationship between Kra-Dai and Hmong-Mien was first suggested in Benedict (1942), where he included Hmong-Mien (Miao-Yao) in his Austro-Thai phylum. More recently, Kosaka (2002) published an article in which he identified a small group of vocabulary items which are suggestive of a relationship between Kra-Dai and Hmong-Mien, although whether this is due to a genetic relationship or to contact remains to be seen. The most comprehensive reconstruction of Hmong-Mien currently available is that of Wang and Mao (1995), and that is what is employed here for comparison. Wang and Mao (1995) is very useful in that it represents a large sample of core vocabulary across twenty-three Hmong-Mien languages. The major drawback of this work, in my opinion, is that the authors engage in a particular kind of 'proto-form stuffing' whereby they do not appear to seek to account for intermediate processes between the proto-

language and daughter languages that may explain what end up being sometimes very divergent realizations in phonetic form. Rather, in the case of the initials, they often merely linearize different reflexes, resulting in clusters that are ultimately unrealistic. This situation is not as bad with the rimes, but the system is still overburdened. The other major omission of this work is the reconstruction of tone categories, which are discussed in the introduction of the book but abandoned in the actual reconstruction. These shortcomings should be borne in mind during the presentation of data below.

At least one third of the potential cognates (using the term to include words which have a relationship either due to common descent or to borrowing) between Hmong-Mien and Hlai appear to be mutual borrowings from Chinese (although some of these are widespread area words, in which case Chinese is not the only candidate for the loan source)[64]. Examples are given below:

(20)	Gloss	MC	PHl	PHM
放	let go	*puɑŋ^C	*pʰɯ:ŋʔ	*poəŋ
槽	trough	---	*tʃʰu:	*dðAw
乾淨	clean	*dzieŋ^C	*tɕʰi:ŋɦ	*ndðɐŋ
雞	chicken	*ke	*kʰəy	*qəy
姜	ginger	*kɨɑŋ	*kʰɯ:ŋ	*qʰwjæŋ
斧子	axe	*puɑ^B	*ɓuɑɦ	*pəw
浮	to float	*bu	*ɓəw	*mbjow
錢	coin, money	*dzian	*tɕi:n	*dðɪn
過	to pass	*kuɑi^C	*kuəʔ	*qlwA:y
龍	dragon	*lioŋ	*hnəŋ	*ŋgloŋ, *klju:ŋ
銀	silver	*ŋin	*hŋən	*ɲwɐ:n
染	dye (cloth)	*ɲam$^{B/C}$	*C-ɲomʔ	*ɲɐm
量	(to) measure	*liɑŋ$^{(C)}$	*C-lɯ:ŋʔ	*ɭuəŋ
兩	pair	*liɑŋ^B	*C-lɯ:ŋɦ	*ɭwɑəŋ
羊	sheep	*jɑŋ	*hja:ŋ	*ʑwɒ:ŋ

The following forms may be related in some way. Due to small number of comparisons, along with the reservations expressed about the Hmong-Mien reconstruction, future work will be necessary to either confirm or deny these comparisons. The first group of words considered here are those which have a

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[64] Note, however, Edmondson (to appear 2007), where the hypothesis is presented that Hmong-Mien is the closest relative to Sino-Tibetan within Southeast Asia. If this is correct, then some HM items which are taken to be Chinese loans might actually be cognates in the genetic sense of the word.

PSKD pedigree, indicating that if borrowing occurred (in either direction), it may not have involved Hlai

directly:

(21)	PSKD	PHl	PHM
tortoise	*tuː^B	*tʰuːɦ	*dAw
white	*xaːw	*kʰaːw	*qləw
tooth	*Civən	*fjən	*hmjnin
return	*mɯa	*hmɯː	*mʊ
you	*C^V-mɯː	*C-mɯː	*mwu
this	*[C-]niː^{B/C}	*C-niːɦ	*ʔneːy
salt	*C-ɲaːw^C	*C-ɲaːwʔ	*ɳʈʂaw
near	*C-lɯː^C	*p-lɯːʔ	*ŋklə
yellow	*Cilaːŋ	*ljaːŋ	*ɢlwjAŋ
fish	*m-laː	*hlaː	*mbɖʐaw
spicy	*p-ret	*rit	*mbɖʐaːt
I	*[C-]ku	*ɦuː	*kəːŋ
excrement	*C-ɢ[aː]y	*ɦaːyʔ	*qɑy
bitter	*C-ɢ[ə/o]ːm	*ɦəːm	*ʔiːm

The next items don't have PSKD etymologies, and Pre-Hlai forms are provided instead:

(22)	Pre-Hl	PHl	PHM
father	*paːʔ	*pʰaːʔ	*pwtsa
cooking stove	*suːʔ	*suːʔ	*tsʊ
in front	*C-təŋ	*ɗəŋ 'face'	*ndæːŋ
porcupine	*C-təy	*ɗəy	*ɳɖʐoy
female	*miːʔ	*hmiːʔ	*mjnip
pig	*məw	*hməw	*mpɒ
uncle (mos bro)	*nɯːʔ	*hnɯːʔ	*nɑw
long	*naːwʔ	*hnaːwʔ	*ntæːw
ear (of grain)	*ɲaːŋ	*hɲaːŋ	*hnjeŋ
heart	*laːwʔ	*hlaːwʔ	*pləw
3p pronoun	*C-naː	*C-naː	*næn
liver	*C-ŋaːn	*C-ŋaːn	*ŋkʰlAn
ear	*Ciləy	*ljəy	*mbɖʐAy
neck	*Ciləŋʔ	*ljoŋʔ	*qlAːŋ
scissors	*Ciliwʔ	*ljiwʔ	*ɲcljiːw
knee	*C-duː	*ruː	*dʐwew

The forms below are superficially less similar, but may still represent a lexical relationship. The first group (23) has a PSKD etymology, and the second group, lacking this, includes Pre-Hlai reconstructions:

(23)	PSKD	PHl	PHM
head louse	*ʈwu:	*tʃʰwu:	*ɳʈʂʰoy
big	*C-l[u]ŋ	*C-luŋ	*hlʊ
shoulder	*C-ba:ᴮ	*ʋa:ɦ	*bu
fly (insect)	*wa:ŋᶜ	*hwa:ŋʔ	*moəŋ

(24)	Pre-Hl	PHl	PHM
burn	*cuyʔ	*tɕʰuyʔ	*pʰtsʰuy
to sink	*C-cə:n	*tɕə:n	*dɒn
sore (n.)	*C-na:ŋ	*C-na:ŋ	*tsʰA:ŋ
fall (rain)	*C-lu:y	*C-lu:y	*du:y
to cut (scissors)	*[C-]rəp	*rəp	*klɐp

Although some of the above examples are most likely chance resemblances, taken as a group, the comparisons above suggest some sort of relationship which transcends mutual contact with Chinese. The nature of this relationship will probably not be clarified further until a fine-tuning of the Hmong-Mien reconstruction and the finalization of a Kra-Dai reconstruction.

6.1.4 Austronesian

The comparison between Kra-Dai and Austronesian was brought to fore in Benedict (1942), where they served as the two main components of his *Austro-Thai* phylum, in which he also included Hmong-Mien. The hypothesis has been extremely controversial, owing particularly to the fact that Benedict had generally very loose criteria for his comparisons, and eventually included an even more controversial branch, Japanese (Benedict 1991). Two notable recent contributions to the debate have been Thurgood (1994), in which it is argued that the similarities between Kra-Dai and Austronesian are due to an ancient

contact relationship, and Ostapirat (2005), where it is argued that these reflect a genuine genetic
relationship.

It is not the purpose of this section to take a stand on this issue, and it is my opinion that this
matter should be examined thoroughly only when a Kra-Dai reconstruction exists that is on par with the
present reconstruction of Proto-Austronesian (PAn), which is considerably more complete and well-
understood. However, a comparison between PAn and Hlai is nevertheless interesting in its own right, not
only because parallels exist in Hlai which are not found in other branches of PSKD, but also because the
polysyllabic nature of PAn can serve as a platform to demonstrate the application of the sound changes
discussed in chapter four. Most of the PAn lexical items below have been taken from Zorc (1995),
although a few have been taken from the Austronesian basic vocabulary database (which can be found at
the following URL: http://language.psy.auckland.ac.nz/austronesian/).

Before examining the data, a discussion of the nature of the PAn reconstruction employed here is
necessary. In general, the system of Blust (1999) will be adopted, but with the following modifications
based on a reinterpretation of the Formosan language data, to be explored in greater detail elsewhere:

(25) C = ʈ   N/L = l
      S = ʂ   l = r
      j = ɖ   r = ---
      Z/z = ɟ

In other words, a retroflex series is introduced, a voiced palatal stop is added, and the system of liquids is
reinterpreted so that original *N/*L are reinterpreted as *l, original *l is reinterpreted as *r, and original
PAn *r is considered secondary (there is little evidence for it in the traditional PAn reconstruction in any
case).

It is significant that the majority of comparisons presented here are part of PSKD etymologies
presented in chapter four. Note that many of the following have been proposed before by others:

(26)	PSKD	PHl	PAn
ancestor	*pu:^B/C	*pʰu:ʔ	*a(m)pu
fart	*S-to[:]t	*tʰu:t	*qə̆(n)tut
land leech	*N-ta:k	*tʰa:k	*matək~mətak
head louse	*ʈ(w)u:	*tʃʰwəw	*kuʈu
eye	*N-ʈa:	*tʃʰa:	*maʈa
rib	*k^(h)ra:ŋ^C	*kʰa:ŋʔ	*tak(ə)ʀaŋ
dirt on skin	*[d-]ɣi:	*kʰəy	*daki
rain~mist	*fon	*fun	*ʀa+bun
fire	*C-vi:	*fi:	*ṣapuy
tooth	*Civən	*fjən	*nipən
you (pl)	*su:	*səw	*i-(ka)ṣu
black	*C-[t]əm^(C)	*ɗəmʔ	*qitəm
gall bladder~liver	*C-təy	*ɗəy	*qaʈəy
otter	*na:k	*hna:k	*ṣanaq
hand	*C^V-mɯ:	*C-mɯ:	*qa-rima
you	*C^V-mɯ:	*C-mɯ:	*kamu
bear	*C-muy	*C-muy	*ʈumay
this	*[C-]ni:^B/C	*C-ni:ɦ	*qa-ni
water~sea	*C^V-nəm^C	*C-nəmʔ	*tənəm
weep	*C-ŋi:^C	*C-ŋi:ʔ	*ʈaŋis
child	*lɯ:k	*hlɯ:k	*alak
shoulder	*C-ba:^B	*ʋa:ɦ	*qabaʀa
raw, live	*Cudi[:]p	*Cuɾi:p	*qudip
shrimp	*Cuda:ŋ	*Cuɾa:ŋ	*qudaŋ
star~sun	*C-da:w	*ɾa:w	*qa-(n)ḍaw
thigh	*C-qa:	*ɦa:	*paqaṣ
excrement	*C-ɢ[a:]y	*ɦa:yʔ	*ʈaqi
I	*C-ku:	*ɦu:	*aku
head	*kurəw^C	*Curəwʔ	*quru
to plant	*Cura	*Cura:	*mura

The following are a list of items which only appear in the Hlai branch of Southern Kra-Dai.

Possible Pre-Hlai reconstructions are provided in place of PSKD forms:

(27)   Pre-Hl   PHl   PAn

slap   *pi:k   *pʰi:k   *pik
rub rope~weave   *bən   *pʰən   *bəl+bəl
pinch   *ti:p   *tʰi:p   *a-tip   (PMP)
seven   *tu: *tʰu: *pitu
three   *ʈu:ʔ   *tʃʰu:ʔ   *təru
sharp   *ɹə:m   *tɕʰə:m   *ʈaɹəm
five   *ma: *hma: *rima
six   *nɔm   *hnom   *ʔənəm
mat. grandma   *na:ʔ   *hna:ʔ   *ina   'mother's sister'
that   *C-na: *C-na: *i-naʔ
bury   *lɔmɦ   *hlomɦ   *ʈaləm
fish scale   *C-lə:p   *C-lə:p   *quʂəlap
eight   *ru: *ru: *waru
sell   *ri:wʔ   *ri:wʔ   *sariw

The following five forms are problematic for various reasons, and may be fortuitous resemblances in some or all cases; since all of the PSKD forms below were listed as problematic in chapter four, it is also possible that one branch of PSKD may have a true connection to the PAn form, while the other branch does not:

(28)   PSKD   PHl   PAn

eat   *k[j]ən   *kʰən   *kaʔən
word clsfr~mouth   *pwa:k   *fa:k   *baq+baq
vomit   *rwa:k   *fa:k   *m-utaq~*ruaq
taro~leaf   *p[i/u]ra:k   *ra:k   *biʀaq
moon   *C-b[i/u]la:n   *C-ɲa:n   *bural

The following forms lacking PSKD etymologies are also problematic, but merit further investigation:

(29)   Pre-Hl   PHl   PAn

one   *ɕɯaʔ   *tɕʰɯ:ʔ   *i+sa
person   *[ʔ]a:w   *[ʔ]a:w   *ʈau
ten   *fu:t   *fu:t   *puruq
skin (of fruit)~fruit *va:k   *fa:k   *buaq
two   *lu:ʔ   *hlu:ʔ   *d₃uʂa
cicada   *rə:y   *rə:y   *lari
snake   *Cila:ɦ   *lja:ɦ   *ʂuraʀ
go~let's go   *C-ɢi: *ɦi: *aʀi   (PHF)

There are a few observations which can be made based on the examples above. The first is that the loss of initial syllables in polysyllabic forms seems to have been an ongoing process in Hlai and its predecessors for some time. The following Hlai-PAn comparisons are those in which the evidence indicates that the Hlai form has developed from an original monosyllabic form in Pre-Hlai:

(30)	Pre-Hl	PHl	PAn
ancestor	*pu:ʔ	*pʰu:ʔ	*a(m)pu
seven	*tu:	*tʰu:	*pitu
fart	*tu:t	*tʰu:t	*qɔ̆(n)tut
land leech	*ta:k	*tʰa:k	*matək~mətak
eye	*ʈa:	*tʃʰa:	*maʈa
sharp	*ɟə:m	*tɕʰə:m	*ʈaɟəm
dirt on skin	*ki:	*kʰi:	*daki
rib	*ka:ŋʔ	*kʰa:ŋʔ	*tak(ə)ʀaŋ
rain~mist	*von	*fun	*ʀa+bun
bury	*lɔmɦ	*hlomɦ	*ʈaləm

There are two examples which indicate that in forms with a sequence of two high back vowels, the second of the two underwent diphthongization:

(31)	Pre-Hl	PHl	PAn
head louse	*ʈwəw	*tʃʰwəw	*kuʈu
head	*Curəwʔ	*kurəwʔ	*quru

Bilabial stops, whether intervocalic voiceless or initial voiced, appear to have been prone to affrication:

(32)	Pre-Hl	PHl	PAn
fire	*C-vi:	*fi:	*ʂapuy
tooth	*Civən	*fjən	*nipən
mist~rain	*[v]on	*fun	*ʀa+bun
mouth~word clsfr	*[v]a:k	*fa:k	*baq-baq
fruit~skin (of fruit)	*[v]a:k	*fa:k	*buaq

The following two examples show that retroflexes merged with alveolars intervocalically:

(33)   <u>Pre-Hl</u>   <u>PHl</u>   <u>PAn</u>

	Pre-Hl	PHl	PAn
gall bladder~liver	*C-təy	*ɗəy	*qaʈəy
star~sun	*C-da:w	*ra:w	*qa-(n)ɖaw

The following two forms (keeping in mind that *snake* shows other irregularities) show one possible source of final *ɦ in Hlai tone category B:

(34)   <u>Pre-Hl</u>   <u>PHl</u>   <u>PAn</u>

	Pre-Hl	PHl	PAn
shoulder	*C-ba:ɦ	*ʋa:ɦ	*qabaʀa
snake	*Cila:ɦ	*lja:ɦ	*ʂuraʀ

One form shows a possible source of final *ʔ in tone category C:

(35)   <u>Pre-Hl</u>   <u>PHl</u>   <u>PAn</u>

	Pre-Hl	PHl	PAn
weep	*C-ŋi:ʔ	*C-ŋi:ʔ	*ʈaŋis

Finally, if the forms for *bear* and *scale* are valid comparanda, there appears to have been an unmotivated metathesis of the two vowels (it is assumed that *scale* first simplified in the following way: *quʂəlap > *qəlap):

(36)   <u>Pre-Hl</u>   <u>PHl</u>   <u>PAn</u>

	Pre-Hl	PHl	PAn
bear	*[ʈa]muy	*C-muy	*ʈumay
scale	*[qa]lə:p	*C-lə:p	*quʂəlap

The existence of the Hlai-PAn cognates above offers a unique opportunity to demonstrate the series of sound changes listed in chapter four. Keeping in mind that 'cognate' here is used to indicate two words that are related non-accidentally, either through common descent or through a language contact relationship, it can be inferred that these words existed at an early stage of Pre-Hlai (including potentially PSKD or higher) before the following changes took place.

(37)	weave	seven	eye	sharp	black	gall~liver
PAn	bəl	pitu	maʈa	ʈaɟəm	qitəm	qaʈəy
Intervocalic lenition	bən	tu:	ʈa:	ɟəːm	qidəmʔ	qadəy
Elimation of uvulars	bən	tu:	ʈa:	ɟəːm	kidəmʔ	kadəy
Peripheral vowel raising	bən	tu:	ʈa:	ɟəːm	kidəmʔ	kadəy
Initial devoicing	pən	tu:	ʈa:	cəːm	kidəmʔ	kadəy
Vocalic Transfer	pən	tu:	ʈa:	cəːm	kidəmʔ	kadəy
Initial aspiration	pʰən	tʰu:	ʈʰa:	cʰəːm	kidəmʔ	kadəy
Monosyllabification	pʰən	tʰu:	ʈʰa:	cʰəːm	ɗəmʔ	ɗəy
Stop and fricative affrication	pʰən	tʰu:	ʈʂʰa:	tɕʰəːm	ɗəmʔ	ɗəy
PHl	pʰən	tʰu:	tʃʰa:	tɕʰəːm	ɗəmʔ	ɗəy

(38)	fire	tooth	shoulder	live	star~sun	thigh
PAn	ʂapuy	nipən	qabaʁa	qudip	qa-ɖaw	paqaʂ
Intervocalic lenition	ʂavi:	Civən	qaʋaːʁ	quɾi:p	qaɾaːw	paʁaː
Elimation of uvulars	ʂavi:	Civən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Peripheral vowel raising	ʂavi:	Civən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Initial devoicing	ʂavi:	Civən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Vocalic Transfer	ʂavi:	Civjən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Initial aspiration	ʂavi:	Civjən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Monosyllabification	fi:	fjən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
Stop and fricative affrication	fi:	fjən	kaʋaːɦ	kuɾi:p	kaɾaːw	pafiaː
PHl	fi:	fjən	C-ʋaːɦ	Cuɾi:p	C-ɾaːw	C-fiaː

(39)	five	six	otter	bury	sell	eight
PAn	rima	ʔənəm	ʂanaq	ʈaləm	sariw	waru
Intervocalic lenition	ma:	nɔm	naːq	lɔmɦ	sariːwʔ	waruː
Elimation of uvulars	ma:	nɔm	naːk	lɔmɦ	sariːwʔ	waruː
Peripheral vowel raising	ma:	nom	naːk	lomɦ	sariːwʔ	waruː
Initial devoicing	ma:	nom	naːk	lomɦ	sariːwʔ	waruː
Vocalic Transfer	ma:	nom	naːk	lomɦ	sariːwʔ	waruː
Initial aspiration	hma:	hnom	hnaːk	hlomɦ	sariːwʔ	waruː
Monosyllabification	hma:	hnom	hnaːk	hlomɦ	sariːwʔ	waruː
Stop and fricative affrication	hma:	hnom	hnaːk	hlomɦ	sariːwʔ	waruː
PHl	hma:	hnom	hnaːk	hlomɦ	riːwʔ	ruː

(40)		bear	this	water~sea	weep	scale	head
PAn		ʈumay	qa-ni	tənəm	ʈaŋis	quʂəlap	quru
Intervocalic lenition		ʈamuy	qani:ɦ	tənəmʔ	ʈaŋi:ʔ	qalə:p	qurəwʔ
Elimation of uvulars		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Peripheral vowel raising		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Initial devoicing		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Vocalic Transfer		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Initial aspiration		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Monosyllabification		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
Stop and fricative affrication		ʈamuy	kani:ɦ	tənəmʔ	ʈaŋi:ʔ	k-lə:p	kurəwʔ
PHl		C-muy	C-ni:ɦ	C-nəmʔ	C-ŋi:ʔ	C-lə:p	Curəwʔ

6.1.5 Interim Summary

Despite the fact that Hlai as a language group has been isolated on Hainan for a non-trivial amount of time, evidence has been provided in this section which indicates that there are vestiges of interaction with all four of the non-Kra-Dai language phyla of Southeast Asia which remain in the lexicon.

Given the cultural prominence of Sinitic in Southeast Asia, it is unsurprising to find that Hlai retains a number of words which indicate early interaction with Chinese, with tone correspondences indicating that this may have occurred at more than one point in history. It was also shown that there may have been at least limited interaction with Tibeto-Burman.

Evidence also exists which indicates interaction with Mon-Khmer, with the greatest amount appearing in Viet-Muong and West Bahnaric. As reconstructions of other Mon-Khmer families are finalized, it may become apparent that Hlai interaction was not limited to these two subgroups, or that interaction with Bahnaric may have occurred at a time preceding that during which West Bahnaric became an independent branch.

Although the present state of Hmong-Mien reconstruction makes comparison with Hlai difficult, it was nevertheless seen that a number of suggestive parallels exist that deserve further examination.

Finally, comparison with Austronesian offers a very satisfying number of lexical parallels, as well as additional confirmation for sound changes postulated in chapter four between the stages of PSKD and

PHl; in addition, comparison with Hlai can inform the reconstruction of the more problematic areas of the PAn consonant inventory.

6.2 Summary of Findings

There are a number of different issues which have been treated in this dissertation 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 an excellent 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 daughters, that there were several points of intimated 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 at the Central Hlai level. 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 those in the second category (with the exception of the glottal stop) are more sonorous, and include only members which are voiced. Perhaps the most important force driving the evolution of Hlai initials was shown to be

temporal compression, which led to further and further reduction of multiple segments in the onset until only a single segment remained.

The rime inventory is 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 all 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, the effects of laryngeals on specific rime categories in various subgroups and daughter languages.

Proto-Hlai was compared with Proto-Be and Proto-Southwest Tai, the only fully reconstructed branch of Tai, in chapter four. Comparison with these other two members of Southern Kra-Dai allowed a tentative reconstruction of Proto-Southern Kra-Dai, from which the 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 initial 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 to the original mid-vowels *e and *o to rise and merge with original *i and *u, allowing original *ɛ and *ɔ to rise in turn and fill their vacated positions.

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 (1991) 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 rimes 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 the variation, although

another source is 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, served to underscore the ultimately non-genetic relationship between Jiamao and Hlai.

Finally, the comparison of Proto-Hlai with other reconstructed Southeast Asian proto-languages in this chapter has shown that Hlai and its ancestors have been anything but isolated in prehistory, and that contact has occurred at one time or another with some constituents of every one of the other Southeast Asian language phyla. Comparison between these families has in some cases been informative in both directions, and comparison with polysyllabic Proto-Austronesian in particular allowed a test of the Pre-Hlai sound changes postulated in chapter four.

6.3 Empirical and Theoretical Contributions

The empirical contributions of this data 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 dissertation 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 in this dissertation.

The collective study of the Hlai languages provides an excellent case study in the dynamics of language contact in a delimited linguistic area such as an island, and this dissertation 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 has 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 dissertation 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 *p-l sesquisyllables was to allow the formation of a cluster *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 is which is retained form comparison.

Another important generalization which can be made based on the data in this dissertation 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 very likely 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 *initial 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 (with the possible exception of *r) 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 post-stopped nasals (Greater Hlai), and the glides were reanalyzed as weak fricatives, leaving the liquids (if *r* is included) 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 PSKD 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 sufficient 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 4.3.4), 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 strong similarity with high vowels). The third generalization is that vocalic transfer did not occur simultaneously in the case of the two high vowels. In all but one case, 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 dissertation 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 dissertation 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-Southern Kra-Dai word shape and related changes in Proto-Be and Proto-Southwest 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 family (and ultimately in other language families and phyla of Southeast Asia where paradigmatic tone categories exist).

6.4 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 Ouyang (1992) 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 dissertation. 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 dissertation, 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 the 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 of course 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, the next important step in Kra-Dai comparative studies is to finalize reconstructions of the Central and Northern subgroups of Tai, so that a full Tai reconstruction can be performed which will finally be able to replace the tentative reconstruction done by Li (1977) which has filled this role since its publication. Northern Tai in particular will provide crucial evidence for this reconstruction, and will allow the question to be resolved of whether Be is ultimately a member of Tai, or a sister as it has been treated here. At this point, comparison with Hlai can be performed in full and a complete PSKD reconstruction performed. Within the area of Northern Kra-Dai, the reconstructions of Proto Kra (Ostapirat 2000), Proto Kam-Sui (Thurgood 1988) and Proto-Lakkja (Theraphan 1992) need to be revisited and brought current with advances in Southern Kra-Dai, including the theory developed here of sesquisyllabic proto-forms. Assuming the accuracy of Ostapirat's classification presented in chapter one, the comparison of Kra, Kam-Sui, and Lakkja will allow ultimately allow a reconstruction of Proto Northern Kra-Dai (PNKD), which can ultimately be compared with PSKD, allowing a reconstruction of Proto-Kra-Dai itself. 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 current state of Austronesian studies makes this a promising venture, with Sino-Tibetan studies advancing, and Mon-Khmer family reconstructions showing progress largely due to the work of Paul Sidwell. As noted, a new and more detailed reconstruction of Hmong-Mien is necessary before serious comparison with Kra-Dai will be possible; the materials exist, and once this undertaking is accomplished, the relevance to Kra-Dai could be pleasantly surprising.

APPENDIX A: HLAI LANGUAGE DATA AND PROTO-HLAI RECONSTRUCTIONS

The data presented in this appendix is based on the wordlist published in Ouyang & Zheng (1983), and has been supplemented by my fieldwork in Hainan during the academic year of 2003-2004. Lexical items are presented in both Chinese and English, and are in alphabetical order according to the standard Mandarin reading. The order in which the languages are given is the following:

BH	HE	LH	TZ	ZD	BT	JM		SSH	SCH
Cun	Nadou	CJ	MF	BS	YM			WQBS	

The three languages at the far right are from Savina's (1931) dictionary and Wang & Qian's (1951) wordlist; the abbreviations are the following:

> SSH = Savina's Southern Hlai (Bouhin)
> SCH = Savina's Central Hlai (Qi)
> WQBS = Wang & Qian's Baisha

Savina's forms have been converted here to the International Phonetic Alphabet as closely as possible based on the Vietnamese script which he used for his transcriptions. The only instances in which this is non-transparent are of vowel length in diphthongs, where he uses the finals <i> and <o> to indicate long nuclei, and the finals <y> and <u> to indicate short nuclei. For example, <ai> and <ao> indicate [a:y] and [a:w], and <ay> and <au> indicate [ay] and [aw] respectively. In the case of the tones, the following conventions have been adopted (where 'v' represent the rime nucleus):

Khong (mid level):	v	Huyen (low falling):	v̀
Sac (high rising):	v́	Hoy (low rising):	v̌
Nga (high broken):	v̋	Nang (low broken):	v̲

Proto-Hlai forms are given to the immediate left of the lexical items. If there is agreement at the highest level of the Hlai phylogenetic tree (between Bouhin and one or more Greater Hlai languages), then a Pre-Hlai form is given to the left of the Proto-Hlai form. If not, then a proto-form is given (appropriate to

the level to which it can be reconstructed), and it is indicated to the left which node of the tree the form is

reconstructible to, using the following abbreviations:

GHl   = Greater Hlai
CHl   = Central Hlai
ECHl   = East Central Hlai
NCHl   = North Central Hlai
NWCHl = Northwest Central Hlai
NECHl = Northeast Central Hlai
Qi
Meifu
Run

Forms which are not cognate with any other forms and which therefore do not contribute to

reconstruction (both loanwords from Chinese and lexical isolates) have been removed for ease of

exposition. Two important exceptions are Bouhin and Ha Em, which both form individual branches at a

high level in the tree, the lexical isolates of which may therefore represent inherited Proto-Hlai forms even

if they do not agree with Greater Hlai (in the case of Bouhin) or Central Hlai (in the case of Ha Em). The

other exception is Jiamao, which appears without brackets when it appears to be a Hlai borrowing, but is

placed in brackets otherwise. Forms which appear to be borrowed between Hlai languages (based on the

criteria given in chapter one) are placed in parentheses. Irregular correspondences that are not obviously

due to borrowing are placed in brackets.

Note that to simplify presentation, reconstructed Greater Hlai and Central Hlai forms are given as

Proto-Hlai in the body of the dissertation.

中文	English	Pre-Hlai	Proto-Hlai								
AI											
矮	short	*tɯ:ʔ	*tʰɯ:ʔ	tʰəuɻ^3 / tʰɔ:^{3}	tʰəuɻ^3 / tʰaw^3	tʰauɻ^3 / tʰauɻ^3	tʰauɻ^3 / tʰauɻ^3	tʰauɻ^3 / tʰəuɻ^3	tʰauɻ^3 / tʰauɻ^3	tʰa:^{1}	tʰəuɻ / tʰa:l^1
愛	love	GHl:	*ʔe:p	(ʔo:p^7) / ---	ʔo:p^7 / ---	ʔo:p^7 / ʔo:p^7	ʔo:p^7 / ʔo:p^7	ʔɔ:p^7 / ʔuap^8	ʔɔ:p^7 / ʔuap^7	[ta:k^{9}tsi:^{1}]	(ɔp) / uap˥
AN											
安裝	set up	*C-ŋəp	*C-ŋəp	ŋop^7 / ---	ŋop^7 / ---	ŋop^7 / ŋap^7	ŋop^7 / ŋap^7	ŋap^8 / ŋap^8	ŋap^7 / ŋap^8	[ka:p^7]	--- / ---
安	press	*C-məc	*C-məc	mat^7 / ---	mat^7 / ---	mac^7 / ---	mat^7 / mat^7	mac^7 / ---	--- / ---	---	--- / ---
安	press	Qi: / Run:	*gom / *tʃʰəmɦ	--- / ---	--- / ---	--- / ---	--- / ---	kom^5 / tsʰam^2	kum^5 / tsʰam^5	kəm^5	--- / ---
AO											
熬	to stew	*C-ŋa:wɦ	*C-ŋa:wɦ	ŋa:w^2 / ŋa:w^2	ŋa:w^2 / ŋaw^2	ŋa:w^2 / ŋa:w^2	--- / ŋa:w^2	--- / ŋa:w^2	ŋa:w^5 / ŋa:w^2	ŋa:w^5	--- / ---
BA											
八	eight	*ru:	*ru:	ru:^{1} / ---	gow^1 / ŋɛwʔ^4	gow^1 / gow^4	gow^4 / xow^1	how^4 / xow^1	how^4 / kʰow^1	ku:^{1}	dú: / xow˦
扒	dig in	*Cuɣɯ:nɦ	*Cuɦɯ:nɦ	hɯ:n^2 / ---	hɯ:n^2 / ŋen^2	hwɯn^2 / ---	hɯn^5 / ---	--- / ɲeɲ^2	hɯn^5 / men^2	---	hɯɣn / ---

		Recon 1	Recon 2	1	2	3	4	5	6	7	8	9
扒	dig in	GHI:	*sin?	---	---	tin³	teɲ³	ten³	---	---	---	---
				---	---	---	---	---	---	---	---	
扒	dig in	*C-ɣɯːt / NECHI:	*ɦɯːt / *kʰɯːt	hɯːt⁷	---	tin³	hɯːt⁷	hɯːt⁷	hɯːt⁷	kɯat⁷	huɣt	
				---	---	kʰɯːt⁷	kʰɯːt⁷	huk⁸	kʰɯːt⁷		---	
芭蕉	plantain	*waːk	*hwaːk	vaː?⁷	veː?⁷	hweːk⁷	veː?⁷	veː?⁸	veː?⁷	vɯɯa⁵	vaː	vɛ[ŋ]
				zɛk²	---	veː?⁷	vɯː²	ve?⁸	via?⁸		ve?H	
拔 (草)	pull out (grass)	*?ʊt	*?ʊt	?ʊt⁷	?ʊt⁷	?ʊt⁷	?ʊt⁷	?[u]t⁷	---	[kɔŋ⁵]	ʊt	
				?ɛt²	---	---	?[ot]⁷	---	---		---	
拔 (釘)	pull out (nail)	*[k/x]əc	*kʰəc	kʰat⁷	kʰat⁷	kʰac⁷	kʰat⁷	---	kʰat⁷	[mak⁷]	---	
				kʰiat²	---	---	kʰat⁷	kʰat⁸	---		---	
拔 (土)	pull out (earth)	*C-gɯːm / NCHI:	*kɯːm / *kʰop	kɯːm¹	---	kɯːm¹	kɯːm¹	kɯːm¹	kɯːm¹	[mak⁷]	---	
				kʰop²	---	kʰop⁷	k[o]m¹	kɯum¹	kɯum¹		---	
把 (刀)	knife clsfr	*piːnɦ / NCHI:	*pʰiːnɦ / *waːŋ?	pʰiːn²	pʰiːn²	pʰiːn²	pʰiːn⁵	(veːŋ⁶)	pʰiːn⁵	[tet⁷]	fien	
				---	veŋ³	veːŋ³	veːŋ³	viaŋ³	viaŋ⁶		---	
把	tool clsfr	*C-lɯːŋ? / Run:	*C-lɯːŋ? / *?weːk	lɯːŋ³	lɯːŋ³	lɯːŋ³	---	(ɓeː?⁸)	---	[tet⁷]	lùɣŋ	
				---	---	---	lɯŋ³	ve?⁸	via?⁷		---	
耙	rake	*Cirik / Run:	*rjik / *reːŋ	zik⁷	zik⁷	rik⁷	tiː?⁸	(pʰaː⁶)	(pʰaː³)	[pʰəː¹]	---	
				---	---	---	---	riaŋ¹	riaŋ⁴		---	
BAI												
白	white	*[k/x]aːw	*kʰaːw	kʰaːw¹	kʰaːw¹	kʰaːw¹	kʰaːw¹	kʰaːw¹	kʰaːw¹	kʰow¹	xaːw	
				kʰaːw¹	kʰaw¹	kʰaːw¹	kʰaːw¹	kʰaːw¹	kʰaːw¹		kʰawɬ	

漢字	gloss											
白麻	white hemp	*[k/x]a:n	*kʰa:n	kʰa:n¹ / ---	kʰa:n¹ / ---	kʰa:n¹ / ---	kʰa:n¹ / kʰa:ŋ¹	kʰa:n¹ / kʰa:ŋ¹	kʰa:n¹ / kʰuan¹	[ven⁴]	--- / ---	┊ / ┊
白藤	white vine	*C-gəc	*kəc	kat[9] / kiat²	kat⁷ / kaʔ⁴	kac⁷ / kat⁷	kat⁷ / kat⁷	kat⁷ / kat⁸	kat⁷ / kat⁷	[ley¹]	kat / ka:tˡ	┊
白天	daytime	*mi:ʔ	*hmi:ʔ	mey³ / ɓay⁴	p[e]y³ / p[u][2]	pay³ / pay³	pay⁶ / p[ɯ]³	pʰay⁶ / pay³	pay³ / pay[3]	[kɯ²]	mèy / ---	┊
		*ŋʋən	*hŋʋən	ven¹ / hon⁴	van¹ / vanʔ⁴	hwan¹ / van⁴	van⁴ / vaŋ¹	van⁴ / vaŋ¹	van¹ / van⁴	[dʉən⁵]	vèn / ---	┊
白頭髮	white hair	*ŋu:k	*hŋu:k	ŋu:ʔ⁷ / ---	ku:ʔ⁷ / ---	ku:k⁷ / ---	ku:ʔ⁸ / kuk⁷	kʰuaʔ⁸ / ---	ku:ʔ⁸ / kuʔ⁸	kua²	--- / ---	┊
白蟻	termite	*p-lu:k	*p-lu:k	lu:ʔ⁷ / lok⁴	lu:ʔ⁷ / pu:²	plu:k⁷ / puʔ⁷	plu:ʔ⁷ / pluk⁷	puaʔ⁷ / pluk⁸	plu:ʔ⁷ / pluʔ⁷	lua⁵	lu̠: / plu:kˡ	┊
百	100	*Cura:n	*Cura:n	ra:n¹ / ---	ga:n¹ / ---	gwa:n¹ / ko:ŋ¹	gwa:n⁴ / ɣa:ŋ¹	va:n⁴ / va:ŋ¹	hwa:n⁴ / vuan[5]	kɯ:n¹	dán / va:ŋ˩	┊
拜	worship	*puc	*pʰuc	pʰut⁷ / pʰət²	pʰut⁷ / pʰuɛʔ⁴	pʰuc⁷ / ---	pʰut⁷ / pʰot⁷	pʰut⁷ / ---	pʰut⁷ / ---	pʰut⁷	pʰʊ̀t / ---	┊
擺手	move (hand)	*ʔu[:]y	*ʔu[:]y	ʔuːy¹ / ʔuy¹	ʔuːy¹ / ʔuy¹	ʔuːy¹ / ʔuy¹	--- / ʔuy²	--- / ---	ʔuːy¹ / ---	---	úːy / ---	┊
擺手	move (hand)	CHI:	*hwin	--- / ven¹	--- / ---	--- / ---	ven⁴ / ---	ven⁴ / ---	vin¹ / ven⁴	[fit⁷]	--- / ven˧	┊

BAN											
斑鳩 ringdove	*[k/x]uː:	*kʰuː	kʰow^1 / kʰow$^{1[5]}$	kʰow^1 / kʰɛw^1	kʰow^1 / kʰow^1	kʰow^1 / kʰow^1	kʰow^1 / kʰow^1	kʰow^1 / kʰow^1	[tsaw^4]	kʰow⊣	---
搬 move (object)	*Cir[e]ːŋʔ	*rj[e]ːŋʔ	zeːŋ^3	zeːŋ^3	reːŋ^3 / zeːŋ^3	teːŋ^6 / tseːŋ^3	--- / ziaŋ^3	teːŋ^6 / ziaŋ^6	---	zɛŋ	---
搬運 carry	*ŋweːyʔ	*ŋweːyʔ	vaːy^3	voːy^3 / ŋɔy^3	hwoːy^3 / ---	vaːy^6 / voːy^3	vaːy^6 / vuay^3	vaːy^3 / vuːy^6	---	---	---
半 half (of object)	GHI:	*tʰəːn	(tʰoːn^1) / tʰan^1	tʰoːn^1 / ---	tʰoːn^1 / tʰ[ɔ]ŋ^1	tʰɔːn^1 / tʰoŋ^1	tʰɔːn^1 / tʰoŋ^1	(tʰum^1) / tʰ[ə]n^1	---	(tʰɔn)	---
半 half (of number)	CHI:	*tʰom	--- / tsʰom^1	--- / tʰon^1	tʰom^1 / tʰom^1	tʰom^1 / ---	tʰom^1 / (tʰom^4)	tʰum^1 / ---	---	tʰomˠ	---
半 half (of number)	CHI:	*fin	---	---	fɛŋ^1 / fiŋ^1	--- / fiŋ^1	--- / fun^2	--- / fən^5	---	---	---
BANG											
綁 tie	GHI:	*fəːt	(pʰoːt^7) / ---	foːt^7 / ---	foːt^7 / ---	foːt^7 / foːk^7	foːt^7 / foʔ^8	foːt^7 / f[u]t^7	[kʰɔːp^9]	---	---
綁 tie	GHI: / NWCHI:	*sən / *C-ŋəːnʔ	--- / ŋan^3	tan^3 / ŋɔn^3	tan^3 / ---	--- / ---	--- / ---	tan^3 / ---	---	---	---
蚌 mussel	*[c/ɕ]iː:	*tɕʰiː	tsʰey^1 / ---	tsʰey^1 / ---	tsʰey^1 / ---	tsʰey^1 / ---	tsʰey^1 / tsʰey^1	tsʰey^1 / tsʰey^1	tsʰay^1	---	---
	GHI: / Run:	*t[ʃ/ɕ]ʰəːŋʔ / *waːʔ	--- / ---	tsʰoːŋ^3 / ---	tsʰoːŋ^3 / ---	--- / ---	(kʰɔp^9) / vaː^6	(kʰɔp^7) / vaː^6	[kʰɔːp^7]	--- / ---	---

BAO

包	wrap	*tu:k	*tʰu:k	tʰu:ʔ⁷ / tsʰok²	tʰu:ʔ⁷ / tʰuʔ⁴	tʰu:k⁷ / tʰuʔ⁷	tʰu:ʔ⁷ / tʰuk⁷	tʰuaʔ⁷ / tʰuk⁸	tʰu:ʔ⁷ / tʰuʔ⁷	tʰu:ʔ⁹	tʰu: / tʰu:kɬ	tʰŋok
剝	skin (a cow)	*C-da:ŋʔ	*da:ŋʔ	da:ŋ³ / dɛŋ³	de:ŋ³ / dɛŋ³	de:ŋ³ / de:ŋ³	de:ŋ³ / de:ŋ³	de:ŋ³ / diaŋ³	de:ŋ³ / diaŋ³		--- / ---	---
剝	skin (a cow)	Qi:	*tʰək	---	---	---	tʰak⁷ / ---	tʰak⁷ / ---	tʰak⁷ / ---	tʰak⁷	--- / ---	---
剝	peel (bark)	*si:nɦ / CHI:	*si:nɦ / *ɖi:nʔ	ti:n²	ti:n²	ɖi:n³ / ---	ɖi:n³ / ɖiŋ³	ɖi:n³ / ɖiŋ³	ɖi:n³ / ɖin³	[ɲi:t⁹]	--- / ---	---
薄	thin	*rɯ:	*rɯ:	her¹	geŋ¹ / ɣɛʔⁱ⁴	geŋ¹ / heg⁴	heg⁴ / hex	heŋ⁴ / hex	heŋ⁴ / hɛ:kɬ	kay¹	ɬʎex / hẹp	hẹ
飽	full	*[k/x]ɯ:m	*kʰɯ:m	kʰɯ:m¹ / kʰum¹	kʰɯ:m¹ / kʰen¹	kʰɯ:m¹ / kʰum¹	kʰɯ:m¹ / kʰum¹	kʰɯ:m¹ / kʰum¹	kʰɯ:m¹ / khom¹	kʰɔm¹	xɯɤm / kʰumɬ	---
抱/背	carry	GHI:	*ʔop	--- / ʔop²	ʔop⁷ / ʔoʔ⁴	ʔop⁷ / ʔop⁷	ʔop⁷ / ʔop⁷	--- / ʔop⁸	ʔop⁷ / ʔop⁷	ʔup⁷	--- / opɬ	---
抱	hold (a child)	*ʔu:nʔ	*ʔu:nʔ	--- / ʔen³	--- / ʔun³	ʔu:n³ / ʔun³	ʔu:n³ / ʔuŋ³	--- / ---	--- / ---	ʔun⁵	--- / ---	---
抱	carry (firewood)	*ʔɔmʔ	*ʔɔmʔ	ʔom³	ʔom³	ʔom³	ʔom³	--- / ---	(ʔɔm³) / ---		ðm / ---	---
豹	leopard	*Cuɣu:yʔ	*Cuɣu:yʔ	hu:y³	hu:y³	hu:y³	gu:y³ / (huy³)	hu:y³ / ŋuy³	hu:y³ / ŋuy⁶	---	--- / ŋuyɬ	ŋuyɬ

字	gloss	Recon (label)	Recon (*form)									
暴露	expose body		*Cuɣaːwɦ	ha:w²	ha:w²	hwa:w²	ha:w²	---	---	[ʔje:ŋ⁵]	---	---
			*Cuɦaːwɦ	---	---	ŋa:w²	---	ŋa:w²	ŋa:w²	---	---	---
暴露	expose body		*tɯːn	tʰɯ:n¹	---	---	tʰɯ:n¹	tʰɯ:n¹	tʰɯ:n¹	---	---	---
			*tʰɯːn	---	---	---	---	---	---	---	---	---
BEI												
背	carry (on side)	GHI:	*fiːŋ	(pi:ŋ)	fi:ŋ¹	fi:ŋ¹	fiaŋ¹ fiŋ¹	fiaŋ¹ fiŋ¹	fiaŋ¹ fiŋ¹	fe:ŋ⁵	(pǐeŋ)	---
北	north	*pəyʔ Run:	*pʰəyʔ *feːŋ	pʰəy³ pʰ[u]y³	--- pʰ[e:]³	pʰay³	pʰa[:]y³	pʰay³ fiaŋ¹	--- fiaŋ¹	---	---	---
		ECHI: NWCHI:	*hnɯː *hjəːk	day¹ zok²	--- zoʔ⁴	təɯ¹	təɯ⁴	---	---	---	---	---
背脊	backridge	*[c/ɕ]uɲʔ	*tɕʰuɲʔ	tsʰun³ ---	tsʰun³ sen³	tsʰuɲ³ ---	tsʰun³ tsʰòn³	tsʰun³ tsʰun³	tsʰun³ tsʰun³	[tu:t⁹]	ʃòn	---
背着手	hide hands behind back	CHI:	*p-le:	---	---	ple:¹	ple:¹ ple:¹	pe:¹ ple:¹	ple:¹ ple:¹	[te·k⁸ tɯ:n¹]	---	---
被	get		*C-dɯ:	dəɯ¹ ɕɯmsɿ⁵	dəɯ¹ :əp⁻¹	tɯ:ɲ²	--- dəɯ¹	dəɯ¹ dəɯ¹	dəɯ¹ dəɯ¹	[mɯən¹]	---	---
被子	quilt	GHI:	*fiːʔ	(pey³) [tθ]ay³	fay³ fay³	fay³ fay³	fay³ fay³	fay³ fay³	fay³ f[u]y³	pay¹	(pèy) fay]	fɛ̀y

漢字	gloss										
蓓蕾	bud	*t[ɛ]:ŋ CHI:	*ʧʰ[e]:ŋ	tsʰe:ŋ¹	tsʰe:ŋ¹	tsʰe:ŋ¹	tsʰe:ŋ¹	hoˑ⁶	tsʰe:ŋ¹	---	---
			*Curəwʔ	---	feŋ¹	---	ɣoˑ³	---	---	[ŋɔˑ¹]	[ʔow¹]
		*Cuʔop CHI:	*Cuʔop	ʔop⁷	---	---	gop⁷	ŋan⁴	---		
		CHI:	*C-ŋən	---	---	---	ŋaŋ¹	tʰuk⁸	tʰuʔ⁷		
		Run:	*tʰu:k								
BEN											
鎊子	adze	*pu:n	*pʰu:n	pʰu:n¹ / pʰu:n¹[3]	pʰu:n¹ / pʰun	pʰu:n¹ / pʰun	pʰu:n¹	---	pʰu:n¹	---	---
笨	stupid	GHI:	*hmæ:y	(po:y¹) / ---	po:y¹ / ---	po:y¹ / po:y⁴	pa:y⁴ / po:y¹	puay¹	pu:y¹	---	---
BI											
鼻涕	mucus	*C-nəmʔ	*C-nəmʔ	nom³ / nam³	nam³ / nan³	nom³ / nam³	nam³ / nam³	nam⁶ / nam³	nam³ / nam⁶	na:m¹	---
		*[k/x]ət	*kʰət	kʰet⁷ / kʰat⁷	kʰat⁷ / kʰaʔ⁴	kʰat⁷ / kʰaʔ⁷	kʰat⁷ / kʰak⁷	kʰat⁷ / kʰak⁷	kʰat⁷ / kʰat⁷	hɔ:t⁹	---
鼻簫	nose flute	Qi:	*lju:nɦ	---	---	---	ɬu:n² / (tu:n²)	ɬu:n² / ---	tsuən²	---	---
鼻子	nose	*[k/x]ət	*kʰət	kʰet⁷ / kʰat⁷	kʰat⁷ / kʰaʔ⁴	kʰat⁷ / kʰaʔ⁷	kʰat⁷ / kʰak⁷	kʰat⁷ / kʰak⁷	kʰat⁷ / kʰat⁷	hɔ:t⁹	xɛ́t / kʰak]
秕子	chaff	*li:p	*hli:p	dɬi:p⁷ / tθip²	ɬi:p⁷ / ---	ɬi:p⁷ / ɬip[9]	ɬi:p⁷ / ɬip⁷	ɬi:p⁷ / ɬip⁸	ɬi:p⁷ / ɬip⁷	[vu:⁴vit⁸]	---
閉	close (eyes)	*ɲe:p	*hɲe:p	ɲap⁷ / tsap⁴	tso:p⁷ / tsɔʔ⁴	tso:p⁷ / ---	--- / tsɔ:p⁷	(tʰap⁷) / ---	(tʰep⁷) / [dap⁷]	ɲiŋp	---

漢字	gloss			1	2	3	4	5	6	7	8
壁虎	gecko	*mi:ʔ	*hmi:ʔ	mey^3	p[e]y^3	p[ɯ]$^{(1)}$	—	—	—	—	(pɛ́ŋ)
				—	—	—	—	—	—	—	—
		*Ciri:nʔ	*rji:nʔ	zi:n^3	zi:n^3	ri:n^3	ti:n^6	—	ti:n^6	[tek^7]	—
				—	—	ti:n^3	—	—	—	—	—
		NECHI:	*ʔwa:w	—	—	—	ɣa:w$^{[4]}$	(va:w^1)	va:w$^{[4]}$	—	—
				—	—	—	va:w$^{[4]}$	va:w$^{[4]}$	—	—	—

BIAN

漢字	gloss			1	2	3	4	5	6	7	8
邊	side	GHI:	*f[e]:ŋ	(pe:ŋ^1)	fe:ŋ^1	fe:ŋ^1	fe:ŋ^1	fe:ŋ^1	fe:ŋ^1	pʰa:y^5	(pɛ́ŋ)
				fɛŋ^1	feŋ$^{1[5]}$	f[i]ŋ^1	f[i]ŋ^1	fiaŋ^1	fiaŋ^1	—	—
邊緣	edge	*C-ŋe:yɦ	*C-ŋe:yɦ	ŋa:y^2	ŋo:y^2	(ŋa:y^2)	ŋa:y^5	—	ŋa:y^2	—	ŋáːy
				—	ŋɔy^2	—	—	—	—	—	—
邊緣	edge	*C-gi:ŋ	*ki:ŋ	ki:ŋ^1	ki:ŋ^1	ki:ŋ^1	—	kiaŋ^1	kiaŋ^1	[tiəŋ^5]	[ɣ]lĩŋ
				—	—	—	kiŋ^1	—	—	—	—
邊緣	edge	CHI:	*ŋga:w	—	—	ka:w^1	—	—	ka:w^4	—	—
				—	—	—	—	ka:w^1	ka:w^4	—	—
編	braid	*pen	*pʰən	pʰen^1	—	pʰan^1	pʰan^1	pʰan^1	pʰan^1	—	—
				pʰon^1	—	pʰan$^{1[3]}$	pʰan^1	pʰan^1	pʰan^1	—	—
編	braid	*C-ɣəc	*ɦəc	hat^7	hat^7	—	—	—	—	—	—
				—	—	—	—	—	—	—	—
編	braid (large)	*p-li:	*p-li:	ley^1	ley^1	pley^1	pley^1	pey^1	pley^1	[ta:^{1}]	—
				—	—	pey^4	pley^1	pley^1	pley^1	—	—

蝙蝠	bat	*C-ɓənʔ	*ɓenʔ	ɓen³	ɓan³	—	—	—	—	—	bèn
				—	—	—	—	—	—	—	—
鞭打	to lash child	*Curɯːk	*Curɯːk	rɯːʔ⁷	(rɯːʔ⁷)	g[u]ːk⁷	gɯːʔ⁸	vuaʔ⁸	huːʔ⁸	[tʰɪək⁷]	drɯ: vɯɯkl
				—	—	guʔ⁷	ɣɯɯk⁷	(vɯɯk⁷)	vɯʔ⁷		—
鞭打	to lash	*fiːt	*fiːt	pʰiːt⁷	fiːt⁷	fiːt⁷	fiːt⁷	fiːt⁷	fiːt⁷	[təp⁸]	—
				f[ɛ]t²	—	fit⁷	fit⁷	fit⁸	(fit⁸)		—
鞭打	to lash	*faːnʔ	*faːnʔ	faːn³	faːn³	—	faːn³	—	faːn³	—	—
				—	—	faɲ³	—	—	—		—
鞭子	whip	*C-ɟuːyʔ NCHI:	*tɕuːyʔ ɗuy	tsuːy³	tsuːy³	tsuːy³	tsuːy³	tsuːy³	tsuːy³	—	tsuy³
				ɗɔy¹	tsuy³	ɗuy¹	tsuy³	tsuy³	tuy³		—
扁	flat	*C-ɓɛːnɦ	*ɓeːnɦ	ɓeːn²	ɓeːn²	ɓeːn²	ɓeːn⁵	—	—	—	—
				ɓɛn²	ɓɛn²	—	—	ɓian²	ɓiːn⁵		—
扁擔	shoulder pole	GHI:	*tʃʰəy	—	tsʰay¹	tsʰay¹	tsʰay¹	tsʰay¹	tsʰay¹	—	—
				—	hay¹	—	tsʰay¹	—	—		—
		GHI:	*fiːk	(piːʔ⁹)	fiːʔ⁷	fiːk⁷	fiaʔ⁷	fiaʔ⁷	fiakʔ⁷	pia⁵	(piː) fiːtl
				—	fiʔ⁴	fiʔ⁷	fik⁷	fiʔ⁷	fiʔ⁷		—
變	change	*Ciluːɦ	*ljuːɦ	zeuʔ²	zauʔ²	zauʔ²	ɬauʔ²	—	—	—	žɐɯ
				—	—	—	zeuʔ²	zauʔ²	tsauʔ²		—
BIE											
鱉	point-nosed turtle	*tɯːp	*tʰɯːp	tʰɯːp⁷	tʰɯːp⁷	tʰɯːp⁷	tʰɯːp⁷	tʰɯːp⁷	tʰɯːp⁷	ɗeup⁹	—
				—	—	—	tʰup⁷	tʰup⁸	tʰup⁷		—

別	don't	*ʔiwʔ	*ʔiwʔ	ʔiw³ / ---	ʔiw³ / ---	ʔ[jo]w³ / ʔiw³	ʔ[jo]w³ / ʔiw³	ʔ[jo]w³ / ʔiw³	ʔ[jo]w³ / ʔiw³	ʔjow⁵	--- / ---
別人	other person	*ʔa[:]w	*ʔa[:]w	ʔaw¹ / ʔ[a:]¹	ʔaːw¹ / [ŋ]aː·¹	ʔaːw¹ / ʔaːw¹	ʔaːw¹ / ʔaːw¹	ʔaːw¹ / ʔ[a:]¹	ʔaːw¹ / ʔ[a:ʔ]	[ɬay⁴]	--- / ---
癟	sunken	*C-ɓɛːp	*ɓɛːp	ɓeːp⁷ / ---	---	ɓeːp⁷ / ---	ɓeːp⁷ / ---	ɓep⁷ / ---	ɓeːp⁷ / ---	peːp⁹	--- / ---
BING											
冰雹	hail	CHI:	*sinɦ	--- / ---	--- / ---	teŋ² / ---	[s]en⁵ / se[m]²	ten⁵ / tsʰen²	--- / tsʰen⁵	[tsʰaː⁵]	--- / tʃʰenɹ
檳榔	betelnut	GHI:	*C-ləːŋʔ	(loːŋ³) / ---	loːŋ³ / ---	loːŋ³ / ---	loːŋ³ / ---	loːŋ⁶ / ---	l[o]ːŋ³ / ---	luəŋ¹	(lɔŋ) / ---
柄	a handle	*Cuɣəwɦ	*Cuɓəwɦ	haw² / ---	haw² / ---	hwow² / ---	go·⁵ / ŋo·²	vo·⁵ / ŋo·²	hɔ·⁵ / mo·²		--- / ---
柄	handle clsfr	*fiːnʔ	*fiːnʔ	[tsʰ]iːn³ / ---	fiːn³ / fiŋ³	fiːn³ / fiŋ³	fiːn³ / fiŋ³	fiːn[⁶] / ---	fiːn³ / fiŋ³	[ɓuən¹]	[ʃʃien / ---
餅	cookie	*ʔaːnɦ	*ʔaːnɦ	ʔaːn² / ---	--- / ---	--- / ---	ʔaːn⁵ / ʔaːŋ²	--- / ---	ʔaːn⁵ / ---	---	--- / ---
病	sick	*[tʃ/c]ɔk	*[tʃʰ/tɕʰ]ok	tsʰok⁷ / sɔk²	tsʰuk⁷ / saʔ⁴	tsʰok⁷ / tsʰɔʔ⁷	tsʰok⁷ / tsʰɔk⁷	tsʰoʔ⁷ / tsʰɔk⁷	tsʰɔk⁷ / tsʰɔk⁷	taːk⁹	sók / tʃʰɔkɹ

BO

Char	Gloss	Reconstruction	D1	D2	D3	D4	D5	D6	D7	Extra
菠蘿	pineapple	*C-ra:ʔ / *ra:ʔ	ra:³	ra:³	ra:³	r[ɯ]a⁶ / ra:³	ra:³	--- / ra:⁶	[tsa:⁵]	---
		*C-mun CHI: / *C-mun, *p-lu:nɦ	mun¹	mun¹	plu:n²	--- / pluŋ²	---	--- / ---	---	---
掰開	pull open	*p-la:ɦ NWCHI: / *p-la:ɦ, *de:ŋʔ	la:² / dɛŋ³	la:² / dɛŋ³	pla:²	pla:⁵	pa:⁵	pla:⁵	[fə:y¹]	---
播種	sow (seed)	*C-mu:nʔ / *C-mu:nʔ	mu:n³	mu:n³	mu:n³ / muŋ³	mu:n³ / muŋ³	mu:n⁶ / muŋ³	mu:n³ / mun⁶	mu:n¹	mùon
伯父	uncle	*[c/ɕ]i:ʔ / *tɕʰi:ʔ	tsʰey³	tsʰay³	tsʰay³	tsʰay³ / tsʰay³	tsʰ[i:]³ / tsʰ[ɯ]y⁵	tsʰay³ / (tay⁵)	tsʰa:y¹	---
伯母	aunt	*ɲi:n / *hɲi:n	ɲji:n¹	(ɲi:n¹)	ki:n¹	ki:n⁴ / kiɲ¹	kʰi:n⁴ / (kiɲ⁴)	ki:n⁴	ɲièn²	---
脖子	neck	*Cìlɔŋʔ / *ljɔŋʔ	zɔŋ³ / lɔŋ⁴	zuŋ³ / zaŋ³	zɔŋ³ / [jua]ɳ³	ɬɔŋ⁶ / zɔŋ³	ɬɔŋ⁶ / zɔŋ³	ɬɔŋ⁶ / tsɔŋ⁶	tsaŋ²	z[ɔ̀]ɳ / ʒɔŋ˦
跛	crippled	Ciɣ[ɛ]:ŋɦ / Ciɦ[e]:ŋɦ	he:ŋ²	he:ŋ² / ɲɟ[ɛ:]²	hje:ŋ² / ɲe:ŋ²	ze:ŋ⁵ / ɲe:ŋ²	ze:ŋ⁵	(ze:ŋ⁵) / ɲaŋ²	he:ŋ²	hɛ̌ŋ
簸	winnow	GHI: *fənɦ / Run: *wet	(pen²) / fan⁵	fan² / f[ɯ]ɛn²	f[ɯ]n² / f[ɯ]ŋ²	fan⁵ / f[ɯ]ŋ²	fan⁵ / vet⁸	fan⁵ / vet⁸	[vat⁷]	---
簸箕	winnowing fan	GHI: / *dɔŋʔ	(dʉŋ³) / dɔŋ³	dʉŋ³ / daŋ³	dɔŋ³ / duaŋ³	dɔŋ³ / dɔŋ³	dɔŋ³ / dɔŋ³	dɔŋ³ / dɔŋ³	tuen¹	---

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BU

漢字	gloss		reconstruction								
補	mend (clothes)	GHl:	*fə:n	--- / fan¹	fo:n¹ / ---	fo:n¹ / fo:ŋ¹	fo:n¹ / fo:ŋ¹	fɔ:n¹ / fuaŋ¹	(ɓɔːm¹) / fⁿuːn¹	[ɓɔːm⁵]	--- / fuaŋ˧	---
補苗	care for (sprout)		*C-dəp	d[u]p⁷ / ---	dap⁷ / ---	dop⁷ / dap⁷	dop⁷ / dap⁷	d[o]p⁷ / dap⁸	d[ə]p⁷ / dap⁷	dəp⁷	--- / ---	---
捕捉	catch		*C-rɐːm	ram¹ / ---	ro:m¹ / ---	ro:m¹ / ɟ[e]p⁷	ro:m⁴ / ro:m¹	lo:m⁴ / ro:m¹	lo:m⁴ / ruam⁴	[tuy⁴]	--- / ---	---
捕鼠器	mousetrap		*Ciɣəːp	hap⁷ / ---	ho:p⁷ / ---	hjo:p⁷ / ɲ[e]p⁷	zo:p⁷ / ɲo:p⁷	zɔ:p⁷ / ɲuap⁸	hjɔ:p⁷ / ɲuap⁸	[kʰiap⁹]	--- / ---	---
不	not		*ʔɛːmɦ CHl:	ʔe:m² / v[ɛ]n³	ʔe:m² / ʔwan³	ta:¹ / ---	van⁶ / ɣan³	--- / van⁶	[ŋɔ:¹]	ʔɛ́m / van˥	[ŋɔ:¹ leŋ⁷ mɯ:⁴]	---
不	not	Qi:	*wi:	--- / ---	--- / ---	--- / ---	vey⁴ / ---	vey[⁴] / ---	[ɓɛ:⁵]	věy	---	---
不懂	not understand		*lɯːmʔ	dɬum³ / tθam³	--- / ---	--- / ɬem³	ɬum³ / ɬem³	ɬum³ / ɬom³	ɬum³ / ɬom³	tʰum⁴	dɯɰm	---
			*rɯːʔ GHl:	rəu¹ / ---	pauɟ³ / ---	pauɟ³ / gəuɟ	van³ / ---	pʰauɟ⁶ / ---	(tay²)	dóuɟ	---	---
			*hmɯ:ʔ									
不肯	not willing		*ʔəyʔ	ʔay³ / ---	ʔay³ / ʔay³	ʔay³ / ʔay³	ʔay³ / ʔay³	ʔay³ / ʔay³	ʔay¹	---	---
不能	not able	NWCHI	*C-ga:ɦ / *ʔwəɲʔ	ka:² / v[ɛ]n³	ka:² / ʔwan³	ka:² / ---	ka:⁵ / ka:²	ka:⁵ / ka:²	ka:⁵ / ka:⁵	kǎ:	---

不是	not	GHl:	*Curi:ɦ	(gay²) / vay⁵	gay² / (ʔway²)	gway² / kway²	gway² / ɣay²	gway² / vay²	hway² / vay⁵ ; vay¹	--- / ---
不要	don't		*ʔiwʔ	ʔiw³ / ---	ʔiw³ / ---	ʔ[ɟo]w³ / ʔiw³	ʔ[ɟo]w³ / ʔiw³	ʔiw³ / ʔiw³	ʔ[ɟo]w³ / ʔiw³ ; ʔjow⁵	--- / ---
不愉快	unhappy	GHl: / NWCHl:	*rɟa:k / *ʔwəɲʔ	me:m³ / v[ɛ]n³	ze:ʔ⁷ / ʔwan³	re:k⁷ / ---	te:ʔ⁸ / tɯ²	--- / teʔ⁸	--- / --- ; [ɲɔ:]	--- / ---
不	cloth	GHl:	*fət / *C-lə:mɦ	ɗin¹ / lam²	fat⁷ / lɔn²	fat⁷ / ---	(vi¹) / fak⁷	(vi¹) / ---	--- / --- ; [vi⁴]	--- / ---
不知道	not know		*hluum? / *luum?	dɯum³ / tθam³	ɬuum³ / ---	ɬuum³ / ɬem³	ɬuum³ / ɬom³	ɬuum³ / ɬom³	ɬuum³ / ɬom³ ; tʰum⁴	dɯ[ɣ]m / ---
			*Curuu: / *Curuu:	reɲ¹ / ---	heɲ¹ / (ʔwɛʔ⁴)	heɲ¹ / heɲ¹	heɲ¹ / heɲ	--- / heɲ¹	heɲ¹ / --- ; [ɗeɲp⁵]	ɦɒp / ---
布	cloth	GHl:	*ɗep	(ɗap⁷) / ---	ɗap⁷ / ɗaʔ⁴	dɔp⁷ / ɗap⁷	dɔp⁷ / ɗap⁷	--- / ɗap⁸	d[e]p⁷ / ɗap⁷ ; tep⁷	dɔp / ---
步	step		*C-ɣa:mɦ / *ɦa:mɦ	ha:m² / ---	ha:m² / ---	ha:m⁵ / ---	ha:m⁵ / ha:m²	ha:m⁵ / ham⁵	ha:m⁵ / ham⁵ ; [tsɤ:m⁵]	hǎm / ---
CAI										
猜测	guess	CHl:	*ɓa:ɲ	--- / ---	--- / ---	ɓa:n¹ / ---	ɓa:n¹ / ---	ɓa:n¹ / ɓan¹	ɓa:n¹ / ɓa:n³	--- / ---
才	just now		*C-nəwʔ / *C-nəwʔ	naw³ / n[o]w³	naw³ / ---	naw³ / [ɔ]n	no:³ / no:³	no:³ / no:³	no:³ / na:¹ ; n[a]:[3]	--- / ---

踩	step	*suːm	*suːm	tɯːm¹ ts'am¹	tɯːm¹ ---	tɯːm¹ suum¹	tɯːm¹ suum¹	tɯːm¹ ---	--- tsʰum¹	tɯːm¹ tsʰum¹	--- ---	---	---
踩	step	Qiː	*tɕɔːmɦ	--- ---	--- ---	--- ---	--- ---	tsɔːm⁵ (tsʰuam¹)	tsɔːm⁵ ---	[tsʰɛː·¹]	---	---
踩	step into	*faːw	*faːw	pʰaːw¹ ---	faːw¹ ---	faːw¹ faːw¹	--- faːw¹	--- ---	--- ---	---	---	---
菜	vegetable	*C-ɓuː: NWCHI: Run:	*ɓuː: *saːyʔ	ɓeɯ¹ tθaː:(y)³	ɓeɯ¹ fay³	ɓeɯ¹ ---	--- ---	ɓəɯ¹ ---	--- ---	---	ɓəɯ	---
		*tʃʰəy NCHI: Run:	*ʔuːɲ *ŋgən	tsʰay¹ ʔuen¹	tsʰay¹ ---	tsʰay¹ ---	tsʰay¹ ʔun¹	tsʰay¹ ʔun¹	(kʰan⁶) kaŋ³	--- kaŋ³	[tsan¹]	ʃəy kaŋ˥
CANG												
蒼蠅	a fly	*mi:ʔ Run:	*hmi:ʔ *C-ɲuːɲ	mey³	p[e]y³	pɯ⁽¹⁾ pɯ¹	--- pɯ³	ve:ŋ³ ve:ŋ³	(nuaŋ⁴) ɲuŋ¹	--- ɲuŋ⁴	[kɯ²]	mèy ɲuːɲ˦
藏	hide (object)	*Ciru:ŋ Run:	*rjuːŋ *tʃʰuː:ʔ	zu:ŋ¹ ---	zu:ŋ¹ lunʔ⁴	ru:ŋ¹ [dʒuŋ]⁽¹¹⁾	tu:ŋ¹ tuŋ¹	tu:ŋ⁴ tuŋ¹	tʰuaŋ⁴ tsʰauɟ³	tuːɲ⁴ tsʰauɟ³	[pey¹]	--- ---
CAO												
槽	trough	*[t/c]u:	*[tʃʰ/tɕʰ]u:	tsʰow¹ ---	tsʰow¹ ---	tsʰow¹ tsʰow¹	tsʰow¹ tsʰow¹	tsʰow¹ tsʰow¹	tsʰow¹ tsʰow¹	tsʰow¹ tsʰow¹	[tɔ:ŋ]	ʃaw ---
草	grass	*ŋən?	*hŋənʔ	ŋen³ kan⁴	kan³ kan³	kan⁶ kaŋ³	kan⁶ kaŋ³	kʰan⁶ kaŋ³	kan⁶ kan⁶	kə:n⁴	ŋèn ---	kǎn

				1	2	3	4	5	6	7
草木灰	ash	*su:ʔ	*su:ʔ	tow³ / tθay³	taw³ / ---	taw³ / saw³	taw³ / tsʰaw³	taw³ / tsʰaw³	[fa:¹]	--- / tɕʰaw]
CENG										
層	layer	*lut	*hlut	dut⁷ / ---	ɬut⁷ / ---	ɬut⁷ / tet⁷	ɬut⁷ / tək⁸	ɬut⁷ / tet⁷	[fuɯ:n⁴]	--- / ---
CHA										
插	insert	GHl:	*C-ɲok	--- / ---	ɲuk⁷ / ---	ɲok⁷ / ɲɔk⁷	ɲok⁷ / ɲɔk⁷	(ɲuk⁷) / ---	---	--- / ---
插	insert forcefully	GHl:	*tɕʰoŋʔ	(tsʰuŋ³) / tsʰɔŋ³	tsʰuŋ³ / ---	tsʰoŋ³ / tsʰɔŋ³	tsʰoŋ³ / tsʰɔŋ³	tsʰɔŋ³ / ---	tsʰa:ŋ⁵	--- / ---
插	insert	*C-ɲi:p	*C-ɲi:p	ɲi:p⁷ / ni:p²	ɲi:p⁷ / ---	ɲi:p⁷ / ɲip⁷	ɲi:p⁷ / ɲip⁷	ɲi:p⁷ / (ʔip⁷)	ɲep⁷	ɲi:pl / ---
岔	fork in road	*pa: Run:	*pʰa: *C-ŋa:ʔ	pʰa:¹ / pʰɔ:³	pʰa:¹ / pʰa:¹	pʰa:¹ / pʰa:¹	(ŋa:⁴) / ŋa:³	pʰa:¹ / ŋa:³	ɓow¹	--- / ---
杈子	branch (tree)	*C-ŋa:mɦ	*C-ŋa:mɦ	ŋa:m² / ---	ŋa:m² / ---	ŋa:m⁵ / ŋa:m²	ŋa:m² / (ŋa:m⁵)	ŋa:m⁵ / ŋam²	ŋəm²	ŋàm / ŋàm
CHAI										
柴刀	sickle	*C-ga:ʔ	*ka:ʔ	ka:³ / kɔ:³	ka:³ / ---	ka:³ / ka:³	ka:³ / ka:³	ka:³ / ka:³	[dow⁵]	--- / ---
柴火	firewood	*ŋun?	*hŋunʔ	ŋun³ / ---	kun³ / kɛn³	kun³ / koŋ³	kʰun⁶ / koŋ³	kun⁶ / ken⁶	[fuɯŋ⁴]	ŋòn / koŋl , kún

CHAN

字	gloss	recon	recon								
饞嘴	gluttonous	*C-laːɲ	*C-laːɲ	laːn^1	laːn^1	laːɲ^1	laːn^1	laːn^4	laːn^1	---	¦
				laːn^1	lɔn^1	laːn^1	laːn^1	laːn^1	lan^4		¦
饞吃乙	crave	*C-ɓət	*ɓət	ɓet^7	ɓat^7	ɓat^7	ɓ[ɯ]t^7	---	(ɓɯt^9)	ɓɯt^7	¦
				---	---	ɓaʔ^7	ɓa[t]^7	---	---		¦
		*tiːw	*tʰiːw	tʰiːw^1	tʰiːw^1	tʰiːw^1	tʰiːw^1	---	tʰiːw^1	tsʰew^1	¦
				---	---	tʰiw^1	tʰiw^1	---	---		¦
纏	twine, wind	*fiːt / NCHIː	*fiːt / *mbiːt	pʰiːt^7	fiːt^7	fiːt^7	fiːt^7	---	(kʰuːt^7)	[huːt^9]	¦
				---	---	pit^7	pit^7	pit^8	pit^8		¦
蟬	cicada	*mi:?	*hmiː?	mey^3	p[e]y^3	puɯ$^{(1)}$	---	---	---	---	¦
				---	---	---	puɯ^3	---	---		¦
		*rəːy	*rəːy	raːy^1	goːy^1	goːy^1	gaːy^4	haːy^4	haːy^4	kuy^1	¦
				---	---	---	xoːy^1	---	[tsɯ]uːy^1		¦
蟬	cicada	Run:	*C-niːŋ	---	---	(niːŋ^2)	---	(niaŋ^1)	---	---	¦
				---	---	---	---	niŋ^1	niŋ^1		¦
		Run:	*C-naːyɦ	---	---	---	---	---	---	---	¦
				---	---	---	---	naːy^2	naːy^2		¦
鏟	shovel	*[c/ɕ]aːc	*tɕʰaːc	tsʰaːt^7	tsʰaːt^7	tsʰaːc^7	tsʰaːt^7	tsʰaːt^7	---	---	¦
				---	---	---	(tsʰaːt^7)	tsʰaːt^8	(tsʰaːt^7)		¦

CHANG

字	gloss	recon	recon								
長	long	*na:w?	*hnaːw?	naːw^3	taːw^3	taːw^3	taːw^6	tʰaːw^6	taːw^6	tow^4	nàːw / táːw
				tsaːw^4	taw^3	taːw^3	taːw^3	taːw^3	taːw^6		tawˀ

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		Proto A	Proto B									
腸	intestine	*C-ra:yʔ	*ra:yʔ	ra:y^3 / la:(y)^4	ra:y^3 / lay^3	ra:y^3 / la:y^3	ra:y^6 / ra:y^3	la:y^6 / ra:y^3	la:y^6 / ruay^6	luɰy^4	dà:y
嘗	taste	*[c/ɕ]im / *NCHI	*tɕʰim / *ɓu:n	tsʰim^1 / ---	tsʰim^1 / ɓun^1	tsʰim^1 / ɓun^1	tsʰem^1 / tsʰem^1	tsʰim^1 / tsʰem^1	tsʰim^1 / tsʰem^1	tsem^4	
CHAO											
炒	stir-fry	*C-g[e]:ŋ	*k[e]:ŋ	ke:ŋ^1 / ---	ke:ŋ^1 / keŋ^1	ke:ŋ^1 / ke:ŋ^1	ke:ŋ^1 / ke:ŋ^1	ke:ŋ^1 / kian^1	ke:ŋ^1 / kian^1	---	
CHE											
車	vehicle	*[c/ɕ]ia	*tɕʰia	tsʰia^1 / tsʰiɵ^5	tsʰia^1 / tsʰiɛ^3	tsʰia^1 / tsʰiːʔ^1	tsʰia^1 / tsʰiːʔ^1	tsʰia^1 / tsʰia^1	tsʰia^1 / tsʰia^1	tsʰia^3	ʃéa / tʃʰiːɬ
車輪	wheel	*mi:ʔ / Run:	*hmi:ʔ / *kʰok	mey^3 / ---	(mey^3) / ---	--- / pay^3	(?eŋ^1) / kʰɔk^8	(?eŋ^1) / kʰɔk^7	?eŋ^3		
扯破	to tear	*ʔi:k / CHI:	*ʔi:k / *C-ɲi:k	ʔi:ʔ^7 / ---	ʔi:ʔ^7 / ---	ɲi:k^7 / ---	ɲiaʔ^7 / ɲit^7	ɲia^8 / ɲit^8	ɲiaʔ^8 / ɲiʔ^8	ɲiak[8]	ɲit^7 / ˇi:
CHEN											
塵土	dust	GHI: / Run: / *veŋ	*fu:ŋʔ / *C-ŋəːn / *veŋ	(pu:ŋ^3) / foŋ^3	fu:ŋ^3 / fuŋ^3	fu:ŋ^3 / fuŋ^3	fuaŋ^3 / fuŋ^3	fuaŋ^3 / ŋuaŋ^1 / fan^1	fu:ŋ^3 / ŋ[u]n / fan^4	pueŋ^5	(pùoŋ)
沉	sink	GHI:	*tɕəːn	(tso:n^1) / ---	tso:n^1 / ---	tsan^1 / tso:n^1	tso:n^1 / tso:ŋ^1	tso:n^1 / tso:ŋ^1	tso:n^1 / tu:n^1	tsen^4	

CHENG

稱呼	be called	GHI:	*hwən	(vən¹)	vən¹	hwan¹	van⁴ / vəŋ¹	--- / vəŋ¹	--- / van⁴	---	---	kʰə̆n
稱呼	be called	CHI:	*tɕaːn	---	---	--- / tsaːn¹	--- / tsaːn¹	tsaːn¹	tsaːn¹	---	---	---
撐	extend	*t[ʃ/ɕ]əwɦ, CHI: *tʰaːyɦ	tsʰaw²	tsʰaw² / tʰay²	tsʰaw²	tsʰaw² / tʰa:y⁵	tʰa:y⁵	tʰa:y⁵ / tʰuay⁵	[təp⁸]	---	---
成功	succeed	CHI:	*tɕiːŋ	--- / ---	--- / tsiŋ¹	tsiːŋ¹	tsiaŋ¹	tsiaŋ¹	tsiaŋ¹	---	tʃʲiːŋ˧	---
成熟	ripe, mature	*sɯːk	tɯːʔ⁷ / tθɯək²	tɯːʔ⁷ / feʔ⁴	tɯːkʔ⁷ / sɯʔ⁷	tɯːʔ⁷ / sɯkʔ⁸	tɯaʔ⁷ / tsʰɯukʔ⁸	tɯːʔ⁷ / tsʰɯuʔ⁷	tsʰaːkʔ⁹	tɯː / tʃʰœk˧	---
盛飯	fill w/ rice	GHI: *kʰəwʔ, Run: *ʔtɯː	zaː¹ / kʰaw³	kʰaw³ / kʰɔ:³	kʰaw³ / kʰo:³	kʰo:³ / kʰo:³	kʰo:³ / ʔəɯ¹	kʰo:³ / ʔəɯ¹	hi:w¹	ɬeʉ˧	---

CHI

吃	eat	*C-luːɦ, Qi *kʰən, Run: *C-ləːk	low² / laː⁵	law² / law²	laː² / law²	law⁵ / law²	kʰan¹ / lɔʔ⁸	kʰan¹ / lɔʔ⁸	[tey⁵]	lăw / lɔʔ˧	kʰə̆n
吃草	graze	*C-gɔmʔ, Qi: *kɛmʔ	kom³	kom³	kom³	kam³ / kom³	kam³ / kom³	kam³ / kom³	[tey⁵]	---	---
池塘	pond	GHI: *[v/hw]eːŋ, ECHI: *Cifuːŋɦ	ʔuːŋ³	ve:ŋ¹	hju:[kʔ⁷] zu:ŋ⁵	zu:ŋ⁵ / laŋ²	zuaŋ⁵ / viaŋ¹	(ʔjɔŋ⁵) / ---	ʔjɔŋ⁵	ùoŋ	---

				D1	D2	D3	D4	D5	D6	D7	
遲	late		*feŋ	pʰoŋ^1 / feŋ^1	faŋ^1 / faŋ^1	faŋ^1	faŋ^1 / faŋ^1	faŋ^1	faŋ^1 / fɔŋ^1	[liaw^1]	—
翅膀	wing	*piːk	*pʰiːk	pʰiːk^7 / pʰiek^2	pʰiː^7 / pʰiʔ^4	pʰiː^7 / pʰiʔ^7	pʰiaʔ^7 / pʰiːk^7	pʰiaʔ^7 / pʰit^8	pʰiak^7 / pʰiʔ^7	pʰiː^5	fiː / ʃɛː
CHONG											
舂	pound rice	*[c/ɕ]aːk Ruːn:	*tɕʰaːk *pʰəw	tsʰaːʔ^7 / tsʰɛk^2	tsʰeːʔ^7 / sɛʔ^4	tsʰeːk^7 / tsʰeːʔ^7	tsʰeːʔ^7 / tsʰɯː^2	tsʰeːʔ^7 / pʰaw^3	tsʰeːʔ^7 / pʰaw^3	tsʰɯː^7	sɐː
舂	pound rice	*suːnʔ	*suːnʔ	tuːn^3	tuːn^3	tuːn^3 / suŋ^3	tuːn^3 / suŋ^3	tuːn^3 / tsʰuŋ^3	tuːn^3 / tsʰun^3	—	—
舂	pound to powder	*C-luːn	*C-luːn	luːn^1	luːn^1	luːn^1 / lun^1	luːn^1 / (luːn^1)	— / luŋ^1	— / lun^4	—	—
蟲	insect	*Ciɣənɦ	*Ciɦənɦ	hen^2 / ɲan^5	han^2 / ɲjen^2	hjan^2 / ɲan^2	zan^5 / ɲaŋ^2	zan^5 / ɲaŋ^2	hjan^5 / ɲan^2	zɔːt^8	ɲaɲʋ
CHOU											
抽	pull out (book)	ECHIː	*C-ɦuc	ɲit^8	kʰat^7	huc^7	hut^7	hut^7	hut^7	[mak^7]	kʰaːtɦ
抽打	to lash	*fiːt	*fiːt	pʰiːt^7	fiːt^7	fiːt^7 / fit^7	fiːt^7 / fit^8	fiːt^7 / (fit^8)	fiːt^7 / (fit^8)	[təp^8]	—
抽打	to lash	CHIː	*faːn	—	—	faːn^3	— / (fat^7)	— / (fat^7)	faːn^3 / fat^7	—	—
抽穗	pull out rice	*C-ɓəw	*ɓəw	ɓaw^1 / ɓaw^1	ɓaw^1 / ɓaw^1	ɓow^1	ɓaw^1 / ɓaw^1	ɓaw^1 / ɓaw^1	ɓow^1 / ɓaw^1	—	—

醜	ugly	*Cɪra:k	*Cɪra:k	za:ʔ⁷ lɛk⁴	ze:ʔ⁷ lɛʔ⁴	re:k⁷ te:ʔ⁷	te:ʔ⁸ tɯ:²	tʰe:ʔ⁸ te:ʔ⁸	te:ʔ⁸ tia:ʔ⁷	[ʔay¹]		⋮	⋮
		*C-muɯ:n NCHI: *C-la:yʔ NCHI: *rjuy	*C-muɯ:n NCHI: *C-la:yʔ NCHI: *rjuy	muɯ:n¹ la:(y)³	muɯ:n¹ ---	muɯ:n¹ la:y³	muɯ:n¹ [ʔ]luy¹	tʰuy⁴ muɯŋ¹	muɯ:n¹ tsow⁴	[huey¹]		⋮	⋮
臭	smelly	*Cɪra:k	*Cɪra:k	za:ʔ⁷ ---	ze:ʔ⁷ lɛʔ⁴	re:k⁷ te:ʔ⁷	te:ʔ⁸ tɯ:²	tʰe:ʔ⁸ te:ʔ⁸	te:ʔ⁸ tia:ʔ⁷	[ʔay¹]	te:ʔ˦	⋮	⋮
		*C-ɣa:y NCHI: *Ciɦɛ:y NCHI:	*C-ɣa:y NCHI: *Ciɦɛ:y NCHI:	ha:y¹ ɲɔ:(y)¹	ha:y¹ ɲɔy¹	ha:y¹ ɲɔ:y¹	ha:y¹ ɲɔ:y¹	ha:y¹ ɲuay¹	ha:y¹ ɲu:y⁴	huɛy⁴	ɲɤaɣˀ	⋮	⋮
臭蟲	stinkbug	*kɯp	*C-gup	kɯp⁷ kup²	kɯp⁷ kɛʔ⁴	kɯp⁷ (kɯp⁷)	kɯp⁷ kep⁷	kup⁷ kop⁸	kɯp⁷ kop⁷	[dɔ:p⁹]	kop˦	⋮	⋮
CHU													
出	exit	*tɯ:n	*tʰɯ:n	tʰɯ:n¹ tsʰɯn¹	tʰɯ:n¹ tʰɛn¹	tʰɯ:n¹ tʰɯn¹	tʰɯ:n¹ tʰɯɲ¹	tʰɯ:n¹ tʰɯɲ¹	tʰɯ:n¹ tʰen¹	ɗaŋ¹	tʰuɛn tʰuɯɲ˦	⋮	⋮
出賣	betray	*ɣwes	*ɣwes	taw² ---	taw² ---	taw² so:²	taw⁵ so:²	to:⁵ tsʰo:²	to:⁵ tsʰo:⁵	---		⋮	⋮
除草	to weed	*C-lu:nɦ	*C-lu:nɦ	lu:n² ---	--- ---	lu:n² l[oŋ]²	lu:n⁵ luɲ²	lu:n² luɲ²	lu:n⁵ lun²	[tsʰuɛn⁹]		⋮	⋮
鋤地	to hoe	CHI:	*ɓwɛɦ	--- ---	--- ---	ɓow² ɓo:²	ɓo:⁵ ɓo:²	ɓo:⁵ ɓo:²	ɓo:⁵ ɓo:⁵	ɓo:w⁵	po:ˀ	⋮	⋮
鋤地	to hoe	*C-ɓənɦ	*C-ɓənɦ	ɓen² ---	ɓan² ---	ɓan² ---	ɓan⁵ ---	--- ---	--- ---	---		⋮	⋮

鋤頭	a hoe	*C-gwa:k / CHI:	*kwa:k / 6əwɦ	ka:ʔ / (kok^2)	ka:ʔ / ---	kwa:k^7 / 6o:^{2}	6o:^{5} / 6o:^{2}	6o:^{5} / 6o:^{2}	6o:^{5} / 6o:^{5}	kuak^7	ká: / ---	--- / ʃát
	CHUAN											
穿	put on	*[c/ɕ]et	*tɕʰet	tsʰet^7 / tsʰat^2	tsʰat^7 / saʔ^4	tsʰat^7 / tsʰa[ʔ]^7	tsʰat^7 / tsʰak^7	tsʰat^7 / tsʰak^8	tsʰat^7 / tsʰat^7	tsʰɔ:t^9	ʃ[l]t / tʃakꜜ	ßát
穿	put on (lower)	*pi:n	*pʰi:n	pʰi:n^1 / pʰi:n^1	pʰi:n^1 / ---	pʰi:n^1 / pʰiŋ^1	pʰi:n^1 / pʰiŋ^1	pʰi:n^1 / ---	pʰi:n^1 / ---	pʰi:n^1	---	---
穿針	thread	*sɔk	*sok	tok^7 / tθok^2	tuk^7 / ---	tok^7 / sɔʔ^7	tok^7 / sɔk^7	tok^7 / tsʰɔk^8	tok^7 / tsʰɔk^7	tsʰɔ:k^9	tok	---
穿插	alternate	*su:ɲ	*su:ɲ	tu:n^1 / ---	tu:n^1 / ---	tu:ɲ^1 / sun^1	tu:n^1 / sun^1	tu:n^1 / tsʰun^1	tu:n^1 / tsʰun^1	---	---	---
穿山甲	pangolin	*C-muɯɲ?	*C-muɯɲ?	muɯn^3 / muɯn^3	muɯn^3 / men^3	muɯn^3 / ---	muɯn^3 / meŋ^3	muɯn^6 / meŋ^3	muɯn^3 / men^6	[tsa:^{4}]	---	---
傳染	infect	*pa:t / GHI:	*pʰa:t / *kʰa:t	pʰa:t^7 / ---	kʰa:t^7 / ---	pʰa:t^7 / kʰa:ʔ^7	kʰa:t^7 / kʰaʔ^7	kʰa:t^7 / kʰaʔ^8	kʰa:t^7 / kʰuat^7	[ʔuey^4]	---	---
船	boat	*Cuɾa:	*Cuɾa:	ra:^{1} / vɔ:^{4}	ra:^{1} / vaʔ^4	va:^{1} / k[ɔ]:^{1}	--- / ɣa:^{1}	fa:^{4} / ---	--- / ---	lɔ:^{4}	dá: / fa:ꜜ	---
串	fish string (clsfr)	*ku:c GHI: / *sok GHI: / *kʰa: NCHI:	*ku:c / *sok / *kʰa:	--- / tθok^2	ku:t^7 / ---	ku:c^7 / kʰa:^{1}	ku:t^7 / kut^7	--- / kut^8	tok^7 / kʰa:^{1}	tsʰɔ:k^9	---	---
串	rice string (clsfr)	*ŋ[e]:ŋ GHI:	*hŋ[e]:ŋ	(tse:ŋ^1) / ---	tse:ŋ^1 / ---	tse:ŋ^1 / ---	tse:ŋ^1 / ---	tsʰe:ŋ^4 / tsiaŋ^1	tse:ŋ^4 / tsiaŋ^1	tsiŋ^2	---	---

CHUANG

Char	Gloss	*Recon A	*Recon B									
			GHI:									
瘡	sore, ulcer	*C-n[e]ːŋ		--- / ---	neːŋ^1 / ---	neːŋ^1 / neːŋ$^{1[3]}$	neːŋ^1 / neːŋ^1	neːŋ^4 / niaŋ^1	neːŋ^4 / niaŋ^1	[naːy˩]	¦	¦
瘡	sore, ulcer	*Cuʔəw	*Cuʔəw	ʔawˀ^1 / vawˀ^1	--- / ʔwawˀ^1	ʔwowˀ^1 / ---	--- / ---	--- / ---	--- / ---	---	âw	¦
床	bed	*t[ɛ]ːŋɦ	*tʰ[e]ːŋɦ	tʰeːŋˀ^2 / ---	tʰeːŋˀ^2 / ---	tʰeːŋˀ^2 / tʰeːŋˀ^2	tʰeːŋ^5 / tʰeːŋˀ^2	tʰeːŋ^5 / ---	tʰeːŋ^5 / ---	---	tʰěːŋ	¦
床	quilt clsfr	*Cɪɣeːn	*Cɪɦeːnɦ	han^1 / (zɔːnˀ^1)	hoːnˀ^1 / ɲɔnˀ^1	hjoːnˀ^1 / ɲoːnˀ^1	zoːnˀ^1 / ɲoːŋˀ^1	zɔːn^1 / ɲoːŋˀ^1	(zɔːnˀ^1) / ɲuːn^4	huan^4	¦	¦
床墊	mattress	*C-gaːn	*kaːn	kaːnˀ^1	kaːnˀ^1	kaːnˀ^1	kaːnˀ^1 / kaːŋˀ^1	kaːnˀ^1 / kaːŋˀ^1	kaːnˀ^1 / kuan^1	[pɯaˀ^5 təːnˀ]	¦	¦

CHUI

Char	Gloss	*Recon A	*Recon B									
吹	blow	*ʔuːɦ	*ʔuːɦ	ʔowˀ^2 / ʔowˀ^5	ʔowˀ^2 / ʔɛwˀ^2	ʔowˀ^2 / ʔowˀ^2	ʔowˀ^5 / ʔowˀ^2	ʔowˀ^5 / ʔowˀ^2	ʔowˀ^5 / ʔowˀ^5	ʔaːw^1	Λ̌w / ʔow˩	¦
炊烟	smoke	*Cuɣeːn	*Cuɦeːn	han^1 / ɲuan^1	hoːnˀ^1 / ɲɔnˀ^1	hwoːnˀ^1 / ɲoːŋˀ^1	goːnˀ^1 / ɲoːŋˀ^1	vɔːnˀ^1 / ɲuaŋˀ^1	hɔːnˀ^1 / [ŋ]uːn^4	huan^4	han	¦

CHUN

Char	Gloss	*Recon A	*Recon B									
春	spring	*C-ɲaːn	*C-ɲaːn	ɲaːnˀ^1 / ---	ɲaːnˀ^1 / ---	ɲaːnˀ^1 / ---	ɲaːnˀ^1 / ɲaːŋˀ^1	naːnˀ^1 / ɲaːŋˀ^1	ɲaːn^4 / ɲuan^4	ɲuən^1	¦	¦
		*ʔəŋ	*ʔəŋ	lay^2 naː^2 ʔaŋ^1 / ---	ʔaŋ^1 / ---	ʔaŋ^1 / ---	ʔaŋˀ^1 / vaŋˀ^1	ʔaŋˀ^1 / vaŋˀ^1	ʔaŋ^1 / van^4	[tʰiaw^4 taːw^1]	¦	¦
	Run:		*wən	---	---	---	---	---	---		¦	¦

CHUO

Gloss	字	*Recon A	*Recon B	1	2	3	4	5	6	7	8
poke	戳	*suːŋʔ	*suːŋʔ	tɯːŋ³	tɯːŋ³	tɯːŋ³	tɯ:ŋ³ / sɯŋ³	tɯaŋ³ / tsʰuŋ³	tɯːŋ³ / tsʰuŋ³	tsʰaːŋ⁵	---

CI

Gloss	字	*Recon A	*Recon B	1	2	3	4	5	6	7	8
rice cake	糍粑	GHI:	GHI:	me·ʔ⁹	---	---	---	---	---	---	---
times	次	*C-ɲeːɦ	*C-beːy	ɲeː·²	ɲeː⁵	ɲeː⁵	(ɲeː⁵) / ɲeʔ²	ɲeː⁵	ɲeː⁵	ɲεː⁵	kǎy
thorn	刺	*C-βəːy	*Cuɣuɯnʔ	pa:y¹	fo:y¹ / fɔy⁶	(fa:y¹) / ko:y¹	fa:y¹ / yo:y¹	fa:y¹ / fu:y¹	fa:y¹ / fu:y¹	fuey¹	---
prick (finger)	刺	*Cuɦɯɯnʔ	*pəwʔ	huɯn³ / ŋuɯn³	huɯn³ / ŋɯn³	[h]uɯn³ / ŋeŋ³	hwuɯn³ / ŋeŋ³	huɯn³ / ŋeŋ³	huɯn³ / mjen⁶	haŋ⁴	huɰ[ɣ]n
porcupine	刺猬	*pʰəwʔ	*[c/ɕ]inʔ	pʰaw³ / pʰay³	pʰaw³ / pʰaw³	pʰow³ / pʰaw³	pʰaw³ / pʰaw³	pʰaw³ / pʰaw³	pʰow³ / pʰaw³	[tsʰua⁵]	pʰoːↃ
	刺猬			tsʰin³ / (tθin³)	tsʰeɲ³	tsʰen³ / tsʰen³	tsʰen³ / tsʰen³	tsʰin⁵ / tsʰen³	tsʰin⁵ / tsʰen³	[luː⁴ low²]	---

CONG

Gloss	字	*Recon A	*Recon B	1	2	3	4	5	6	7	8
once upon a time	從前	*tɕʰi	GHI:	---	tsʰi¹	tsʰi¹	---	---	---	tsʰi¹	---
				---	---	tsʰi¹	tsʰi¹	tsʰi¹	---	---	---
		*kʰuːnɦ	*[k/x]uːnɦ	kʰuːn² / kʰu[a]n⁵	kʰuːn²	kʰuːn²	kʰuːn⁵ / kʰuŋ²	kʰuːn⁵ / (kʰun²)	kʰuːn⁵ / kʰun²	[voːnˀ mɔːˀ⁵]	kʰúon
				kʰʰun²	kʰʰun²	---	kʰʰuŋ²				---
clump	叢	*roŋʔ	GHI:	(guŋ³)	guŋ³	goŋ³	goŋ³	goŋ⁶ / ɕɔx³	hoŋ⁶ / ɕɔx³	h[o]ŋ⁶ / kʰɔɲ³	---
				---	---	---	---			[fuk⁷]	---

CU

字	gloss										
粗糙	rough	*Cura:w	*Cura:w	va:w^4	[fʃ]aʔ^4	kwa:w^1	— / fa:w^4	fa:w^4 / fa:w^4	— / fa:w^4	—	sǎw / —

CUAN

字	gloss										
竄	escape	*piw	*pʰiw	pʰiw^1	pʰiw^1	pʰiw^1 / pʰiw^1	pʰiw^1 / pʰiw^1	— / pʰiw$^{[2]}$	pʰiw^3 / pʰiw^1	pʰiw^1	—

CUN

字	gloss										
村庄	village	*C-bəwʔ / CHI:	*ɓəwʔ / *C-βa:n	ɓaw^3 / fɔn^1	ɓaw^3 / fan^1	ɓow^3 / kwa:n^1	fa:n^1 / ɣa:ŋ	fa:n^1 / fa:ŋ	fa:n^3 / fuan^1	fuən^1	ɓàw / fa:ŋˀ

CUO

字	gloss										
搓	rub (rope)	*pəc	*pʰəc	pʰat^7	pʰat^7	pʰac^7 / pʰat^7	pʰat^7 / pʰat^7	pʰat^7 / pʰat^8	pʰat^7 / pʰat^7	—	—
搓	rub (rope)	*pən	*pʰən	pʰən^1	pʰan^1 / pʰan^1	pʰan^1 / pʰan^1	pʰan^1 / pʰan^1	pʰan^1	pʰan^1	ɓɔ:n^1	—
搓洗	scrub	GHI:	*fɟɯ:p	(pɯ:pˀ)	fɯ:pˀ	fɯ:pˀ / fupˀ	fɯ:pˀ / fupˀ	fupˀ / fup^8	fɯ:pˀ / fupˀ	tsʰuəpˀ	— / fu:pˀ̚
撮	pinch	*C-ɟɛ:mʔ	*tɕe:mʔ	tse:m^3	tse:m^3 / sɛ:ʔ^4	tse:m^3	tse:m$^{[6]}$ / tse:m^3	tse:m^3 / (tem^3)	— / tem^3	—	—
撮	pinch	Qi:	*C-ɲimʔ	—	—	—	ɲim^3	ɲim^6	ɲim^3	ɲim^1	—

DA

	gloss	proto		1	2	3	4	5	6	7	8	9
答應	reply	*tin	*tʰin	tʰin¹ / tʰen¹	tʰin¹ / tʰen¹	tʰeŋ¹ / tʰen¹	tʰen¹ / tʰen¹	tʰen¹ / tʰen¹	tʰin¹ / tʰen¹	[hoːn⁴]	¦	¦
打	hit	*ta[:]yɦ	*tʰa[:]yɦ	tʰay² / ---	tʰaːy² / tʰay²	tʰaːy² / tʰaːy²	tʰaːy⁵ / tʰaːy²	tʰaːy⁵ / tʰaːy²	tʰaːy⁵ / tʰuay⁵	[təp⁸]	tʰǎy	¦
打柴舞	bamboo dance	*seːp GHI: CHI:	*rəːp *tɕuːnʔ	tap⁷ / ---	goːp⁷ / ---	goːp⁷ / ---	toːp⁷ / tsun³	tsuːn³ / tsʰuap⁸	toːp⁷ / tsʰuap⁸	tsuen¹	¦	¦
		*[c/ɕ]aːk	*tɕʰaːk	tsʰaːʔ⁷ / ---	tsʰeːk⁷ / ---	tsʰeːʔ⁷ / ---	tsʰeːʔ⁷ / tsʰɯː²	tsʰeːʔ⁷ / tsʰeʔ⁸	tsʰeːʔ⁷ / tsʰiaʔ⁷	tsʰɯː⁵ / tsʰiaʔ⁷	¦	¦
打盹兒	doze off	*C-ɟəːn NWCHI:	*tɕeːn *kuːɦ	(tsoːn¹) / kaː⁵	tsoːn¹ / kaw²	tsoːn¹ / tsoːn¹	tsoːn¹ / tsoːŋ¹	tsoːn¹ / tsuaŋ¹	tsoːn¹ / tuːn¹	[tʰaw]	(tsɔŋ)	¦
		*C-ŋut	*C-ŋut	ŋut⁷ / ŋət²	ŋut⁷ / ŋeʔ⁴	ŋut⁷ / ŋut⁷	ŋut⁷ / ŋok⁷	ŋut⁸ / ŋok⁸	ŋut⁷ / ŋət⁸	ŋɔk⁷	ŋɤ́t	¦
打	slap	*piːk	*pʰiːk	pʰiːʔ⁷ / pʰiek²	pʰiːʔ⁷ / pʰiʔ⁴	pʰiːk⁷ / pʰiʔ⁷	pʰiaʔ⁷ / pʰik⁷	pʰiaʔ⁷ / pʰit⁸	(pʰiaʔ⁷) / pʰiʔ⁷	ɓia⁵	ɬiː	¦
打滾	roll (like a child)	*p-liːn	*p-liːn	liːn¹ / ---	liːn¹ / pjinʔ⁴	pliːn¹ / ---	pliːn¹ / pliŋ¹	(liːn¹) / pliŋ¹	(liːn¹) / pliŋ¹	[lamᴸ]lin¹	¦	¦
打滾	roll	GHI:	*Ciʔoŋʔ	(ʔuŋ³) / zɔŋ³	ʔuŋ³ / ---	ʔjoŋ³ / zɔŋ³	zoŋ³ / zɔŋ³	zoŋ³ / zɔŋ³	ʔjoŋ³ / zɔŋ³	[tsaːm⁴]	¦	¦

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打哈欠 yawn	*C-ga:w	*ka:w	ka:w¹ kaw¹	ka:w¹ kaw²	ka:w¹ ka:w¹	--- ka:w¹	--- ka:w¹	--- ka:w⁴	--- ka:w⁴	hɔː⁵	kaw kɛw┐	kǎː
	*hŋa:p	ŋa:p⁷	ŋa:²	ŋa:p⁷ pu?⁷	ka:p⁸	kʰa:p⁸ ka:p⁸	ka:p⁸ kap⁸	hɔ:p⁸	ŋáp kap┤	kạp
打鼾 snore	*C-ɔːɲ	raŋ¹	ro:ŋ¹	ro:ŋ¹ lo:ŋ⁴	ro:ŋ⁴ ro:ŋ¹	---	lo:ŋ⁴	dáŋ	---
	*Cuɾa:n	ra:n¹	ra:n¹	va:n¹ ko:n¹	fa:n⁴ (va:ŋ¹)	fa:n⁴ fa:ŋ¹	fa:n⁴ f[u]n⁴	luːn⁴	dán fa:ŋ┤	---
打 make a mark (記號)	*p-lu:k	lu:?⁷	lu:?⁷	plu:k⁷ pu?⁷	plu:?⁷ [p]luk⁷	pua?⁷ pluk⁸	plu:?⁷ plu?⁷	[təp⁸]	---
打開 open	*C-ŋa:ɦ / CHI: / *Cuʔa:ɦ	ŋa:²	ŋa:²	?wa:²	gwa:⁵ ɣa:²	va:⁵ va:²	?wa:⁵ va:⁵	?ow¹	ŋǎː	víː
打獵 go hunting	*rip	rip⁷	gip⁷	gip⁷	gip⁸	--- xep⁸	(tu:n⁴)	(tuen²)	---
打噴嚏 sneeze	*[c/ç]imɦ	tsʰi¹n²	tsʰi¹n²	---	tsʰen⁵	tsʰen⁵	tsʰi¹n⁵	tsʰit⁷	ʃín	---
	GHI: / *dəɲ	?en¹ dian¹	dan¹	dan¹	dan¹	dan¹ dan¹	dan¹ dan¹	tuen¹	én	---
打水 pump water	GHI: / *ɓəːk	va:y¹	ɓo:?⁷ ɓoɣ⁴	ɓo:k⁷ ---	ɓo:?⁷ ɓo:k⁷	ɓo:?⁷ ɓoɣ⁸	ɓo:?⁷ ɓoɣ⁸	[tɔ:p⁹]	váːy	---

		*Proto 1	*Proto 2	L1	L2	L3	L4	L5	L6	L7	L8
打聽	inquire	*C-ɣi:ŋʔ GHI:	*ɦi:ŋʔ / *ɦi:ŋ GHI:	hi:ŋ^3 / ---	hi:ŋ^1 / ---	hi:ŋ^1 / ---	hiaŋ^1 / [ŋ]iŋ^1	hian^1 / ---	hian^1 / ---	[ɲey^2] / ---	hien / ¦
打圍	surround	*ɲa:wʔ	*ɲpa:wʔ	ɲa:w^3 / ---	tsa:w^3 / ---	tsa:w^3 / ---	tsa:w^6 / tsa:w^3	tsʰa:w^6 / tsa:w^3	tsa:w^6 / ---	nə:w^2 / ---	--- / ---
		*ljey GHI:	*ljey	--- / ---	zay^1 / ---	zay^1 / ---	ɬay^4 / zay^1	ɬay^4 / zay^1	--- / tsay^4	--- / ---	--- / ---
大	big	*C-luŋ	*C-luŋ	luŋ^1 / loŋ^1	luŋ^1 / loŋ^1	loŋ^1 / luŋ^1	lon^1 / loŋ^1	luŋ^4 / luŋ^1	luŋ^1 / luŋ^4	lo:^{1} / ---	luń / luːŋ˩
大大后天	3 days after tomorrow	*ŋwən CHI:	*hŋwən / *mbəyʔ CHI:	ven^1 / ---	van^1 / ---	--- / ---	pay^6 / ---	pʰay^6 / pay^3	pay$^{[4]}$ / pay^3	[kɯ^2]	vén / pa:y˩
		*Cuɣa:t CHI:	*Cuɦa:t / *Cuɦi:t	ha:t$^{[9]}$ / ŋɔt^2	ha:t^7 / ŋwaʔ^2	hwi:t^7 / ---	vi[aʔ^8] / ɲik^7	vi[aʔ^7] / ɲit$^{[17]}$	--- / ɲit$^{[7]}$	[kut^{10}]	hạt / ti:t˩
大后天	2 days after tomorrow	*ŋwən CHI:	*hŋwən / *mbəyʔ	ven^1 / ---	van^1 / ---	--- / ---	pay^6 / ---	van^4 / ---	pay$^{[4]}$ / pay^6	[kɯ^2]	vén / pa:y˩
		*Cuɣɯ: NCHI:	*Cuɦɯ: / *C-ɲɯ:	heɰ^1 / ŋow^1	heɯ^1 / njiɛ:$^{[2]}$	hwewɰ^1 / ---	heɰ^1 / hefɯ	heɰ / heɲ	hweɰ^1 / mɲeɰ$^{[11]}$	[ka:^{2}]	hôɰ / ɲi:t˩
大前年	2 years ago	*mu:ɦ	*hmu:ɦ	mow^2 / 6a:^{5}	paw^2 / paw^2	pow^2 / ---	paw^2 / paw^2	pʰo:^{2} / paw^2	pɔ:^{2} / paw^2	mɯ^2	--- / ---
		ECHI: / NCHI:	*rɯ: / *tɕʰɯ:n	(rut^9) / tsʰɯn^1	ma:^{2} / seɲ	rəɰ^4 / ---	rəɰ^4 / tsʰɯn^1	--- / ---	--- / ---	[lut^{10}]	--- / ---

Character	Gloss													
大前天	day before yesterday	*ŋwən	*hŋwən	ven¹ ---	van¹ ma:²	rəɯ¹ ---	rəɯ⁴ ---	--- ---	van¹ ---	--- ---	vɔ:n¹ vɔ:n¹	--- ---	vén pa:y]	--- ---
		ECHl: *rɯ:		(rut⁹) ---	--- ---	rəɯ¹ ---	rəɯ⁴ ---	--- ---	--- ---	--- ---	[tsu:n⁴] ---		dʉt ---	

DAI

Character	Gloss													
帶須	to lead	*C-ɣun Qi:	*C-ɦuŋ *ruy?	hun¹ ---	hun¹ huɛn¹	rəɯ¹ (hun¹)	guy⁶ hon¹	--- hon¹	huy⁶ h[u]n¹	van² luəy²			
帶子	belt	*C-də:y	*də:y	da:y¹ ---	do:y¹ doy¹	do:y¹ do:y¹	da:y¹ do:y¹	da:y¹ duay¹	da:y¹ du:y	tuɯy¹	da:y tuay˦		
戴	wear (hat)	*Cuɲəwʔ	*	ŋaw³ ŋaw³	ŋaw³ ŋɔ:³	ŋwow³ ŋɔ:³	--- ŋwo:³	ŋɔ:⁶ ŋɔ:³	ɲɔ:³ ŋɔ:⁶	ɲiaw¹	ɲàw ---		
戴	wear (hat)	Qi:	*Cur[e]:ŋ	--- ---	--- ---	--- ---	gwe:ŋ¹ ---	--- ---	hwe:ŋ¹ ---	---	--- ---		
戴	wear (necklace)	*kʰi:nʔ	*[k/x]ji:nʔ	kʰi:n³ ---	kʰi:n³ ---	--- ---	kʰi:n³ kʰiŋ³	kʰi:n³ ---	kʰi:n³ kʰin³	[tuəy¹]	--- ---		
戴	wear (earrings)	*C-mi:ŋ	*C-mi:ŋ	mi:ŋ¹ ---	mi:ŋ¹ ---	mi:ŋ¹ ---	miaŋ¹ miŋ¹	miaŋ⁴ ---	miaŋ¹ miŋ⁴	[tuəy¹]	mién ---		

DAN

Character	Gloss													
膽	gall bladder	*C-dəy	*dəy	day¹ day¹	day¹ ---	day¹ day¹	day¹ day¹	day¹ day¹	day¹ day¹	ti:¹	--- ---		
淡	light, insipid	*C-dəc	*dəc	dat[9] tsiat²	dat⁷ daʔ⁴	dac⁷ dat⁷	dat⁷ dat⁷	dat⁷ dat⁸	dat⁷ dat⁷	tsia²	--- ---		

漢字	Gloss										
蛋/卵	egg	*juːm	*hjuːm	zuːm^1 / —	zɯːm^1 / zunʔ^4	zɯːm^1 / zum^1	zɯːm^1 / zum^1	zɯːm^4 / zum^1	zɯːm^4 / zum^4	tsum^1 / —	zùɣm / ʒuːmꜛ
DANG											
擋	block	*C-bəːmɦ / NCHIː	*ɓəːmɦ / *ɓiːnɦ	ɓam^2 / —	ɓɔːm^2 / ɓiːn^2	ɓɔːm^2 / ɓin^2	ɓoːm^5 / ɓoːm^2	— / —	ɓɔːm^5 / —	—	— / —
DAO											
刀	knife (large)	*C-gaʔ	*kaːʔ	kaː^3 / kɔː^3	kaː^3 / kaː^3	kaː^3 / kaː^3	kaː^3 / kaː^3	kaː^3 / kaː^3	kaː^3 / kaː^3	—	ká: / kaːꜜ
刀鈎	knifehook	*C-dɛːwɦ	*dɛːwɦ	dɛːw^2 / —	dɛːw^2 / —	dɛːw^2 / —	— / —	— / —	— / —	—	— / —
刀簍	knife basket	GHIː / CHIː	*p-lonʔ / *ruːk	laː^3 / lok^4	lunj^3 / luʔ^4	plonj^3 / —	ruːʔ^8 / ruk^7	luaʔ^8 / ruk^8	luʔ^8 / ruʔ^8	—	— / —
倒伏	bend down	*C-dəwɦ / GHIː	*dəwɦ / *ɓuːk	daw^2 / dɔː^5	ɓuːʔ^7 / —	ɓuːk^7 / dɔː^2	— / dɔː^2	dɔː^5 / dɔː^2	— / dɔː^5	—	— / —
倒塌	collapse	*tuːɦ	*tʰuːɦ	tʰow^2 / tsʰaꜜ^5	tʰaw^2 / —	tʰaw^2 / tʰaw^2	tʰow^5 / tʰaw^2	tʰoː^5 / tʰaw^2	tʰɔː^5 / tʰaw^5	[hum^2]	— / —
搗	pound with pestle	*suːɲɦ	*suːɲɦ	tuːn^2 / —	tuːɲ^2 / —	tuːɲ^2 / —	tuːn^5 / sun^2	tuːn^5 / tsʰun^2	tuːn^5 / tsʰun^5	—	— / —
到處	everywhere	*ŋɔm	*hŋom	ŋom^1 / —	kom^1 / —	kom^1 / —	kom^4 / kom^1	kʰom[11] / —	— / —	[vow^1]	— / —
		*ŋa[ː]yʔ / Ruːɲ	*hŋa[ː]yʔ / *raːʔ	ŋay^3 / —	kaːy^3 / —	kaːy^3 / —	kaːy^6 / kaːy^3	(kaːy^3) / raː^3	— / raː^3	laːy^4	— / —

到達	arrive	*C-daːnʔ	*daːnʔ	d[a]ŋ³ / dɔn³	daːn³ / dan³	daːn³ / daːŋ³	daːn³ / daːŋ³	daːn³ / daːŋ³	daːn³ / duan³	[vow¹]	dǎn	---
稻草	straw	*Cuɲiŋʔ	*Cuɲiŋʔ	ɲiŋ³ / ɲeŋ³	ɲiŋ³ / ŋw[ɛ]n³	ŋwiŋ³ / ŋen³	ɲiŋ³ / ŋen³	ɲiŋ³ / ŋen³	ɲiŋ³ / ŋen⁶	[nɔːŋ¹]	--- / ---	
稻穀	unhusked rice	*mɔk	*hmɔk	mok⁷ / ---	puk⁷ / ---	pok⁷ / ---	pok⁸ / ---	--- / ---	pɔk⁸ / ---	pəːk⁸	mɔ́k / ---	---
稻子	rice	*C-muːnʔ CHIː	*C-muːnʔ *C-muc	muːn³ / mət²	muːn³ / muɛʔ⁴	muːn³ / mɘt⁷	mut⁷ / m[u]t⁷	mut⁸ / mot⁸	mut⁷ / mɘt⁸	muɘt⁹	mùon / ---	---
稻剪	sickle	*C-liːm GHIː	*C-liːm *kʰɯːp	liːm¹ / (lin¹)	kʰɯːp⁷ / lin¹	kʰɯːp⁷ / kʰup⁷	liːm¹ / kʰup⁷	(kʰup⁷) liːm¹ / kʰup⁸ kʰup⁷	liːm¹ / kʰup⁷	lin⁴ laːt⁹ hup⁷	liem / ---	---
稻剪	sickle	NECHIː	*reːw	--- / ---	--- / ---	--- / ---	--- / reːw⁴	--- / ---	--- / leːw⁴	---		
稻穗	ear of rice	*ɲ[ɛ]ŋ NWCHIː	*hɲ[e]ːŋ *C-muc	(tseːŋ¹) / mət²	tseːŋ¹ / muɛʔ⁴	tseːŋ¹ / tseːŋ¹	tseːŋ⁴ / tseːŋ¹	tsʰeːŋ⁴ / tsian¹	tseːŋ⁴ / tsianⁿ	tsiːŋ²	--- / ---	---
稻穗	ear of rice	*C-miːnʔ	*C-miːnʔ	miːn³ / ---	miːn³ / min³	miːn³ / (min³)	miːn³ / miŋ³	miːn⁶ / miŋ³	miːn³ / miŋ⁶	miːn¹	--- / ---	
DE												
得到	get	*C-m[e]ːk	*C-m[ɛ]ːk	meːʔ⁷ / ---	meːʔ⁷ / ---	meːk⁷ / ---	meːʔ⁷ / muːːʔ²	meːʔ⁷ / ---	meːʔ⁷ / ---	mɯːⁿ⁵	mɛ́ː / ---	dəuŋ

DENG

| 等候 await | CHI:
Meifu: | *[j/Ciì]ə:ŋ
*tʰəw
*C-ŋe:ŋ | zaŋ^1
--- | zo:ŋ^1
tʰaw^3 | zo:ŋ^1
ŋo:ŋ^1 | tʰaw^3
ŋo:ŋ^1 | tʰaw^3
tʰaw^3 | tʰaw^5
tʰaw^3 tʰaw^3 | záŋ
tʰaw⌐ | tʰáw
 |
| 瞪眼 glare | GHI:
Run: | *C-la:wʔ
*ʔwa:wʔ | pa:n^3
--- | la:w^3
--- | la:w^3
--- | la:w^3
la:w^3 | ---
va:w^3 | ---
va:w^3 | ---
--- | ---
 |

DI

低頭 lower head	*C-ŋut Run	*C-ŋut *Cuɦə:m	ŋut^7 ŋət^2	ŋut^7 (ŋuʔ^5)	ŋut^7 ŋoʔ^7	ŋut^7 ---	--- ŋuam^3	ŋut[9] ɲuam^6	--- 	ŋʊ́t ---
滴 drip (clsfr)	GHI:	*kʰok	dɑk^7 ---	kʰuk^7 ---	kʰok^7 ---	kʰok^7 kʰɔk^7	--- dɔk^7	--- kʰok^7	[kɔŋ^1] 	dʏk ---
地 ground, earth	*Cuɾən	*Cuɾən	ren^1 ---	ran^1 van^4	van^1 kwaŋ^1	fan^4 ɣaŋ^1	fan^4 fan^1	fan^4 fan^4	len^4 	dén fanꜜ
地方 place	*C-gom	*kom	kom^1 ---	kom^1 ---	kom^1 kum^1	kom^1 kom^1	kom^1 kom^1	kum^1 kom^1	[len^4] 	--- ---
弟弟妹妹 ynger sibling	*ru:ŋ Meifu: Run:	*ru:ŋ *ʔe:ŋʔ *C-nuŋɦ	ru:ŋ^1 ---	gu:ŋ^1 ---	gu:ŋ^1 ʔe:ŋ^3	gu:ŋ^4 ʔe:ŋ^3	huaŋ^4 noŋ^2	hu:ŋ^4 noŋ^2	[nuəy^5] 	duóŋ noŋꞂ
蒂 stem	GHI: CHI:	*kʰo:ŋ *C-ŋen	(kʰo:ŋ^1) ŋo[ŋ]^1	kʰo:ŋ^1 ŋ[ɛŋ]^1	kʰo:ŋ^1 (ŋaŋ^1)	kʰo:ŋ^1 ŋaŋ^1	ŋan^4 ŋaŋ[4]	ŋan^1 ŋaŋ[11]	ŋa:n^1 	--- ---

gloss		proto-form									Std.
DIAN											
顛倒 upside down	ECHI:	*p-lom	paːn^3	---	plom^1	---	plom^1	pom^1	plum^1	[tsaːm^4]	pǎn
	CHI:	*p-ley	---	---/pay^3	play^1	play^1/play^1	play^1/play^1	pay^1/play^1	play^1/play^1	---	---
	CHI:	*p-luun	---	---	---	plum^1/pəŋ^2	---/pləŋ^1	---/pləŋ^1	---/pləŋ^1	---	---
點火 to light	*[c/ɕ]uyʔ	*[c/ɕ]uyʔ	tsʰuy^3/tsʰoy^3	tsʰuy^3/tsʰoy^3	tsʰuy^3/tsʰuy^3	tsʰuy^3/tsʰuy^3	tsʰuy^3/tsʰoy^3	tsʰuy^3/tsʰoy^3	tsʰuy^3/tsʰow^3	tsey^1	sùːy
DIAO											
吊 hang	*C-riːŋʔ	*riːŋʔ	riːŋ^3/lieŋ^4	riːŋ^3/liŋ^3	riːŋ^3	riaŋ^6/riŋ^3	liaŋ^6/riŋ^3	liaŋ^6/riŋ^6	lin^4	dʲeŋ / ɓiːŋ˥
釣魚 to fish	*C-rɔŋʔ / Run	*C-lep	(ruŋ^3)	ruŋ^3	roŋ^3/rɔŋ^3	roŋ^6/rɔŋ^3	loŋ^6/lep^7	loŋ^6/lep^8	leŋ^2	dròŋ / lúː
掉 fall	*laːɦ / Qi:	*ʔaːɦ	ɗaː^2	(ɗaː^2)	ɬaː^2/[l]aː^2	ɬaː^2	ʔaː^5/ɬaː^2	ʔaː^5/---	ʔaː^5	
DIE											
跌倒 fall down	*C-dəwɦ	*C-dəwɦ	ɗaw^2	ɗaw^2	ɗaw^2/dɔː^2	dɔː^5/dɔː^2	dɔː^5/dɔː^2	dɔː^5/dɔː^5	ɗaːw^1	dáw
跌倒 fall down	GHI:	*hluːnɦ	---	ɬuːn^2	ɬuːn^2	ɬuːn^5	---	---	[lamˡlinˡ]	

疊	pile (clsfr)	*C-lɛ:p	*C-le:p	le:p⁷	le:p⁷	le:p⁷	le:p⁷	le:p⁷	---	le:p⁷	[ɓa:k⁹]	---	---
				---	---	---	---	---	---	---		---	---
DING													
頂	net clsfr	*[k/x]u:	*kʰu:	kʰow¹	[h]ow¹	kʰow¹	kʰow¹	kʰow¹	kʰow¹	kʰow¹	---	---	---
				---	---	---	---	kʰow¹	kʰow¹	kʰow¹		---	
鼎鍋	tripod	*tʰəw		tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	[tʰiˀ]	tʰàw	---
					tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹		---	---
		GHI:	*hjɯ[:]nʔ	zay¹	zɯm³	zɯ:n³	zɯ:n⁶	zɯ:n⁶	---	---	[ʔa:w⁴]	---	---
				---	---	---	---	---	---	---		---	---
釘	to nail	*tʰut		tʰut⁷	tʰut⁷	tʰut⁷	tʰut⁷	tʰut⁷	---	tʰut⁷	---	---	---
				---	---	---	tʰok⁷	(tʰok⁷)	---	tʰət⁷		---	---
定居	settle down in	*Cɪrɯ:k	*rjɯ:k	zɯ:ʔ[⁹]	tuŋ³	toŋ³	to[:]ŋ⁶	tʰɯaʔ⁸	tɯ:ʔ⁸	[liaw¹]	---	---	
		GHI:	*[s/ɬn]oŋʔ	---	---	---	tsɔŋ³	tsɔŋ³	---			---	
		NECHI:	*tɕoŋʔ										
DIU													
丟	throw away	GHI:	*fit	(pe:ŋ³)	fit[⁸]	f[it]⁷	fet⁷	[v]et⁷	fit⁷	fit⁷	pʰɛ̀ŋ	pʰɛ́t	
				---	(fiʔ⁵)	---	fet⁷	fet⁷	fʰet⁷	fet⁷	fet̚		
丟失	loss	*tɔk	*tʰok	tʰok⁷	tʰuk⁷	tʰok⁷	tʰok⁷	tʰoʔ⁷	tʰɔk⁷	tʰɔk⁷	dɔ:k⁹	tʰɔk	---
				tʰɔk²	tʰaʔ⁴	tʰ[o]ʔ⁷	tʰɔk⁷	tʰɔk⁸	tʰɔk⁷	tʰɔk⁷		---	

DONG

東	east	*pʰəyʔ	raw³	pʰ[e]y³	pʰay³	pʰa[ː]y³	pʰay³	pʰa[ː]y³	---	¦	¦
		Run: *feːŋ	pʰuy³	pʰeː³	pʰay³	pʰay³	fiaŋ¹	fiaŋ¹		¦	¦
		*ʈa:	tsʰaː[2]	təɯ¹	pʰeːk⁷	tsʰaː¹	tsʰaː¹	tsʰaː¹	kɔŋ¹	dɯŋ	¦
		CHI: *pʰaːk	pʰeːk²	pʰɛʔ⁴	pʰeːʔ⁷	pʰɯː²	---	---		toŋ]	
		*ŋʰɰen	ven¹	---	---	van⁴	van⁴	van¹		¦	¦
		ŋwen	---	---	---	---	vaŋ¹	van⁴		¦	¦
		CHI: *tʰɯːn	---	---	---	tʰɯːn¹	tʰɯːn¹	tʰɯːn¹		¦	¦
			---	---	---	---	tʰɯŋ¹	tʰən¹		¦	¦
東西	thing	GHI: *koŋ	(kuŋ¹)	kuŋ¹	koŋ¹	koŋ¹	---	---	kɔŋ¹	(kúŋ)	¦
			---	---	---	---	---	---		¦	¦
東西	thing	*C-muːɦ	---	maw²	mow²	maw⁵	moˑ²	moˑ⁵	moˑ⁵	---	¦
		*C-muːɦ	---	maw²	maw²	maw²	maw²	maw²	maw²	mawˑw	maʼw
冬	winter	*C-ɲaːn	ɲaːn¹	ɲaːn¹	ɲaːn¹	ɲaːn¹	naːn⁴	ɲaːn¹	nuen¹	¦	¦
		*C-ɲaːn	---	---	ɲaːŋ	ɲaːŋ	ɲaːŋ¹	ɲnuan⁴	nuen¹	¦	¦
		*kʰaːyɦ	kʰaːy²	kʰaːy³	kʰaːy⁵	kʰaːy⁵	kʰaːy⁵	kʰaːy⁵	kʰuay¹	¦	¦
		*kaːyɦ	---	---	kʰaːy²	kʰaːy²	kʰaːy²	kʰaːy⁵	kʰuay⁵	¦	¦
冬瓜	white gourd	*Cuɦɯːp	huːp⁷	kuːy³	hwɯːp⁷	huːp⁷	vuːp⁷	huːp⁷	huep⁷	¦	¦
		*Cuɣɯːp	---	---	g[o]p⁷	g[o]p⁷	---	---	huep⁸	¦	¦
		NCHI: *mbeːŋʔ	ɓeŋ⁴	peŋ³	---	pe:ŋ³	piaŋ³	piaŋ[4]	---	piaŋ]	¦
		*mbeːŋʔ	---	---	---	---	---				
懂	understand	*kʰuːŋ	kʰuːŋ¹	kʰuːŋ¹	kʰuːŋ¹	kʰuːŋ¹	kʰuaŋ¹	kʰ[u]ŋ¹	[min⁴tay²]	xuoŋ	¦
		*[k/x]uːŋ	kʰ[o]ŋ	---	kʰ[o]ŋ	kʰ[o]ŋ	kʰuŋ¹	kʰuŋ¹	kʰuŋ¹	¦	¦

字	Gloss	Variety	Proto	1	2	3	4	5	6	7	8		
動	move	ECHI: NWCHI: Run:	*C-ɦɐnɦ *uːy *C-ɲoŋɦ	— ʔuey^1	— ʔuy^1	han^2	han^5 (hen^2)	han^5	han^2 ɲɔŋ^2	h[ə]n^5 ɲɔŋ^2	han^2	¦	¦
洞	hole	ECHI: Run:	*[c/ɕ]uːŋʔ *tɕʰuːŋʔ	tsʰuːŋ^3 tsʰoŋ^3	tsʰuːŋ^3 suŋ^3	tsʰuːŋ^3 tsʰuŋ^3	tsʰuaŋ^3 tsʰuŋ^3	tsʰuːŋ^3 tsʰuŋ^3	tsʰuːŋ^3 tsʰuŋ^3	tsʰua^1	ʃûoŋ tʃʰuŋ]	¦	¦
恫嚇	threaten		*ʔuːŋ *ʔuːŋ	ʔuːŋ^1	ʔuːŋ^1	ʔuːŋ^1	ʔuːŋ^1 ʔuːn^1	ʔuaŋ^1 ʔuŋ^1	ʔuːŋ^1	—		¦	¦
DOU												¦	¦
都	all	GHI: CHI:	*C-rɯʔ *diːʔ *ʔjaːʔ	r[i]ʔ^3	ɖiːʔ^3	rɯːʔ^3	zaːʔ^3	— ɖiːʔ^3	lɯː$^{[4]}$ zaːʔ^3	—		¦	¦
蔸	bundle (of rice)		*wiw *hwiw	viw^1	viw^1	hwiw^3 viw^1	viw^4 viw^1	viw^4 vew^1	viw$^{[4]}$ vew$^{[11]}$	vew^1	vǐw	¦	¦
斗笠	bamboo hat		*laːŋʔ *hlaːŋʔ	ɖaːŋ^3	ɬeːŋ^3 leŋ^3	ɬeːŋ^3 ɬeːŋ^3	ɬeːŋ^3 ɬiaŋ^3	ɬeːŋ^3 ɬiaŋ^3	ɬeːŋ^3 ɬiaŋ^3	[kuɐn^3 lɔːy^5]	dàŋ	¦	¦
豆子	bean	GHI: NWCHI:	*Ciɦɐw *dɐjn	— ɗian^1	haw^1 ɗan^1	hjaw^1	zaw^1	zaw^1	hjaw^1	[tsʰua^5]		¦	¦
DU												¦	¦
獨木凳	bench		*timɦ *tʰimɦ	tʰim^2	tʰim^2	tʰim^2	tʰim^5 tʰem^2	tʰim^5	tʰim^5	(ɲaːn^1)	ɲuɐn^1	¦	¦
賭	gamble		*C-ŋɐt	ŋet^7	ŋat^7	ŋat^7	ŋat^7 ŋak^7	ŋat^8 ŋak^8	ŋat^7	ŋɐt^7/ŋɐːt^8		¦	¦

字	gloss	Proto-A	Proto-B	1	2	3	4	5	6	7	8	9
肚臍	navel	*Curɯː	*Curɯː	rɐɰ^1 / vow^4	rɐɰ^1 / ---	vɐɰ^1 / kɐɰ^1	fɐɰ^1 / ꜒hɐɰˠ	fɐɰ^4 / (fɐɰ^4)	fɐɰ^4 / ⁿhɐɰ[2]	loː^2	dɕɐɰ^1 / ꜒hɐɰ꜒	--- / ---
肚子	belly	*hmok	*mɔk	mok^7 / bɔk^4	(pok^7) / pa?^{4}	pok^7 / pɔ?^{7}	pok^8 / pɔk^7	pʰoʔ^8 / pɔk^8	pɔk^8 / pɔk^8	[lɯɰ^4]	--- / pɔk꜒	--- / pɔk

DUAN

字	gloss	Proto-A	Proto-B	1	2	3	4	5	6	7	8	9
端	hold with two hands	*[k/x]jit NWCHI	*kʰit / *ʔɯn	kʰit^7 / ʔɯn^1	kʰit^7 / ʔɯn^1	kʰec^7 / ---	kʰet^7 / kʰet^7	kʰet^7 / kʰet^7	kʰet^7 / kʰet^7	[ʔuŋ^1]	kʰit^7 / kʰet^7	--- / ---
短	short	GHI:	*tʰəc	tʰ[e]t[9] / tsʰiat^2	tʰat^7 / ---	tʰac^7 / tʰat^7	tʰat^7 / tʰat^7	tʰat^7 / tʰat^8	tʰat^7 / tʰat^7	[tʰaː^1]	tʰ[ɛ]t / tʰat꜒	--- / ---
斷	break	*[k/x]ut CHI: NWCHI:	*kʰɯt / *tʰɯt / *fəc	kʰuut^7 / fiat^2	kʰuut^7 / fa?^{4}	tʰuut^7 / ---	tʰuut^7 / tʰət^7	tʰuut^7 / tʰət^7	tʰuut^7 / tʰək^7	dʊɵt^9	tʰuut^7 / tʰət^7	kʰuft / ---
斷	break	*[c/ɕ]aːw NWCHI:	*tɕʰaːw / *hləŋ	tsʰaːw^1 / tθian^3	tsʰaːw^1 / lan^3	tsʰaːw^1 / ---	tsʰaːw^1 / tsʰaːw^1	tsʰaːw^1 / tsʰaːw^1	tsʰaːw^1 / tsʰaːw^1	[kʰiaw^5]	tsʰaːw^1 / tsʰaːw^1	ʃaːw^1 / ---

DUI

字	gloss	Proto-A	Proto-B	1	2	3	4	5	6	7	8	9
堆	a pile	*pəwʔ	*pʰəwʔ	pʰaw^3 / ---	pʰaw^3 / pɔː^3	pʰow^3 / pɔː^3	pʰoː^3 / pɔː^3	pʰoː^3 / pɔː^3	pʰoː^3 / pʰoː^3	[dʊɵn^1]	pʰɔː^3 / pʰoː^3	--- / ---
堆	pile (clsfr)	*pəwʔ	*pʰəwʔ	pʰaw^3 / ---	pʰaw^3 / ---	pʰow^3 / pʰoː^3	pʰoː^3 / pʰoː^3	pʰoː^3 / pʰoː^3	pʰoː^3 / pʰoː^3	[tsuːn^5]	pʰɔː^3 / pʰoː^3	--- / ---
堆砌	build	GHI:	*reːp	(goːp^7) / ---	goːp^7 / ŋʑɔʔ^4	goːp^7 / goːp^7	goːp^8 / xoːp^7	hoːp^8 / xuap^8	hɔːp^8 / kʰuap^7	kɐp^7	hɔːp^8 / kʰuap^7	--- / ---

DUN

墩子	pillar	*tunʔ	*tʰunʔ	tʰun³	tʰun³	tʰun³ / tʰoŋ³	tʰun³ / tʰoŋ³	tʰun³ / tʰoŋ³	tʰun³ / tʰoŋ³	tʰun³ / tʰən³	[tʰok⁷]
				---	---	---	---	---	---	---	---
炖	stew	GHI: CHI: Meifu:	*ʔuyʔ *ɓa:w *ʔuŋɦ	tsi:n³	ʔuy³	ʔuy³ / ʔoŋ²	?oŋ²	--- / ʔoŋ²	ɓa:w¹ / ɓa:w¹	--- / ɓa:w¹	---
				---	---	---	---				
鈍	dull	*Cɯra:k	*rja:k	za:ʔ⁷	---	re:k⁷ / te:ʔ⁷	te:ʔ⁸ / tɯ:²	te:ʔ⁸ / tɯ:²	--- / teʔ⁸	--- / tiaʔ⁷	[ŋɔ:¹]
				---	---	te:ʔ⁷	tɯ:²				
		*[c/ɕ]ə:m	*tɕʰə:m	tsʰam¹	tsʰo:m¹	tsʰo:m¹ / tsʰo:m¹	tsʰo:m¹ / tsʰo:m¹	tsʰɔ:m¹ / tsʰuam¹	tsʰɔ:m¹ / tsʰuam¹	tsʰ ɔ:m¹ / tsʰuam¹	tsʰiam¹
				---	---	tsʰo:m¹	tsʰo:m¹				---

DUO

多	many	*lə:y	*hlə:y	da:y¹ / tθɔ:(y)¹	ɬo:y¹ / lɔy¹	ɬo:y¹ / ɬo:y¹	ɬa:y¹ / ɬo:y¹	ɬa:y¹ / ɬuay¹	ɬa:y¹ / ɬuay¹	ɬa:y¹ / ɬu:y¹	ɬey⁴
										da:y / ɬuay˧	tra:y
多少	how many	*lə:y	*hlə:y	da:y¹ / tθɔ:(y)¹	ɬo:y¹ / lɔy¹	ɬo:y¹ / ---	ɬa:y¹ / ɬo:y¹	ɬa:y¹ / ɬo:y¹	ɬa:y¹ / ɬuay¹	ɬa:y¹ / ɬu:y¹	ɬey⁴
										da:y / ---	tra:y
躲		*C-ra: Run:	*ra: *rjəwɦ	ra:¹ / ---	ra:¹ / ---	ra:[³] / ---	ra:[²] / ---	la:⁴ / to:²	la:⁴ / to:·[³]	la:⁴ / to:·[³]	la:y⁴
										da: / ---	la:
	hide from rain	*C-ŋəw	*C-ŋəw	ŋaw¹ / ŋaw¹	ŋaw¹ / ---	ŋaw¹ / ŋaw¹	ŋaw¹ / ŋaw¹	ŋaw⁴ / ŋaw¹	ŋaw¹ / ŋaw⁴	ŋaw¹ / ŋaw⁴	[kɔ:¹]
										--- / ---	---
躲藏	hide	*C-məŋ Run:	*C-məŋ *ljəɲɦ	man¹ / mian¹	man¹ / ---	maɲ¹ / ---	man¹ / ---	(me:t⁸) / zan²	man¹ / tsan²	man¹ / ---	[miet⁸]
										mæɲ / ---	---

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剁	chop	GHl:	*h[n/ɲ]ek	(tak⁷) / dak²	tak⁷ / ---	tak⁷ / tsap⁷	(tsak⁷) / tsap⁷	tʰak⁸ / tsak⁸	tak⁸ / tak⁸	tsʰɔp⁷	--- / ---
E											
鵝	goose	*C-ŋɛ: / CHl: *C-ŋa:nɦ / CHl: *ɓunɦ		ŋe:¹ / ---	ŋe:¹ / ---	ŋe:¹ / ŋe:¹	ŋa:n⁵ / ŋe:¹	ɓun⁵ / ɓoŋ²	(ŋəːn⁵) / ŋuan²	ŋəːn⁵	ŋe: / poŋ˩
額頭	forehead	*p-la:ʔ		raw³ / lɔ:⁵	la:³ / pja:³	pla:³ / ---	pla:³ / ---	--- / ---	--- / ---		là:
惡毒	vicious	*C-da:w		da:w¹ / da:w¹	da:w¹ / ---	da:w¹ / da:w¹	da:w¹ / da:w¹	da:w¹ / (da:w⁴)	da:w¹ / da:w¹	tu:¹	dá:w
		GHl: *rja:k		(ze:ʔ⁷) / lɛ⁴	ze:ʔ⁷ / lɛʔ⁴	re:k⁷ / te:ʔ⁷	--- / tɯː	tʰe:ʔ⁸ / te:ʔ⁸	te:ʔ⁸ / ---		---
		GHl: *fən		(fan¹) / ---	fan¹ / ---	fan¹ / ---	--- / faŋ˩	fan¹ / ---	fan¹ / ---		---
餓	hungry	*C-rən		ren¹ / lon⁴	ran¹ / lanʔ⁴	ran¹ / laŋ⁴	ran⁴ / raŋ¹	lan⁴ / (raŋ⁴)	lan⁴ / ran⁴	len⁴	dén / ʐa:ŋˠ
鱷魚	crocodile	*C-gəyʔ		kay³ / kay³	kay³ / ---	kay³ / kay³	kay³ / kay³	kay³ / kay³	kay³ / kay³	kay¹	--- / ---
ER											
兒女	offspring	*lɯ:k / *hlɯ:k		dɯ:ʔ⁷ / tθɯek²	dɯ:ʔ⁷ / lɛʔ⁴	ɬɯ:k⁷ / ɬuk⁷	ɬ[a]k⁷ / ɬuk⁷	ɬɯa²ʔ / ɬuk⁸	ɬ[ɯ]ʔʔ⁷ / ɬuʔ⁷	ɬiek⁸	dɯ: / ɬœkɬ

		(recon 1)	(recon 2)									
兒女	offspring	Qi:	*dʑiʔ	--- / ---	--- / ---	--- / ---	dʑiʔ^3 / ---	--- / ---	dʑiʔ^3 / ---	---	--- / ---	---
兒媳	daughter-In-law	*hlɯ:k / Qi:	*hlɯ:k / *dʑiʔ	dʑɯ:ʔ^7 / tθɯek^2	ɬɯ:ʔ^7 / ---	ɬɯ:k^7 / ɬuk^7	ɬuk^7 / ɬuk^7	ɬɯa?^{7} / ɬuk^8	dʑiʔ^3 / ɬɯʔ^7	ɬiək^8	--- / ---	---
		*C-liw	*C-liw	liw^1 / lɔy^1	liw^1 / liw^1	liw^1 / liw^1	liw^1 / liw^1	liw^4 / lew^1	liw^1 / li:w^4	[na:w^5]	liw / ---	---
耳朵	ear	*Cilǝy	*ljəy	zay^1 / lay^4	zay^1 / [n]ayʔ^4	zay^1 / zay^4	ɬay^4 / zay^1	ɬay^4 / zay^1	ɬay^4 / tsay^4	[kɔ:^{1}]	zay / ʒayꜜ	tʰáy
耳環	earring	*C-miŋ / GHl:	*C-miŋ / *hwi:ŋɦ	miŋ^1 / viɛn^3	vi:ŋ^2 / ---	hwi:ŋ^2 / miŋ^1	viaŋ^2 / miŋ^1	viaŋ^2 / ---	viaŋ^5 / viŋ^2	[tsʰiaw^1]	--- / ---	---
二	two	*lu:ʔ	*hlu:ʔ	dʑow^3 / tθa:(y)^3	ɬaw^3 / law^3	ɬaw^3 / ɬaw^3	ɬaw^3 / ɬaw^3	ɬaw^3 / ɬaw^4	ɬaw^3 / ɬaw^3	ɬiaw^4	dʌ̀w / ɬew˧	tɬráw
FA												
發抖	tremble	*C-ɲən	*C-ɲən	ɲen^1 / ---	ɲan^1 / nɟan^1	ɲan^1 / ɲaŋ^1	ɲan^1 / ɲaŋ^1	nan^4 / ɲaŋ^1	ɲa[:]n^1 / ɲaŋ^4	[tan^2]	ɲén / ɲaŋ꜓	---
發誓	swear	*C-ma:n	*C-ma:n	ma:n^1 / ---	ma:n^1 / ---	ma:n^1 / ---	ma:n^1 / ma:ŋ^1	ma:n^4 / ---	ma:n^1 / ---	[mi:n^5]	mán / ---	---
發芽	to sprout	*ʔu:t / Run:	*ʔu:t / *ʔʉt	ʔu:t^7 / ʔuət^2	ʔu:t^7 / ---	ʔu:t^7 / ʔuk^7	ʔu:t^7 / ʔuk^7	ʔu:t^7 / ʔek^8	ʔu:t^7 / ʔet^7	[tɔk^7]	u̯ot / ---	---

漢字	Gloss	Proto-form									
發芽	to sprout (tree)	*tʰunɦ	tʰun² / tʰən⁵	tʰun² / tʰɜn¹	tʰun² / tʰ[ɯ]n¹	tʰun⁵ / tʰɔŋ²	tʰun⁵	tʰun⁵	tʰuun⁵	---	–
		*tɕʰa:	tsʰa:¹	tsʰa:¹	tsʰa:¹ / tsʰa:¹	tsʰa:¹ / tsʰa:¹	tsʰa:¹	tsʰa:¹ / tsʰa:¹	tsʰa:¹	[ʔa:¹]	–
FAN											
番石榴	guava CHl:	*kɛwʔ	tʰa:y²	---	---	kɔ:³	kɔ:³ / kɔ:³	kɔ:³ / kɔ:³	kɔ:³ / kɔ:³	[tʰum¹]	–
			---	---	---	---	---	---			
翻身	turn body *jɯ:ɦ	*hjɯ:ɦ	zəɯʔ²	zaɯʔ²	zaɯʔ²	zaɯʔ² / zəɯʔ²	zaɯʔ²	(tsam⁵)	[tsa:m⁴]	žɛ̌hɯʔ	–
煩亂	lose patience *C-ʋɯ:	*C-ʋɯ:	ʋəɯʔ¹	ʋəɯʔ¹	ʋəɯʔ¹ / ʋəɯʔ⁴	(ʋəɯʔ¹) / ʋəɯʔ¹	---	ʋəɯʔ¹ / ---	[lu:y⁴]	–	–
繁殖	reproduce *t[e]:ŋ	*tʰ[e]:ŋ	tʰe:ŋ¹	tʰe:ŋ¹	tʰe:ŋ¹ / tʰe:ŋ¹	tʰe:ŋ¹ / tʰe:ŋ¹	tʰe:ŋ¹ / tʰian¹	tʰe:ŋ¹ / tʰian¹	tʰe:ŋ¹	[tʰe:ŋ¹]	–
反當	instead of *lɯnɦ Run:	*ɬlɯnɦ *plɯnʔ	dɯun²	ɬɯun²	ɬɯun² / tɯun²	ɬɯun⁵ / tɯun²	ɬɯun⁵ / plɔŋ³	ɬɯun³ / plɔn³	[ʔe:k⁹]	plɔɛŋ˥	–
反面	instead of *p-lɯt NCHl: Run:	*p-lɯ:nɦ *p-lɯ:nʔ	--- / lɯun⁵	plɯut⁷	plɯut⁷ / plɯun²	plɯut⁷ / plɯuŋ²	puut⁷ / plɯuŋ³	plɯut⁷ / plɔn³	[pʰa:y¹ tu:t⁹]	plɔɛŋ˥	–
飯	cooked rice	*ta:ɦ / *tʰa:ɦ	tʰa:² / tsʰɔ:⁵	tʰa:² / tʰa:²	tʰa:² / tʰa:²	tʰa:⁵ / tʰa:²	tʰa:⁵ / tʰa:²	tʰa:⁵ / tʰa:²	tʰow¹	tʰá: / tʰa:˩	tʰá:

FANG

漢字	gloss		proto	C1	C2	C3	C4	C5	C6	C7	C8	C9
方法	way	GHl: / CHl:	*pʰa:yʔ / *pʰət	--- / ---	pʰa:y^{3} / ---	pʰa:y^{3} / ---	--- / ---	pʰat^{7} / pʰat^{7}	pʰa:y^{3} / pʰat^{7}	pʰat^{7}	⋮ / ⋮	⋮ / ⋮
方向	direction	*pəyʔ / Run: *fe:ŋ	*pʰəyʔ / *fe:ŋ	pʰa:y^{3} / ---	pʰa:y^{3} / ---	pʰa:y^{3} / pʰa:y^{3}	pʰa[:]y^{3} / pʰa:y^{3}	pʰa:y^{3} / fiaŋ^{1}	pʰa[:]y^{3} / fiaŋ^{1}	pʰa:y^{5}	fày	fǎy
房子	house	GHl:	*p-lɔŋʔ	rɯ:n^{1} / ---	luŋ^{3} / pjaŋ^{3}	plɔŋ^{3} / pɔŋ^{3}	plɔŋ^{3} / plɔŋ^{3}	pɔŋ^{3} / plɔŋ^{3}	plɔŋ^{3} / plɔŋ^{3}	[tɯ:^{2}]	dɯʁn / plɔŋ]	plóŋ
紡	weave (fabric)	*wi:	*hwi:	vey^{1} / (huy^{5})	vey^{1} / pʰan^{1}	vey^{1} / vey^{1}	hwey^{1} / vey^{1}	vey^{1} / vey^{1}	vey^{1} / vey^{1}	[tsʰup^{7}]	⋮ / ⋮	⋮ / ⋮
放置	put (down)	*tɕʰɘ:nɦ	*tɕʰɘ:nɦ	(tsʰo:n^{2}) / han^{5}	tsʰo:n^{2} / ---	tsʰo:n^{2} / tsʰo:n^{2}	tsʰo:n^{5} / ---	tsʰɔ:n^{5} / ---	tsʰo:n^{5} / ---	---	(ʃɔn)	---
放置	put (down)	NECHl:	*tʃʰɯ:ʔ	--- / ---	--- / ---	tsʰəuʔ^{3} / ---	--- / tsʰauʔ^{3}	tsʰauʔ^{3} / ---	tsʰauʔ^{3} / ---	---	⋮	---
放	put (on)	*sa:n	*sa:n	ta:n^{1} / ---	ta:n^{1} / ---	ta:n^{1} / ---	ta:n^{1} / sa:ŋ^{1}	ta:n^{1} / tsʰa:ŋ^{1}	ta:n^{1} / tsʰuan^{1}	[ʔuŋ^{1}]	⋮	---
放	put (in)	GHl:	*fu:ŋ	(pu:ŋ^{1}) / ---	fu:ŋ^{1} / ---	fu:ŋ^{1} / ---	fu:ŋ^{1} / f[o]ŋ^{1}	--- / ---	fu:ŋ^{1} / fuŋ^{1}	pɔ:ŋ^{1}	⋮	---
放	put (down in)	GHl:	*fət	(pat^{7}) / ---	fat^{7} / ---	fat^{7} / ---	fat^{7} / fak^{7}	fat^{7} / fak^{8}	fat^{7} / fa[p]^{7}	fat^{7} / fa[p]^{7}	⋮	---
放走	let go	*pɯ:ŋʔ	*pʰɯ:ŋʔ	pʰɯ:ŋ^{3} / pʃen^{3}	pʰɯ:ŋ^{3} / ---	pʰɯ:ŋ^{3} / pʰɯŋ^{3}	pʰɯ:ŋ^{3} / pʰɯŋ^{3}	pʰuaŋ^{3} / pʰɯŋ^{3}	pʰɯ:ŋ^{3} / pʰɯŋ^{3}	ɓɔŋ^{5}	pʰɯʁŋ	pʰɯʁŋ
放蠱	poison	*C-mi:n	*C-mi:n	mi:n^{1} / ---	mi:n^{1} / ---	mi:n^{1} / miŋ^{1}	mi:n^{1} / miŋ^{1}	mi:n^{4} / ---	mi:n^{1} / ---	mi:n^{5}	⋮	⋮

汉字	gloss	Recon 1	Recon 2	1	2	3	4	5	6	7	8	9
放牧	herding	*tuːʔ	*tʰuːʔ	tʰow³ / ---	tʰaw³ / ---	tʰaw³ / tʰaw³	tʰaw³ / tʰaw³	--- / tʰaw³	tʰaw³ / tʰaw³	---	--- / ---	---
FEI												
飛	fly	*C-ɓin	*ɓin	ɓin¹ / ɓen¹	ɓin¹ / ɓen¹	ɓeŋ¹ / ɓen¹	ɓen¹ / ɓen¹	ɓen¹ / ɓen¹	ɓin¹ / ɓen¹	fin⁴	bín / pen꜒	---
肥胖	fat	*ruːyʔ	*ruːyʔ	ruːy³ / huy⁴	guːy³ / vuy³	g[we]y³ / guy³	guːy⁶ / xuy³	huːy⁶ / xuy³	huːy⁶ / kʰuy³	kuy¹	dùoy / huy꜓	uy
吠	to bark	GHI:	GHI:	v[u]n³ / ---	v[u]n³ / ---	vun³ / ---	fun⁶ / voŋ³	vun⁶ / voŋ³	v[u]n³ / v[ɔ]ŋ⁶	[kiːw¹]	kǎw / ---	bútʃn
吠	to bark	GHI:	GHI:	(gat⁷) / ---	gat⁷ / ŋɔʔ⁴	gac⁷ / ---	gat⁸ / xat⁷	--- / xat⁸	hat⁸ / ---	[tsuːt⁹]	ɣɐt / ---	---
沸騰	boil	*C-ɗaːn	*ɗaːn	ɗaːn¹ / tsɔn¹	ɗaːn¹ / dan¹	ɗaːn¹ / daːŋ¹	ɗaːn¹ / daːŋ¹	ɗaːn¹ / daːŋ¹	ɗaːn¹ / duan¹	[puɐt⁸]	dán / ---	---
肺	lung	*C-ɡɘwɦ	*kɛwɦ	kaw² / kaw⁵	kaw² / koː²	kaw² / ---	k[aw]⁵ / koː²	koː⁵ / koː²	koː⁵ / koː⁵	[vʊɐŋ⁴]	kǎw / koːꜗ	---
FEN												
分配	distribute	*C-ɡuːɦ	*kuːɦ	kow² / ---	kaw² / ---	kaw² / kaw²	kow⁵ / ---	koː⁵ / kaw²	koː⁵ / kaw⁵	koːꜗ¹	kǎw / ---	---
分贈	give as gift	GHI:	GHI:	(giːm³) / ---	giːm³ / ---	giːm³ / ---	giːm⁶ / xim³	hiːm⁶ / xim³	[z]iːm⁶ / kʰim³	---	--- / ---	---
吩咐	instruct	*C-ŋənʔ	*C-ŋənʔ	ŋen³ / ŋ[e]n[e]n³	ŋan³ / ŋaŋ³	ŋan³ / ŋaŋ³	ŋan³ / ŋaŋ³	ŋan⁶ / ŋaŋ³	ŋan³ / ŋan⁶	ŋaːn¹	--- / ---	---

漢字	gloss										
墳塋	grave	*ʔinʔ Meifu:	*ʔinʔ *jinʔ	ʔin^3 ---	ʔin^3 ʔeŋʔ^4	ʔeŋ^3 zen^3	ʔen^3 zen^3	ʔen^3 (zen^3)	ʔin^3 ʔen^3	--- ---	ĩn ---
焚燒	burn	*C-ɓəŋ	*C-ɓəŋ	ɓoŋ^1 ---	ɓaŋ^1 ɓaŋ^1	ɓaŋ^1 ---	ɓaŋ^1 ɓaŋ^1	ɓaŋ^1 ɓaŋ^1	ɓaŋ^1 ɓɔŋ^1	ɓɔŋ^5 	--- ---
粉刺	blackhead	*Curut Qi: NCHI:	*Curut *rwup *[tɕ]uːn	rut^7 tsuɯn^1	rut^7 ---	vut^7 ---	fuɯp^8 tuɯn^1	--- fok^8	lup^8 ---	(lup^8) 	--- ---
FENG											
風	wind	*wiw CHI:	*hwiw *hŋwəːt	viw^1 hɔt^4	viw^1 ŋɔʔ^4	hwoːt^7 voːk^7	viw^4 voːk^7	vɔːt^8 (vɔ^7)	vɔːt^7 vət^8	vuɯat^7 	víw vuːʔ
封住	seal	*lun	*hlun	dun^1 ---	ɬun^1 ---	ɬun^1 ---	ɬun^1 ɬoŋ^1	--- ɬoŋ^1	ɬun^1 ɬen^1	[puːk^7] 	--- ---
鋒利	sharp	*lin	*hlin	dín^1 ---	ɬin^1 ---	ɬeŋ^1 ---	ɬen^1 ɬen^1	--- ɬen^1	--- ɬen^1	--- 	--- ---
		*[c/ɕ]əːm	*tɕʰəːm	tsʰam^1 tsʰam^1	tsʰoːm^1 sɔn^1	tsʰoːm^1 tsʰoːm^1	tsʰoːm^1 tsʰoːm^1	tsʰɔːm^1 tsʰuam^1	tsʰɔːm^1 tsʰuam^1	tsʰɯam^1 	ʃãm ---
蜂蜜	honey	*C-nəmʔ	*C-nəmʔ	nom^3 nam^3	nam^3 nan^3	nom^3 nam^3	nam^3 nam^3	nam^6 nam^3	nam^3 nam^6	na:m^1 	--- ---
		GHI:	*kəːy	(koːy^1) kɔː	koːy^1 kɔy^1	koːy^1 koːy^1	ka:y^1 koːy^1	ka:y^1 kuay^1	ka:y^1 pʰuan^3	[tey^1] 	(kɔ́y) ---
縫	sew	*C-ɲəp	*C-ɲəp	ɲop^7 ɲap^2	ɲap^7 ---	ɲop^7 ɲap^7	ɲop^7 ɲap^7	nap^8 ɲap^8	ɲap^7 ɲap^8	ɲɔːp^9 	ɲóp ɲaːpˤ

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中文	Gloss	Subgroup	Proto									
孵	to brood		*pə:k	pʰak⁷ / pʰak²	pʰo:ʔ⁷	pʰo:k⁷ / pʰo:k⁷	moʔ⁸ / mɔk⁸	mok⁷ / mɔk⁸	mɔːkᵃ⁹	mɔːk⁹	pʰɐk	—
伏	bend down	GHl: / Run:	*C-mok / *Cuɦə:mʔ	(muk⁷)	muk⁷	mo[ː]k⁷	mol[ː]k⁷ / mok⁷	mok⁷ / (ŋom²)	mok⁷ / ŋuam³	— / ŋuam⁶ · [pʰak⁷]	—	—
伏擊	ambush	GHl:	*tʰʊmʔ / *tʰomʔ	tʰʊm³ / tʰam³	tʰʊm³	tʰom³ / tʰom³	tʰom³ / tʰom³	— / tʰom³	tʰ[a]m³ / tʰ[ua]m³	tʰ[a]m¹	—	—
浮	float		*C-bəw	ɓaw¹	ɓaw¹	ɓow¹ / ɓaw¹	ɓaw¹ / ɓaw¹	ɓaw¹ / ɓaw¹	ɓow¹ / ɓaw¹	—	ɓáw	—
斧子	axe	NWCHl:	*C-buaɦ / *Cuɦa:ɲ	ɓua² / ŋɔn¹	ɓua² / ŋwɔn¹	ɓua⁵	ɓua⁵	ɓua⁵ / ɓu:²	ɓua⁵ / ɓu:˥	—	ɓǔa / pu:˩	—
腐爛	rotten		*tʰuy	tʰuy¹ / tʰoy¹	tʰuy¹ / tʰoy¹	tʰuy¹ / tʰuy¹	tʰuy¹ / tʰuy¹	tʰuy¹ / tʰoy¹	tʰuy¹ / tʰow¹	tʰuy⁵	—	—
腐朽	decay		*tʰɯːm	tʰɯːm¹	tʰɯːm¹	tʰɯːm¹ / tʰɯːm¹	tʰɯːm¹ / tʰɯːm¹	tʰɯːm¹ / tʰɯːm¹	tʰɯːm¹ / tʰom¹	dɔm¹	—	—
父親	father	Run:	*pa:ʔ / *ɓa:ɦ	pʰa:³	pʰa:³	pʰa:³	pʰa:³ / ɓa:²	pʰa:³ / ɓa:²	pʰa:˧ / ɓa:˥	po:⁵	pʰa: / pa:˩	bà:
富	rich	CHl:	*C-ʋ[e]:ŋ / *C-mun	ve:ŋ¹ / vɛŋ⁴	ve:ŋ¹	ve:ŋ¹ / ve:ŋ⁴	mun¹ / ve:ŋ¹	mun⁴ / moŋ¹	— / m[u]n⁴	[ɬay⁴ɦua²]	— / moŋ˥	—
覆蓋	cover		*pʰut	pʰut⁷	pʰut⁷	pʰut⁷	pʰut⁷ / pʰⁱeʔ⁷	(kʰɔp⁹)	— / pʰət[8]	[kʰɔp⁷]	—	—

汉字	Gloss	Proto	D1	D2	D3	D4	D5	D6	D7	D8
覆蓋	cover	CHI: *p-lom	[ts]um^5 / plom^5	--- / plom^2	plom^5 / ---	plom^2 / ---	--- / ---	--- / ---	--- / ---	--- / plomꜜ
GAI										
蓋	cover	*sunʔ	tun^3 / ---	tun^3 / ---	tun^3 / ---	tun^3 / ---	(tuːn^6) s[ɔ]ŋ^3 / ---	--- / ---	--- / ---	--- / ---
蓋	cover	CHI: *kʰop	--- / kʰap^5	--- / ---	kʰop^7 / ---	kʰop^7 / ---	kʰop^7 / kʰ[a]p^7	kʰop^7 / ---	kʰɔp^7 / ---	--- / ---
蓋	cover (with quilt)	*sɔm / *som	tom^1 / ---	tom^1 / ---	tom^1 / som^1	--- / som^1	tom^1 / ---	tom^1 / ---	tsam^2	tsóm
蓋	cover (with quilt)	CHI: *kɯːŋɦ	--- / ---	--- / ---	--- / ---	kɯːŋ^5 / ---	kɯɯaŋ^5 / kɯɯŋ^2	--- / kɯɯŋ^5	--- / ---	--- / kɯɯŋꜜ
蓋子	lid	GHI: *hɲeːt	--- / kat^4	koːt^7 / kɔʔ^4	koːt^7 / koːk^7	koːt^8 / koːk^7	kʰˀɔːt^8 / (kɔt^8)	kɔːt^8 / kuːt^8	ŋɯt^8	kuːʔ꜓
GAN										
乾	dry (clothes)	GHI: *daːw	--- / ---	--- / ---	daːw^1 / ---	daːw^1 / ---	daːw^1 / daːw^1	daːw^1 / daːw^1	---	taw꜔
乾潤	dry	*[k/x]ɯːɦ / *kʰɯːɦ	kʰəuꜗ^2 / kʰˀɔ.^{5}	kʰauꜗ^2 / kʰaw^2	kʰauꜗ^2 / kʰauꜗ^2	kʰauꜗ^5 / kʰəuꜗ^2	kʰɯauꜗ^5 / kʰauꜗ^2	kʰauꜗ^5 / kʰauꜗ^5	kʰaː^1	kʰˀɛ̌ꜟ
乾飯	dry rice	*taːɦ / *tʰaːɦ	tˀaː.^{2} / tsʰˀɔ.^{2}	tˀaː.^{2} / ---	tˀaː.^{2} / ---	tʰaː.^{5} / ---	tʰaː.^{5} / tˀaː.^{2}	tˀaː.^{5} / tˀaː.^{5}	tʰow^1	---
		*C-m[ɛ]ːk / *C-m[e]ːk	meʔ^7 / ---	meʔ^7 / mɛʔˀ^4	meːk^7 / ---	meːk^7 / ---	meʔ^7 / ---	meʔ^7 / meʔˀ^8	meʔ^8 / meʔˀ^8	---

中文	English	Proto	Proto	1	2	3	4	5	6	7	8	9
乾淨	clean	*[c/ɕ]i:ŋɦ / CHI:	*tɕʰi:ŋɦ / *C-li:ŋɦ	tsʰi:n² / —	tsʰi:n² / —	tsʰi:ŋ² / lin²	— / tsʰin²	liaŋ² / tsʰin²	liaŋ⁵ / tsʰin⁵	tsʰiɘŋ⁵	ʃ̃iɘŋ / tʃʰi:ŋN	— / —
甘薯	yam	*ŋʋɛ:y / GHI:	*hɲʋɛ:y / *C-mɘn	va:y¹ / h[ɔ]y⁴	man¹ / ŋɔyʔ⁴	man¹ / maŋ¹	man¹ / maŋ¹	— / maŋ¹	— / man⁴	mɔ:n¹	va:y / —	mùon
甘薯	yam	Qi:	*C-mu:ŋ	— / —	— / —	mu:ŋ¹ / —	mu:ŋ¹ / —	muaŋ⁴ / —	mu:ŋ¹ / —	mu:ŋ¹	— / —	—
甘蔗	sugarcane	*C-ma[:]yʔ	*C-ma[:]yʔ	may³ / ma:(y)³	may³ / ma:y³	ma:y³ / may³	ma:y³ / ma:y³	ma:y⁶ / ma:y³	ma:y³ / muay⁶	muay¹	mày / ma:y˧	— / —
肝	liver	*C-ŋa:n	*C-ŋa:n	ŋa:n¹ / ŋɔn¹	ŋa:n¹ / ŋan¹	ŋa:n¹ / ŋa:ŋ¹	ŋa:n¹ / ŋa:ŋ¹	ŋa:n⁴ / ŋa:ŋ	ŋa:n¹ / ŋuan⁴	ŋuen¹	ŋán	—
趕	herd cattle	*C-lu:t / Run:	*C-lu:t / *ɦu	lu:t⁷ / —	lu:t⁷ / —	lu:t⁷ / —	lu:t⁷ / —	— / hu:¹	(hwa⁵) / hu:¹	[hua²]	—	—
趕	expel	ECHI:	*C-lu:yʔ	— / —	lu:y³ / —	lu:y³ / —	lu:y³ / —	lu:y⁶ / —	lu:y³ / —	lu:y³	—	—
趕上	catch up	*nɘ:nɦ	*hnɛ:nɦ	nan² / —	to:n² / to:ŋ²	to:n² / to:ŋ²	to:n² / to:ŋ²	tʰɔ:n² / tuan²	to:n² / t[u]n²	[pʰe:k⁹ kʰuɘn¹]	nɛ̀n	—
敢	dare	CHI:	*ʔɯ:ɦ	— / —	ʔaɯ² / ʔɘɯ²(ʔɘɯ⁴)	ʔaɯ² / ʔɘɯ²	ʔaɯ⁵ / ʔɘɯ²	ʔaɯ² / ʔaɯ⁵	— / ʔaɯ²	—	—	—
感冒	catch cold	GHI:	*hlɘ:m	ɗam¹ / —	ɗo:m¹ / lɔn¹	ɬo:m¹ / —	ɬo:m¹ / —	— / —	— / —	[mu²]	đɛ̌m	—
		*[k/x]ɘt	*kʰɘt	kʰet⁷ / —	kʰat⁷ / —	kʰat⁷ / —	kʰat⁷ / kʰak⁷	— / —	kʰat⁷ / —	[vɯat⁷]	— / —	—

GANG

漢字	Gloss	Reconstruction	1	2	3	4	5	6	7	8	9
剛才	a moment ago	GHl: / *?ən?	(?an³)	?an³	?an³ ?an³	?an³	?an³	?an³ ?an³	[tsa:t⁹] [tsa:t⁹]	---	---
剛剛	just now	*C-nəw? / *C-nəw?	na[:]w³	naw³	naw³	no:[6] no:³	no:⁶ no:³	no:³ no:⁶		---	---
缸	jar	GHl: / *kə:ŋ?	(ko:ŋ³)	ko:ŋ³	ko:ŋ³	ko:ŋ³ kuaŋ³	ko:ŋ³ kuaŋ³	ko:ŋ³	ko:ŋ¹	---	---
鋼	steel	*Cuɣa:c / *Cuɦa:c	h[a]t⁷	ha:t⁷	hwa:c⁷	hwa:t⁷	h[ua?]⁷	hwa:t[8]	hua?⁷	---	---

GAO

漢字	Gloss	Reconstruction	1	2	3	4	5	6	7	8	9
高	high	*pa:k / *pʰa:k	pʰa:?⁷ pʰɛk²	pʰe:?⁷ pʰɛ?⁴	pʰe:k⁷ pʰe:?⁷	pʰe:?⁷ pʰuɯ:²	pʰe:?⁷ pʰe?⁸	pʰe:?⁷ pʰia?⁷	pʰuɯ:⁵	fa: pʰekɬ	pʰɛt
高興	happy	GHl: / *hlin	---	ɬin¹	ɬeŋ¹	ɬen¹ ɬen¹	ɬen¹ ɬen¹	ɬen¹ ɬen¹	ɬin¹ ɬen¹	---	---
		GHl: Qi / *tɕɯ: *tɕəwɦ	---	ʰhesɬ	ʰhesɬ	ʰhesɬ¹ tsəuɬ¹	tsaw⁵	tsaw⁵	tsaw⁵ [pl]əuɬ	---	---
睪丸	testicles	ECHl: / *?u:k	---	?iw²	?u:k⁷	---	---	---	?u:?⁷	---	---
		*jɯ:m / *hjɯ:m	zɯu:m¹ zum¹	zɯu:m¹ zumʔ⁴	zɯu:m¹	zɯu:m⁴	zɯu:m⁴ zum¹	zɯu:m¹	zɯu:m¹ tsum¹	---	---
		*ma:n? Run: *pləy / *hma:n? *pləy	---	---	---	pa:n⁶ pləy³	pʰa:n³ play³	pa:n⁶ play³	pa:n³ pɔ:n²	---	---

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GE

字	GE												
哥哥	big brother	*ʔ[ɛ]:ŋʔ	*ʔ[e]:ŋʔ	ʔeːŋ³	ʔeːŋ³	ʔeːŋ³	ʔeːŋ³	ʔeːŋ³	ʔeːŋ³	ʔeːŋ¹		ɛ̀ŋ	ɛŋ
哥哥	big brother	CHI:	*hlɛwʔ	---	---	---	---	---	---	---		---	---
胳臂	arm	*[k/x]iːn	*kʰiːn	kʰiːn¹ / kʰiːn¹	kʰiːn¹ / kʰ[iː]¹	kʰiːn¹ / kʰiŋ¹	kʰiːn¹ / kʰiŋ¹	kʰiːn¹ / kʰiŋ¹	kʰiːn¹ / kʰin¹	[tɯːn¹]		xien	---
胳肢	armpit	*C-ɟɛk GHI:	*tɕek *tɕi	tsok⁷ / ---	tsi² / tsi¹	tsak⁷ / ---	--- / tsʰok⁷	tsi³ / ---	tsi¹ / ---	tsi¹		---	---
		GHI:	*rik	--- / lik¹	ri[t]⁷ / (liʔ⁵)	rik^[8]	[ts]i[t]⁷ / ---	--- / rek⁷	(lit⁹)	lit⁷		---	---
割	harvest	*tɛt CHI:	*tʰɛt *kʰiːwɦ	tʰet⁷ / kʰiw⁵	tʰat⁷ / kʰiː²	kʰiːw² / kʰiw²	--- / kʰiw²	kʰiw² / kʰiw²	--- / kʰiw⁵	---		tʰɛt	---
割	harvest	*tu[n/ɲ]	*tʰu[n/ɲ]	tʰun¹	tʰun¹	---	tʰun¹	tʰun¹	tʰuːn¹	[pʰuːw]		---	---
個	object clsfr	*C-ɣɔm	*ɦom	hom¹ / ---	hom¹ / (hon⁵)	hom¹ / hom¹	hom¹ / hom¹	hom¹ / hom¹	hum¹ / hom¹	kɔːm⁴		hóm	---
個	person clsfr	*C-ɟuːn	*tɕuːn	tsuːn¹	tsuːn¹ / tsunʔ⁴	tsuːn¹ / tsuŋ¹	tsuːn¹	tsuːn¹	tsuːn¹	[ɲuən˩]		tʃúon	---
個	animal clsfr	*C-lɛŋ	*C-lɛŋ	---	---	laŋ¹	laŋ¹ / laŋ¹	laŋ¹ / laŋ¹	laŋ¹ / lɔŋ⁴	---		lóŋ	laŋ˩

個 child clsfr	*C-ɣɯ:ʔ	*ɦɯ:ʔ	həɯ³	həɯ³	hɐɯ³	hauɯ³	hauɯ³	---	---	həɯ³
			---	---	---	hauɯ³	---	hauɯ³	---	---
GEI										
給 give	CHI:	*ndɯ:ŋɦ	---	---	tɯ:ŋ²	---	---	---	---	ɟiew
	NCHI:	*ku:ɦ	tɕɐmɕ	tɐɜn²	kaw²	kaw²	kaw²	kaw²	[mɯuan¹]	ɟi:pɫ
給 give	*C-dɯ:	*dɯ:	dɐhɯp¹	dɐhɯp¹	dɐhɯp¹	dɐhɯp¹	dɐhɯp¹	dɐhɯp¹	---	dɐhɯp³
			---	dɛ:¹	---	---	---	---	---	---
GEN										
根 root	*ri:w	*ri:w	ri:w	gi:w	key¹	van⁴	van⁴	van¹	[tat⁷]	diew
	CHI	*ki:	kʰɯɐŋ⁵	kʰɛŋ²	kʰɯ:ŋ[3]	rip⁸	rip⁸	rip⁸		ɟi:pɫ
	Qi:	*hwɔn				key¹				
	NCHI:	*kʰɯ:ŋɦ								
	Run:	*ri:p								
眼 with	*Curu:	*Curu:	row¹	row¹	vow¹	fow⁴	---	[vʲɔw[11]]	[dɯɜn¹]	---
			vow⁴	[ŋ]ɛwʔ⁴	[g]ɔw⁴	yow¹	(fow⁴)	fow¹		---
GONG										
弓 bow	*C-ʋɔc	*ʋɔc	vat[9]	vat⁷	vac⁷	fat⁸	vat⁸	vat⁷	[vi:²]	vat
			viat⁴	vaʔ⁴	vat⁷	vat⁷	vat⁸	vat⁸		vatɫ
弓弦 bowstring	GHI:	*ru:	(gow¹)	gow¹	gow¹	gow⁴	how⁴	how⁴	[tɯy¹]	---
			---	---	gow⁴	xow¹	[h]ɔw¹	---		---

公雞	rooster	*pa:ʔ	*pʰa:ʔ	pʰa:ʔ³ pʰɔ:ʔ³	pʰa:ʔ³ pʰa:ʔ³	pʰa:ʔ³	--- pʰa:ʔ³	pʰa:ʔ³ pʰa:ʔ³	--- pʰa:ʔ³	---	fà:
		*[k/x]ey	*kʰey	kʰay¹ kʰay¹	kʰay¹ kʰay¹	kʰay¹	kʰay¹ kʰay¹	kʰay¹ kʰay¹	kʰay¹ kʰay¹	kʰay¹	xáy
		*Cira:n	*Cɹa:n	za:n¹	za:n¹	ra:n¹	ta:n⁴ (ra:n¹)	ta:n⁴	ta:n⁴	[puan²]	
公路	road	*C-gu:n	*ku:n	ku:n¹	--- kuŋ¹	ku:n¹	ku:n¹ kuŋ¹	--- kuŋ¹	ku:n¹	---	kúon
公水牛	steer	*pa:ʔ	*pʰa:ʔ	pʰa:ʔ³	pʰa:ʔ³ pʰa:ʔ³	pʰa:ʔ³ pʰa:ʔ³	pʰa:ʔ³ pʰa:ʔ³	pʰa:ʔ³	pʰa:ʔ³	---	
		*C-na:w	*C-na:w	na:w¹ na:w¹	na:w¹	na:w¹ na:w¹	na:w¹ na:w¹	na:w⁴ na:w¹	na:w¹ na:w⁴	now¹	
		CHI:	*suyʔ	---	--- foy³	---	tuy³ tsʰoy³	---	--- tsʰow³	tsʰey¹	
共同	together	*ʔu:ɲʰ	*ʔu:ɲʰ	ʔ[u]ɲ²	ʔu:ɲ²	ʔu:ɲ⁵ ʔuɲ²	ʔu:ɲ⁵ ʔuɲ²	ʔuaɲ⁵ ʔuɲ²	ʔu:ɲ⁵	[leŋ⁵]	uóŋ
		*tɕe:ɲʔ	*tʰe:ɲʔ	tʰaɲ³	tʰo:ɲ³ tʰoɲ³	tʰo:ɲ³ tʰo:ɲ³	tʰo:ɲ³ tʰo:ɲ³	tʰo:ɲ³ tʰuaɲ³	tʰɔ:ɲ³	[lem¹]	tʰàŋ
供飯	offer food	*ru:k	*ru:k	ru:ʔ⁷	gu:k⁷	gu:k⁷ guʔ⁷	gu:ʔ⁸ xuk⁷	---	---	---	

The following is a comparative linguistic table (reconstructions with attested dialect forms and tone numbers). Page number 478 appears in the top margin.

	Gloss	Reconstr. A	Reconstr. B	C1	C2	C3	C4	C5	C6	Margin
供飯	offer food	*taːɦ	*tʰaːɦ	--- / ---	--- / ---	--- / ---	tʰaː^5 / tʰaː^2	tʰaː^5 / tʰaː^5	tʰow^1	---
		*[c/ɕ]əːy	*tɕʰəːy	--- / ---	--- / ---	--- / ---	tsʰaːy^1 / tsʰuay^1	tsʰaːy^1 / tsʰuːy^1	[vɯat^9]	pǎː
GOU										
狗	dog	*maː	*hmaː	maː^1 / ---	paː^1 / paʔ^4	paː^4 / paː^4	pʰaː^4 / paː^1	paː^4 / paː^4	pow^4	máː / paː$^⌐$
狗豆子	dogbean	*[c/ɕ]ip	*tɕʰip	tsʰip^7 / ---	tsʰip^7 / ---	tsʰip^7 / tsʰep^7	tsʰip^7 / tsʰep^8	tsʰip^7 / tsʰep^7	tsʰep^7	--- / ---
GU										
孤兒	orphan	*lɯːk Qi:	*hlɯːk	dɯːʔ^7 / tθuɪk^2	ɬuʔ^7 / ---	ɬuːk^7 / ---	dʑɔ^3 / ɬuk^7	ɬuaʔ^7 / ɬuk^8	ɬiek^8	dɯː / ---
		*laːk	*hlaːk	[l]aːʔ^7 / ---	teːʔ^7 / ---	teːk^7 / ---	teːʔ^7 / ɬeʔ^8	teːʔ^7 / ɬiaʔ^7	ɬak^9 ɬuaˀ^2	[l]áː / tɛʔ$^⌐$
姑	husband's sister	*miːʔ	*hmiːʔ	mey^3 / ---	(mey^3) / ---	pɯ$^{(1)}$ / ---	pʰay^6 / pay^3	--- / pay^3	---	--- / ---
		*C-dɯːŋ CHI: Qi:	*dɯːŋ *veːŋ *ŋgiːn	dɯːŋ^1 / ---	dɯːŋ^1 / ---	veːŋ^1 / ---	veːŋ^4 / viaŋ^1	kiːn^4 / ---	ŋjen^2	--- / ---
姑父	Father's younger sister's husband	*jəwʔ	*hjəwʔ	zaw^3 / ---	zaw^3 / ---	zaw^3 / zoː^3	zoː^6 / zoː^3	zoː^6 / zoː^3	tsiːw^1	--- / ---
姑父	Father's elder sister's husband	*[c/ɕ]iːʔ	*tɕʰiːʔ	tsʰey^3 / ---	tsʰay^3 / ---	tsʰay^3 / tsʰay^3	tsʰ[iː]^3 / tsʰ[ɯ]y^3	tsʰay^3 / (tay^5)	tsʰaːy^1	--- / ---

Meaning	漢字	Proto-A	Proto-B	1	2	3	4	5	6	7	8
Father's younger sister	姑母	*C-buɯ:ʔ	*C-βɯ:ʔ	pɵɯ^3	faɯ^3	faɯ^3	faɯ^3	faɯ^3 / faɯ^3	faɯ^3	[fi:^{4}]	—
Father's younger sister	姑母	Run:	*wa:ɦ	—	—	—	—	va:^{5}	va:^{2}	—	—
Father's elder sister	姑母	*ŋji:n	*hŋji:n	ŋji:n^1	(ŋji:n^1)	ki:n^1	ki:n^1 / kiŋ^1	kʰi:n^4 / (kiŋ^4)	ki:n^4	ɲiɐn^2	ki:ŋˤ
girl	姑娘	*lɯ:k	*hlɯ:k	ɬɯ:k^7 / tθɯɐk^2	ɬɯ:ʔ^7 / lɛʔ^4	dɬɯ:ʔ^7 / ɬuk^7	ɬɯ:ʔ^7 / ɬuk^7	ɬɯaʔ^7 / ɬuk^8	ɬɯ:ʔ^7 / ɬɯʔ^7	—	—
		*ʔu:ŋ	*ʔu:ŋ	ʔu:ŋ^1	ʔu:ŋ^1	ʔu:ŋ^1 / ʔu:ŋ^1	ʔu:ŋ^1 / ʔu:ŋ^1	ʔuaŋ^1 / ʔu:ŋ^1	ʔu:ŋ^1 / ʔu:ŋ^1	ʔu:^{1}	—
bone	骨頭	*Cuɾɯ:k	*Cuɾɯ:k	rɯ:ʔ^7 / vɯɰɐkɐ^4	rɯ:ʔ^3 / vuʔ^4	vɯ:k^7 / kuɯʔ^7	fɯ:ʔ^8 / yuk^7	fɯa:ʔ^8 / fɯuk^8	fɯ:ʔ^8 / fɯuk^8	liək^{10}	fuɔk / druɯ: / fɯuk^L
ancient	古代	GHl: *pʰɯ:n	Qi: *va:	—	pʰɯ:n^1	pʰɯ:n^1	pʰɯ:n^1 / pʰɯŋ^1	fa:^{4} / pʰɯŋ^1	fa:^{4}	—	—
		GHl: *hja:	CHl: *C-ma:n	ɟŋoŋ^3	za:^{1}	za:^{1}	ma:n^1 / ma:ŋ^1	ma:n^4 / ma:ŋ^1	ma:n^1 / muan^1[5]	—	—
barn	谷倉	*ja:wʔ	*hja:wʔ	—	za:w^3 / zaw^3	za:w^3 / za:w^3	za:w^6 / za:w^3	za:w^6 / za:w^3	za:w^6	—	—
kernel	谷粒	*C-ɦa:p	*ɦa:p	ha:p^7 / hɔp^2	ha:p^7	ha:p^7 / ha:p^7	ha:p^7 / ha:p^7	ha:p^7 / ha:p^8	ha:p^7 / hap^7	[pə:k^8]	—
drum	鼓	*C-leŋ	*C-leŋ	loŋ^1 / leŋ^1	laŋ^1	laŋ^1 / laŋ^1	laŋ^1 / laŋ^1	laŋ^4 / laŋ^1	laŋ^1 / lɔŋ^4	lɔ:ŋ^1	lɔ́ŋ

GUA

Char	Gloss	Recon A	Recon B	1	2	3	4	5	6	7	8	9
瓜棚	squash lattice	*t[ɛ]:ŋʔ / Run:	*tʰ[e]:ŋʔ / *tʰe:ɲɦ	tʰe:ŋ^{3} / ---	--- / tʰeŋ^{3}	tʰe:ŋ^{3} / tʰe:ŋ^{3}	--- / tʰe:ŋ^{3}	--- / tʰiaŋ[2]	--- / tʰian[2]	[luŋ^{4}]	--- / ---	---
刮	scratch	*taːw / CHI:	*tʰaːw / *rɯɯn	tʰaːw^{1} / ---	tʰaːw^{1} / ŋɛn^{2}	tʰaːw^{3} / ---	tʰaːw^{1} / ---	guun^{2} / ---	[k]uun[5] / xɛn^{2}	huun^{2} / kʰən^{5}	[kɔ:tʰ]	tʰàːw / xœɛⁿ↘	---
寡婦	widow	*mi:ʔ	*hmi:ʔ	mey^{3} / ɓay^{4}	(mey^{3}) / ---	pay^{3} / ---	p[i:]^{6} / pay^{3}	pʰay^{6} / pay^{3}	p[i:]^{6} / pay^{6}	maːy^{5}	mèy / ---	---
		*t[ʧ/c]un / CHI:	*t[ʃ/ɕ]ʰun / *mbə:yʔ	tsʰun^{1} / ---	tsʰun^{1} / ---	tsʰun^{1} / ---	pa:y^{6} / ---	pʰaːy^{6} / puay^{3}	paːy^{6} / puːy^{6}	puɛy^{4}	ʃʊ́n / ---	---
掛	hang up	*kaːɦ	*kʰaːɦ	kʰaː^{2} / ---	kʰaː^{2} / kʰaː^{2}	kʰaː^{5} / kʰaː^{2}	kʰaː^{5} / kʰaː^{2}	kʰaː^{5} / kʰaː^{2}	kʰaː^{5} / kʰaː^{5}	---	xǎː / kʰàːɴ	---
掛	hang up	Qi:	*pʰəɦ	--- / ---	--- / ---	--- / ---	kap^{8} / ---	kʰap^{8} / ---	kap^{8} / ---	kap^{8}	--- / ---	---
掛搭	set up	*C-ɦuːy	*ɦuːy	huːy^{1} / ---	huːy^{1} / ---	hu:y^{1} / ---	hu:y^{1} / ---	--- / huy^{1}	--- / huy^{1}	---	--- / ---	---

GUAN

Char	Gloss	Recon A	Recon B	1	2	3	4	5	6	7	8	9
關	close	*C-ŋət / NCHI:	*C-ŋət / *ŋgə:t	ŋet^{7} / kat^{4}	ŋat^{7} / kɔʔ^{4}	ŋat^{7} / ŋak^{7}	ŋat^{7} / ŋak^{7}	ŋat^{8} / kɔʔ^{8}	ŋat^{7} / k[oʔ]^{8}	ŋat^{7}	ŋɛ́t / kuːk˧	---
官	an official	*C-mun	*C-mun	mun^{1} / men^{1}	mun^{1} / muɛn^{1}	mun^{1} / mon^{1}	mun^{1} / moŋ^{1}	mun^{4} / moŋ^{1}	mun^{1} / men^{4}	[hɯɯa^{2}]	móⁿ / ---	---

棺材	coffin	*tɕʰəy	*təy	tsʰay¹ --	tsʰay¹ hay¹	tsʰay¹ --	tsʰay¹ tsʰay¹	-- --	-- --	tsʰay¹	--	--
鰥寡	widowed	GHI:	*C-goŋɦ GHI:	(kuŋ²) --	kuŋ² maw³	koŋ² --	koŋ⁵ k[o]ŋ²	-- --	-- --	[tɔ:²]	--	--
罐子	jar	GHI:	*hmaːyʔ GHI:	(po:y³) --	po:y³ --	po:y³ --	pa:y⁶ --	pʰa:y⁶ puay³	pa:y⁶ pu:y⁶	puəy⁴	--	--
	jar	*C-gəy	*kəy	kay¹ --	kay¹ kay¹	kay¹ --	kay¹ kay¹	kay¹ kay¹	kay¹ kay¹	[ley⁵]	--	--
GUI												
歸還	return	*sut	*sut	tut⁷ --	tut⁷ --	tut⁷ sok⁷	tut⁷ sok⁷	tut⁷ ru³	tuɯt⁷ ru⁶	tsɔk⁷	--	--
鬼	spirit	*wəːt	*hwəːt	vat⁷ --	vo:t⁷ --	hwo:t⁷ --	vo:t⁸ --	vɔ:t⁸ --	vɔ:t⁷ --	vɯɯat⁹	vɐt	--
鬼	spirit	CHI:	*tɕʰəːy	-- hɔ:¹	-- hɔʏ˩	-- --	-- --	tsʰa:y¹ tsʰuay¹	tsʰa:y¹ tsʰu:y¹	--	tʃʰuayˤ	--
跪	kneel	*ku:yɦ Qi:	*kʰu:yɦ *pʰut	kʰu:y² kʰuy⁵	kʰu:y² --	-- --	-- --	pʰut⁷ kʰuy²	pʰut⁷ kʰuy⁵	pʰut⁷	xúoy	--
GUN												
滾	roll	*C-lun	*C-lun	lun¹ --	lun¹ --	lun¹ loŋ¹	lun¹ loŋ¹	lun⁴ --	lun¹ (lin⁴)	[lam¹lin¹]	--	--

Gloss											
GUO											
鍋 pot	*tew	*tʰew	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	dɓaw¹	tʰàw
			tsʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹		tʰɐw]
鍋巴 burned rice	*C-gin	*kin	kin¹	kin¹	keŋ¹	tʰiŋ¹	tʰiŋ¹	tʰiŋ¹	tʰiŋ¹	---	---
	CHl:	*tʰiŋ	ken¹	---	ken¹	ken¹	tʰen¹	tʰen¹	tʰen¹		---
		*tʰew	tʰaw¹	tʰaw¹	tʰaw¹	tʰaw¹	---	---	---		---
	*tew		tsʰaw¹	---	---	tʰaw¹	tʰaw¹	tʰaw¹			---
果子 fruit	*tɘːm	*tʃʰɘːm	tsʰam¹	tsʰoːm¹	tsʰoːm¹	tsʰoːm¹	tsʰɔːm¹	tsʰɔːm¹	tsʰɔːm¹	tsʰɔːm¹ [muuat⁷]	ʃam
			ham¹	hɔn¹	(ham¹)	tsʰoːm¹	tsʰuam¹	tsʰuam¹	tsʰuam¹		hom˥
過(渡) pass	*C-guaʔ	*kuaʔ	kua³	kua³	dɓua³	gwaːy¹	vaːy¹	hwaːy¹	kua⁵	kua⁵	kuà
	CHl:	*dɓua	kuɘ³	dɓuɘ³	dɓuː³	dɓuː³	kuː[2]	---			---
	Qi:	*Cureːy									
HAI											
害羞 shy	CHl:	*rjɛːk	---	---	---	teːʔ⁸	tʰeːʔ⁸	teːʔ⁸	[paŋ¹]		kɯ
			---	---	---	---	teʔ⁸	tiaʔ⁷			---
	*ri	*ri	rey¹	gey¹	gey¹	laːy³	laːy⁶	laːy³	[laː¹]		déy
	CHl:	*C-laːyʔ	---	ŋɛyʔ⁴	gey⁴	xey¹	laːy³	luay⁶			---
HAN											
含 contain	GHl:	*fɘːm	(poːm¹)	foːm¹	foːm¹	foːm¹	fɔːm¹	fɔːm¹	[tɔm⁵]		---
			---	---	foːm¹	foːm¹	fuam¹	fuam¹			---

Chinese	Gloss	Reconstruction										
含羞草	Mimosa pudica	CHI:	*ŋgənʔ	tsʰay¹ / ---	ɓəu¹ / ---	kan³ / ---	kan⁶ / kaŋ³	kan⁶ / kaŋ³	kʰan⁶ / kaŋ³	kan⁶ / kan⁶	kə:n⁴	--- / ---
		GHI:	*tɕə:n	--- / ---	tso:n¹ / ---	tso:n¹ / ---	tso:n¹ / tso:ŋ¹	tso:n¹ / tsuaŋ¹	tsɔ:n¹ / tu:n¹	[tʰaw˩]		--- / ---
			*C-ŋut	ŋut⁷ / ---	ŋut⁷ / ---	ŋut⁷ / ŋok⁷	ŋut⁷ / ŋet⁸	ŋut⁸ / ŋok⁸	ŋut⁷ / ŋet⁸	ŋok⁷		--- / ---
汗	sweat		*C-nəmʔ	nom³ / nam³	nam³ / ---	nom³ / nam³	nam³ / nam³	nam⁶ / nam³	nam³ / nam⁶	---	nòm nam˩ / nàm	
			*Cuʔen	ʔen¹ / von¹	ʔan¹ / ʔwan¹	ʔw[om³][ʔ]wan¹ (van¹)	nom³ / nam³	van¹ / vaŋ¹	ʔwan¹ / van¹	[ʔɯat⁷]	én vaŋ˧ / vwan	
汗垢	dirty sweat	GHI:	*C-nəmʔ	nam³ / ---	nam³ / ---	nom³ / ---	nam³ / ---	nam⁶ / ---	nam³ / nam⁶	na:m¹	--- / ---	
		GHI:	*tʰa:mʔ	--- / ---	tʰa:m³ / ---	tʰa:m³ / tʰa:m³	tʰa:m³ / tʰa:m³	tʰa:m³ / ---	tʰa:m³ / ---	[nɯa¹]	--- / ---	
汗垢	dirty sweat		*kiː	kʰey¹ / kʰɛy¹	--- / kʰɛy¹	kʰey¹ / kʰey¹	--- / ---	kʰey¹	--- / ---	---	--- / ---	
旱	dry		*C-ra:nɦ	ra:n² / ŋɔt²	ra:n² / ---	ra:n² / raŋ²	ra:n² / ---	la:n² / raŋ²	la:n² / ŋuat⁸	[kʰa:˩]	--- / ŋuat˧	
		NCHI:	*C-ŋa:t									
旱睡蟥	land leech		*tʰa:k	tʰa:ʔ⁷ / ---	tʰe:ʔ⁷ / ---	tʰe:k⁷ / tʰe:ʔ⁷	tʰe:ʔ⁷ / tʰuː²	tʰe:ʔ⁷ / tʰe:ʔ⁸	tʰe:ʔ⁷ / tʰia?⁷	dʉa⁵	--- / ---	
旱鴨	land duck		*C-ŋa:nɦ	ŋa:n² / ŋan¹	ŋa:n² / ---	ŋa:n² / ŋa:n²	ŋa:n² / ŋa:n²	--- / ---	--- / ---	---	--- / ---	

漢字	Gloss	Reconstruction		C1	C2	C3	C4	C5	C6	C7
漢人	Chinese	*C-mɜːy	*C-mɜːy	maːy¹ / mɔː¹	moːy¹ / ---	maːy¹ / moːy¹	maːy⁴ / muay¹	maːy¹ / muːy⁴	muəy¹	máːy / ---
HANG										
行	row (clsfr)	*rɜːyɦ	*rɜːyɦ	raːy² / ---	goːy² / ---	gaːy² / xoːy²	gaːy² / ---	gaːy² / ---	tuy⁵	dàːy / ---
HAO										
毫豬	porcupine	*C-dəy	*C-dəy	dáy¹ / day¹	day¹ / day¹	day¹ / day¹	day¹ / day¹	dáy¹ / day¹	ti¹	--- / ---
好	good	*hlin	*lin	dín¹ / tθen¹	łin¹ / len¹	łeŋ¹ / łen¹	łen¹ / łen¹	łin¹ / łen˩	[maŋ¹]	dín / łen˩ · tlen
HE										
喝	drink	CHl:	*Cihaːw	--- / ---	--- / ---	hjaːw¹ / ɲaːw¹	hjaːw¹ / ---	hjaːw¹ / ---	---	--- / ---
喝	drink	*ruːnɦ / *kuːnɦ	Meifu:	ruːn² / ---	guːn² / ---	(kuːn²) / kunɟ²	guːn² / ---	guːn² / ---	kuːn⁵	--- / ---
		*tʰeːŋʔ		tʰaŋ³ / ---	tʰoːŋ³ / ---	tʰoːŋ³ / tʰoːŋ³	tʰoːŋ³ / tʰuaŋ³	tʰɔːŋ³ / tʰuaŋ³	[leŋ⁵lem˩]	--- / ---
和	and	*ʔuːŋɦ / Run:	*C-məy	ʔuːŋ² / ---	ʔuːŋ² / ʔuŋ²	ʔuːŋ⁵ / ʔuŋ²	ʔuaŋ⁵ / may¹	ʔuːŋ⁵ / may¹	[ɓeː˩]	úoŋ / ---
核	fruit pit	*ʔiwɦ / *ʔuːk	CHl:	ʔiw² / ʔuʔ⁴	ʔiw² / ʔuʔ⁴	ʔuːʔ⁷ / ---	ʔuaʔ⁷ / ---	ʔuːʔ⁷ / ʔuʔ⁷	[huɐt⁷]	ʔuːʔ⁷ / ---

		Recon A	Recon B								
HEI											
黑色	black	*C-dəmʔ	*dəmʔ	ɗom^3 / ---	ɗam^3 / ---	ɗom^3 / ɗam^3	ɗam^3 / ɗam^3	ɗam^3 / ɗam^3	ɗ[ə]m^3 / ɗam^3	[tsʰey^1]	dòm / tam⌐
HENG											
橫	horizontal	*C-ɣən	*ɦen	hen^1 / ---	han^1 / ---	han^1 / ---	han^1 / haŋ^1	han^1 / haŋ^1	han^1 / han^1	[tiam^1]	---
HONG											
烘	dry by fire	*Curumʔ	*Curumʔ	ruum^3 / ---	guum^3 / ---	guum^3 / kum^1	guum^3 / ɣum^3	guum^3 / yum^3	huum^6 / ---	[ŋɰət^9]	d[ù]m / ---
烘	dry by fire	GHl:	*ʔiːŋ	--- / ʔieŋ^1	ʔiːŋ^1 / ʔiŋ^1	--- / ---	ʔiaŋ^1 / ʔiŋ^1	--- / ʔiŋ^1	--- / ʔiŋ^1	---	---
紅色	red	GHl: / Qi:	*raːnʔ / *hlaːt	deːŋ^3 / ---	gaːn^3 / ŋan^3	gaːn^3 / ---	gaːn^3 / xaːŋ^3	ɬaːt^7 / ---	ɬaːt^7 / ---	[ɬɯːn^4]	dɛ̀ŋ / tɬaː
紅螞蟻	red ant	*muc	*hmuc	mut^7 / ---	put^7 / pɯɛʔ^4	mut^7 / ---	--- / pət^8	--- / ---	--- / ---	---	---
		*Cuɦɯːʔ	*Cuɦɯːʔ	heuɰ^3 / ---	hauɰ^3 / ---	hwauɰ^3 / ---	gwauɰ^3 / ɲeɰ^3	vauɰ^3 / ɲauɰ^3	[ʔ]wauɰ^3 / ---	[kuːt^9]	---
紅藤	red vine	*C-guːŋ / Run:	*kuːŋ / *kat / *C-mɛːk	kuːŋ^1 / koŋ^1	kuːŋ^1 / kun^1	kuːŋ^1 / ---	kuːŋ^1 / kun^1	kuaŋ^1 / kat^8 / meʔ^8	kuːŋ^1 / kat^7 / miaʔ[17]	kiət^7	---

字	gloss	reconstruction								
虹	rainbow	CHI: *tɕʰomʔ	mey³ / tsʰɔ[ŋ]³	mey³	tsʰo[pʔ]	---	ts[a]m³ tsʰɔm³	tsɔŋ²	mèy	---
		*ʔɔk — CHI:	ʔok⁷	ʔuk⁷	---	tsʰun¹	---	tsʰu[m]¹ tɔŋ¹	ók	---
		*tʃʰun — CHI:	hən¹	---	---	---	---	tsʰən¹	---	---
映	to comfort	*C-tɕəw — Qi:	tsaw¹	tsaw¹	tsaw¹	tsaw¹	tsuut⁷	tsuut⁷	---	---
		*tɕut	---	---	tsaw¹	tsaw¹	tsaw¹	t[s]aw¹	---	---
HOU										
喉嚨	throat	GHI: *kʰəːk	(kʰoːʔ⁹)	(kʰoːʔ⁷)	kʰoːk꜖⁷	kʰoːk꜖⁷	kʰoːʔ⁷	(lɔːʔ¹⁰) [lɔːk⁸]	(xɔ̃ː)	---
		Run: *tʰiːw	---	---	kʰoːk꜖⁷	kʰoːʔ⁷	tʰiw¹	tʰiw¹	---	---
猴子	monkey	*C-nɔk	nok⁷	nuk⁷	nok⁷	nok⁷	noʔ⁸	nɔːk⁹ tsʰaːŋ¹	(nɯk) nɔk˧	---
		*C-nok	nɔk⁵	---	nɔk⁷	nɔk⁷	nɔk⁸	nɔk⁸	nɔk꜖	---
猴子	wart	*suːc	tu:t⁷	tu:t⁷	tu:c⁷	tu:t⁷	tu:t⁷	tu:t⁷	[mɯ²tsʰiaw⁵]	---
		*suːc	tsʰuət²	---	---	sut⁷	tsʰut⁸	tsʰut⁷	---	---
吼	roar	*C-ɣɔk	hok⁷	huk⁷	hok⁷	hok⁷	---	hɔːk⁸	---	---
		*ɦok	hɔk⁷	---	hɔk⁷	hɔk⁷	hɔk⁷	hɔk⁷	---	---
後面	rear	*pəyʔ	pʰay³ / pʰuy³	pʰ[e]y³ / pʰeː³	pʰay³	pʰa[:]y³ / pʰay³	pʰay³	pʰa[:]y³	fãy	---
		*pʰəyʔ	---	---	---	pʰay³	---	pʰaːy⁵	---	---
		*[tʃ/ɕ]uɲʔ — CHI:	ts[h]un³	ts[h]un³	dɯ:n³	dɯ:n³	dɯ:n³	dɯ:n³	ʃʊ̃n	---
		*duːnʔ — NCHI:	nɯɛn³	dɯn³	---	ts[h]ey¹	(ts[h]ey⁴)	ts[h]ey¹	---	---
		*tʃiː								

漢字	English												
後年	two years later	*hmɯ:ɦ	*mu:ɦ	mow²	paw²	paw²	pow²	pʰo:²	---	ma:˥	⫶	⫶	⫶
				ɓa:⁵	paw²	paw²	---	paw²	paw²			⫶	
		*C-ɲɯɯ:	*C-ɲɯɯ:	ɟheɯʃ	ɟheɯʃ	heɯʃ	heɯʃ	heɯ	---	na:˥	⫶	⫶	⫶
				ɲow¹	ɲjɛ:¹	heɯʃ	heɯʃ	heɯʃ	heɯʃ		⫶	⫶	
後天	two days later	*ŋwen	*hŋwen	ven¹	van¹	pay⁶	---	van⁴	pay³	[kɯ²]	vén	⫶	⫶
		CHI:	*mbəyʔ	---	---	---	---	pay³	pay⁶		pa:y˥		
		*C-ɲɯɯ:	*C-ɲɯɯ:	ɟheɯʃ	ɟheɯʃ	heɯʃ	heɯʃ	neɯ	heɯʃ	[na:˥]	ɲheɯ	⫶	⫶
				ɲow¹	ɲjɛ:⁵	heɯʃ	heɯʃ	heɯʃ	heɯʃ[1]	[1]	ɬheɯ˥		
厚	thick	*C-na:	*C-na:	na:˥	na:˥	na:˥	na:˥	na:⁴	na:˥	now¹	na:	⫶	⫶
				nɔ:˥	na:˥	na:˥	na:˥	na:˥	na:⁴		na:˥		
HU													
狐狸	fox	*nɔm[ʔ]	*hnom[ʔ]	nom³	---	---	tom⁴	(tʰum⁴)	tum⁴	[tsip⁷]	⫶	⫶	⫶
				---	---	---	t[u]m¹	tom¹	tom⁴		⫶		
		*C-muc	*C-muc	mut⁷	mut⁷	muc⁷	mut⁷	(mut⁷)	mut⁷	[tsʰuŋ¹]	⫶	⫶	⫶
				met⁵	---	---	m[u]t⁷	mut⁸	m[u]t⁸		⫶		
鬍子	beard	*mɯ:mʔ	*hmɯ:mʔ	mɯ:m³	pɯ:m³	pɯ:m³	pɯ:m⁶	phu:m⁶	pɯ:m⁶	mum²	mɯ́ɤm	pɯ́ɤm	⫶
				ɓu[ŋ]⁵	puen²	pum³	pum³	pum⁶	puum⁶	mum⁶	pɯ:m˥		
葫蘆	bottle gourd	*ra:yɦ	*ra:yɦ	(ga:y²)	ga:y²	ga:y²	ga:y²	ha:y²	---	[ɗuk⁷]	⫶	⫶	⫶
				---	ŋay²	ga:y²	xa:y²	xa:y²	(vuay²)		⫶		
蝴蝶	butterfly	*mi:ʔ	*hmi:ʔ	mey³	pey³	pɯ⁽¹⁾	---	---	---	---	⫶	⫶	⫶
				mɛy³	---	pɯ¹	pɯ³	---	---		⫶	⫶	
蝴蝶		*Cilom	*Cilom	zom¹	zom¹	zom¹	ɬom⁴	ɬom⁴	ɬom⁴	---	⫶	⫶	⫶
				---	---	zom⁴	zom¹	zom¹	tsom⁴		⫶	⫶	

字	gloss	A	B								
蝴蝶	butterfly	Qi:	*kəŋʔ	mey^3	mey^3	---	kaŋ^3	kaŋ^3	kaŋ^3	[ɓaŋ^5]	mèy
		Qi:	*kə:ŋ	mɯ:ŋ^1	mɯ:ŋ^1	---	kɔ:ŋ^1	kɔ:ŋ^1	kɔ:ŋ^1	[ɓua^1]	muɤŋ
戶	household clsfr	*C-dun	*dun	dun^1	dun^1	dun^1	dun^1	dun^1	dfun^1	tuŋ^1	dún
				---	---	---	dɔŋ^1	dɔŋ^1	dən^1		¦
庠水	bail water	*wi:t	*hwi:t	vi:t^7	vi:t^7	hwi:t^7	vi:t^8	vi:[ʔ]^8	vi:t^7	vet^7	¦
		NWCHI:	*fə:y	f[ɔy]^1	fɔy^1	---	v[e]t^7	vit^8	v[e]t^8		¦
HUA											
花	flower	*tʃ[ɛ]:ŋ	*tʃʰ[e]:ŋ	tsʰe:ŋ^1	tsʰe:ŋ^1	tsʰe:ŋ^1	tsʰe:ŋ^1	tsʰe:ŋ^1	tsʰe:ŋ^1	[ŋɟua^1]	ʃɛŋ
				heŋ^1	---	tsʰe:ŋ^1	tsʰe:ŋ^1	tsʰiaŋ^1	tsʰiaŋ^1		tʃʰi:aŋ꜔
花邊/紋	embroidery	*pʰa:nʔ	*pʰa:nʔ	pʰa:n^3	pʰa:n^3	pʰa:n^3	pʰa:n^3	pʰa:n^3	pʰa:n^3	[liaw^{4}ŋɟua^1]	fãn
				---	---	pʰa:ŋ^3	pʰa:ŋ^3	pʰa:ŋ^3	pʰua:n^3		¦
滑	slippery	*C-gi:t	*ki:t	ki:t^7	ki:t^7	ki:t^7	tsɯ:n^4	tsʰɯ:n^4	tsɯ:n^4	ɲuan^5	kiet
		Qi:	*ɲɟɯ:n	kit^2	---	kit^7	kit[8]	---	kit^7		nɯn˥
滑脫	slip	*p-lac	*p-lac	---	lat^7	plac^7	---	---	plat[9]	[mut^7]	¦
		Run:	*plʉt	---	---	---	plat^7	plat^7	plət^7		¦
HUAI											
懷念	fondly remember	(*C-ŋup)	(*C-ŋup)	ŋup^7	ŋu:y^2	ŋu:y^2	---	---	ŋu:y^2	[kua^4]	¦
		GHI:	*C-ŋu:yɦ	---	---	---	ŋuy^2	ŋuy^2	ŋop^8		¦
懷孕	pregnant	GHI:	*ʔə:m	zow^3	ʔɔ:m^1	ʔɔ:m^1	ʔɔ:m^1	ʔɔ:m^1	ʔɔ:m^1	---	¦
		Run:	*je:ŋʔ	---	---	---	zian^3	zian^3	zian^6		¦

Character	Gloss	Source	Proto-form									
壞	bad	*Cɪraːk	*ŋjaːk	zaːʔ^7 lɛk^4	zeːʔ^7 leʔ^4	reːk^7 teːʔ^7	teːʔ^8 tɯːʔ^2	tʰeːʔ^8 teʔ^8	teːʔ^8 tiaʔ^7	[ʔay^1]	zaː tɛʔ˧	tɛk ---
壞（蛋）	spoiled (egg)	*Curaːwʔ	*Curaːwʔ	(gaːw^3) vaː˙^{3}	gaːw^3 ---	gwaː·w^3 ---	gwaːw^6 ---	vaːw^6 vaːw^3	hwaːw^6 vaːw^3	[tsum^{1}luəŋ^2]	--- ---	---
HUAN												
緩慢	slow	GHI: Qi:	*hnəːŋʔ *fəːy	tuŋ^1 ---	toːŋ^3 ---	toːŋ^3 ---	faːy^1 toːŋ^3	faːy^1 ---	faːy^1 tuaŋ^6	[tsəŋ^2]	--- ---	---
換	change clothes	*C-ləw	*C-ləw	law^1 ---	law^1 ---	law^1 law^1	law^1 law^1	law^4 law^1	law^1 law^4	law^1	--- ---	---
換	exchange	CHI:	*p-ley	--- lay^4	--- pjɛʔ^4	play^1 pay^4	play^1 play^1	pay^1 ---	play^1 ---	---	--- ---	---
HUANG												
荒地	to open land	NCHI:	*daːwʔ	--- daw^3	--- ---	--- ---	--- ---	--- daːw^3	--- daːw^3	---	--- ---	---
		GHI:	*hmuːŋ	--- ---	puːŋ^1 ---	puːŋ^1 ---	puːŋ^4 puŋ^1	pʰuaŋ^4 ---	--- ---	[faː^2]	--- ---	---
黃峰	wasp	*p-lu:	*p-lu:	low^1 low^4	low^1 ---	plow^1 pow^1	plow^1 plow^1	pow^1 plow^1	plow^1 plow^1	law^1	lʌw	---
黃峰	wasp	GHI:	*tʰin	--- tʰe[ŋ]^1	tʰin^1 tʰen^1	tʰeŋ^1 ---	tʰen^1 tʰen^1	tʰen^1 tʰen^1	tʰin^1 tʰen^1	---	--- ---	---

漢字	gloss	Proto A	Proto B	1	2	3	4	5	6	7	8	9	10
黃蜂	wasp	*hmi:ʔ	*mi:ʔ	mey³	pey³	---	---	---	---	---	---	---	---
				---	---	---	---	---	---	---	---	---	---
黃牛	cow	*C-la:ɦ	*C-la:ɦ	la:²	la:²	---	---	---	---	---	---	---	---
				---	---	---	---	---	---	---	---	---	---
黃色	yellow	*C-ɲiw	*C-ɲiw	ɲiw¹	ɲiw¹	ɲiw¹	ɲiw¹	niw⁴	ɲiw¹	ɲiw¹	naw¹	ɲiw	---
				ŋjiw¹	---	ɲiw¹	---	ɲew¹	ɲi:w⁴	---	---	---	---
		*lj[e]:ŋ	*Cil[ɛ]:ŋ	ze:ŋ¹	ze:ŋ¹	ze:ŋ¹	ze:ŋ¹	ɬe:ŋ⁴	ɬe:ŋ⁴	ɬe:ŋ⁴	[tsay⁴]	zéŋ	---
				zeŋʔ⁴	---	ze:ŋ⁴	ze:ŋ¹	(ziaŋ⁴)	tsiaŋ⁴	ze:ŋ¹	---	ʒiaŋ˥	---
HUI													
灰色	grey	*hma:wɦ (GHI:)		---	pa:w²	---	pa:w²	---	---	---	[pʰu:˩]	---	---
		*pluŋɦ (NCHI:)		---	---	pluŋ²	puŋ²	plun²	plun²	pluŋ⁵	---	---	---
揮動	to wave	*hwit (*wit)		vit⁷	vit⁷	hwec⁷	vet⁸	---	---	[fʃit⁷]	[viən⁴]	---	---
		*u:y (NWCHI:)		ʔuəy¹	ʔuy¹	vet⁷	vet⁷	vet⁸	vet⁸	vet⁸	---	---	---
回	trip clsfr	*ɓɯ:ɦ (*C-bɯ:ɦ)		ɓəɰ²	ku:n¹	ku:n¹	ku:n¹	ku:n¹	ku:n¹	ku:n¹	[lem˩]	bə̌ɰ	---
		*ku:n (GHI:)		---	---	ɓəɰ²	---	---	---	---	---	---	---
回來	come back	*hmɯ:	*mɯ:	meu¹	peu¹	peu¹	peu¹	p[a:]ɫu⁴	p[a:y]⁴	p[a:]ɫu⁴	pə:⁴	mə́ɰ	pə́ɰ
				---	pɛʔ⁴	---	---	peu¹	pauɰ⁴	peu¹	---	pa:˥	---
								pʰəɰ⁴	pʰəɰ⁴				
								pauɰ¹	pauɰ¹				
		*C-lɯ:ŋ	*C-lɯ:ŋ	lɯ:ŋ¹	lɯ:ŋ¹	lɯ:ŋ¹	lɯ:ŋ¹	lɰ:ŋ¹	lɯ:ŋ¹	ku:n¹	---	lúɤɰ	---
				ɲemɪ¹	uɜl	lɯ:ŋ¹	lɯ:ŋ¹	lɯɯ¹	---	---	---	---	---
回去	go back	*hmɯ:	*mɯ:	meu¹	peu¹	peu¹	peu¹	p[a:]ɫu⁴	p[a:y]⁴	peu¹	pə:⁴	mə́ɰ	---
				---	pɛʔ⁴	pay⁴	peu¹	pʰəɰ⁴	pʰəɰ⁴	pay⁴	---	---	---
								pauɰ¹	pauɰ¹				

字	Gloss	Proto	1	2	3	4	5	6	7	8
會	able	*C-gi:w NWCHI: Run:	ki:w¹ / kʰoŋ¹	ki:w¹ / kʰoŋ¹	ki:w¹ / ---	ki:w¹ / kiw¹	--- / pauɴ³	ki:w¹ / pauɴ⁶	kiw¹	mạ: / ---
		*kʰuŋ								
		*mbəuɴʔ								
HUN										
昏迷	unconscious	*hnəp Run:	nop⁷ / ---	tap⁷ / ---	top⁷ / tap⁷	--- / tap⁷	--- / ɬem³	--- / ɬom³	---	---
		*hləm?					paw⁵	paw²		
		*mbəwɦ								
混合	blend	*C-ɲu:k	ɲu:ʔ⁷ / ---	ɲu:ʔ⁷ / ɲuɣ⁴	ɲu:k⁷ / ---	ɲu:ʔ⁷ / ɲuk⁷	--- / ɲuk⁸	ɲu:ʔ⁷ / ɲuʔ²[7]	[le:w¹]	---
混雜	mix	*rom CHI:	--- / ---	dɯum¹ / ---	rom¹ / ---	rom⁴ / rom¹	lom⁴ / rom¹	(lɔm⁴) / [tʃom⁴]	---	---
混雜		*rəp CHI:	zap⁷ / ---	daʔ⁷ / ---	rop⁷ / ---	rop⁸ / rap⁷	l[o]p⁹ / rap⁸	lap⁸ / [tʃap⁸]	---	---
HUO										
火	fire	*fi: GHI:	(pey) / ---	fey¹ / fey¹	fey¹ / fey¹	fey¹ / fey¹	fey¹ / fey¹	fey¹ / fʰey¹	pay¹	féy
										(pey) fey↓
火把	torch	*tɕʰin Qi:	tsʰin¹ / ---	tsʰin¹ / ---	tsʰəɲ¹ / ---	tʰam³ / tsʰen¹	tʰam³ / tsʰeʔ⁸	tʰam³ / ---	tʰam¹	ʃín / ---
		*tʰəm								
JI										
雞	chicken	*[k/x]əy *kʰəy	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹	xáy
										kʰay↓

漢字	gloss									
雞冠	cockscomb	*C-dɛ:ɦ CHI:	*dɛ:ɦ *fi:wɦ	de:ʔ² ---	de:ʔ² ---	fi:w² fiw[1]	fi:w⁵ fiw²	fiw⁵ fiw²	fi:w⁵ fʰiw⁵	pi:w⁵ ---
雞冠花	cockscomb flower	*tʃ[ɛ]:ŋ *Cur[ɛ]:ŋʔ	*tʃʰ[e]:ŋ —	tsʰe:ŋ¹ ---	tsʰe:ŋ¹ ---	tsʰe:ŋ¹ ---	tsʰe:ŋ¹ tsʰe:ŋ¹	tsʰe:ŋ¹ tsʰiaŋ¹	tsʰe:ŋ¹ tsʰiaŋ¹	[ɲɯa¹]
		CHI:	*fi:wɦ	raw³ ---	dfe:ʔ² ---	fi:w⁵ ---	fi:w² fiw²	fiw⁵ fiw²	fi:w⁵ ---	pi:w⁵
雞蝨	chicken louse	*jəw Run:	*hjəw *hjəwɦ	zow³ zaw³	zow³ [ɲ]ɔ:³	zaw³ zo:³	zo:³ zo:³	zo:[3] zo:²	zɔ:³ zo:⁵	[tsʰi:tʔfow¹]
雞窩	chicken roost	*C-ru:k Qi:	*ru:k *p-lə:m	ru:ʔ⁷ lok⁴	--- luʔ⁴	--- ---	plo:m³ ---	luaʔ⁸ ruk⁸	plɔ:m³ ---	lu:ʔ⁸
積累	accumulate	*tɯ:mʔ Qi:	*tʃʰɯ:mʔ *ʋɯ:mʔ	tsʰɯ:m³ hum³	tsʰɯ:m³ ---	tsʰɯm³ tsʰum³	fɯ:m⁶ tsʰum³	vu:m⁶ tsʰum³	vɯ:m³ tsʰom³	vɯam¹
積水	accumulate water	*C-nəmʔ	*C-nəmʔ	nom³ ---	nam³ ---	nom³ ---	nam³ nam³	nam³ nam³	nam³ nam⁶	na:m¹
		*Cur[ɛ]:ŋʔ	*Cur[e]:ŋʔ	re:ŋ³ ve:ŋ³	re:ŋ³ ---	ve:ŋ³ ke:ŋ³	fe:ŋ⁶ ɣe:ŋ³	fe:ŋ⁶ fiaŋ³	fe:ŋ⁶ fiaŋ⁶	[ʋɯ:n⁴]
麂子	muntjac	*C-lə:y	*C-lə:y	la:y¹ lɔ:¹	lo:y¹ lɔy¹	lo:y¹ lo:y¹	la:y¹ lo:y¹	la:y⁴ luay¹	la:y¹ lu:y⁴	ley¹ luay˥
忌嘴	taboo food	*C-ŋəc	*C-ŋəc	ŋ[e]t⁷ ---	ŋat⁷ ---	ŋac⁷ ŋat⁷	ŋat⁷ ŋat⁷	ŋat⁸ ŋat⁷	ŋat⁷ ŋat⁸	ŋa:t⁹

漢	English										extra
忌日	death anniversary	GHI:	*ŋwən	(van¹) / —	van¹ / —	hwan¹ / —	van⁴ / van¹	van⁴ / vaŋ¹	van¹ / van⁴	vɔːn¹ / —	— / —
		CHI:	*Cuɣuːɦ *Cuɦəwɦ / *C-məwʔ	haw² / —	haw² / —	hwow² / —	maw³ / ŋaw²	maw⁶ / maw⁶	mow³ / maw³	maːw¹ / maːw³	— / —
忌諱	taboo	GHI:	*C-muːʔ	(maw³) / —	maw³ / —	mow³ / —	maw³ / maw³	maw⁶ / maw³	mow³ / maw⁶	maːw¹ / —	— / —
祭祀	memorial	*C-bən	*ɓən	— / —	ɓan¹ / —	ɓan¹ / (ɓan¹)	ɓan¹ / —	ɓan¹ / —	— / ley²	— / —	—
		Run:	*C-liːɦ tʃʰəːy	—	—	—	ley² / tsʰuay¹	ley² / tsʰuːy¹	ley² / tsʰuːy¹	—	—
髻	hairbun	(*C-ɲet)	(*C-ɲet)	ɲet⁹	ɲet⁷	fun³ / foŋ³	fun³ / foŋ³	fun³ / foŋ³	fun³ / fən³	pɔŋ¹	— / —
		CHI:	*funʔ	—	—						
JIA											
夾	press under arm	*C-ɣɛːp	*ɦeːp	heːp⁷ / —	heːp⁷ / —	heːp⁷ / heːp⁷	heːp⁷ / —	heːp⁷ / —	heːp⁷ / —	— / —	hɛ́ːp
夾	pinch	*[c/ɕ]iːp	*tɕʰiːp	tsʰiːp⁷ / —	tsʰiːp⁷ / —	tsʰiːp⁷ / —	tʰiːp⁷ / tʰip⁷	tʰiːp⁷ / tʰip⁷	tʰiːp⁷ / tʰip⁷	— / —	tʰiːpˡ
甲蟲	beetle	*miːʔ	*hmiːʔ	mey³ / —	pey³ / —	pɯ⁽¹⁾ / pɯ¹	pɯ¹ / pɯ³	— / —	— / —	[kɯ²] / —	— / —
		*C-raːp	*raːp	raːp⁷ / laʔ²⁴	raːp⁷ / laːp⁷	raːp⁷ / laːp⁷	raːp⁸ / raːp⁷	raːp⁸ / raːp⁸	laːp⁸ / raːp⁸	[paːp⁸] / —	— / —
假如	if	*C-laːyʔ	*C-laːyʔ	laːy³ / —	laːy³ / laːy³	laːy³ / laːy³	laːy³ / laːy³	laːy³ / laːy³	laːy³ / luay⁶	— / —	— / —

字	gloss										
架	handle clsfr	*fi:nʔ	*fi:nʔ	pʰi:n^3 / ---	fi:n^3 / ---	fi:n^3 / fiŋ^3	fi:n^3 / fiŋ^3	fi:n^3 / fiŋ^3	fi:n^3 / fiŋ^3	---	ꜰen / ---
嫁	marry	*[k/x]u:yʔ / CHI:	*kʰu:yʔ / *mbɯ:	kʰu:y^3 / ---	kʰu:y^3 / ---	pəuŋ^1 / ---	p[a:uŋ]^4 / ---	p[a:y]^4 / ---	--- / ---	p[a:y]^4 pə.^{4} low^5 / pʰəuŋ[ʔ]^7	xuoy / ---
JIAN											
尖刀	pointed knife	*Cliwʔ	*Cliwʔ	ziw^3 / ---	ziw^3 / zew^3	ziw^3 / liw^3	ɬiw^6 / ziw^3	ɬiw^6 / zew^3	ɬiw^6 / tsi:w^6	[ɬiək^8 kʰua^1]	--- / ---
肩膀	shoulder	*C-va:ɦ	*va:ɦ	va:^{2} / vɔ:^{5}	va:^{2} / va:^{2}	fa:^{2} / va:^{2}	va:^{2} / (va:^{5})	va:^{5} / va:^{2}	--- / ---	[vet^{10}]	vǎ: / va:ˀ
搣	collect	*sip / *C-vun	*sip / *vun	tip^7 / (sip^2)	vun^1 / feʔ^4	vun^1 / ---	fun^4 / sep^7	vun^1 / voŋ^1	vun^1 / (vun^1)	[vuɑm^1]	vǔn / ---
剪	cut	*rep / NCHI:	*rep / *rə:p	--- / ---	gap^8 / lɔʔ^4	gop^7 / ---	[k]ap^7 / ro:p^7	--- / ---	--- / ---	---	--- / ---
碱(水)	soda (water)	GHI:	*hje:k	(zo:ʔ^7) / zak^2	zo:ʔ^7 / ---	zo:k^7 / ---	zo:ʔ^8 / zo:k^7	zɔ:ʔ^8 / zoʔ^8	--- / zoʔ^8	[na:m^{1}fa:^{1}]	--- / ---
見	see	*C-la:yʔ	*C-la:yʔ	la:y^3 / la:(y)^3	la:y^3 / lay^3	la:y^3 / la:y^3	la:y^3 / la:y^3	la:y^6 / la:y^3	la:y^3 / luay^6	[may^{1}tsʰuəŋ^5]	là:y / ---
件	clothing clsfr	*fənʔ	*fənʔ	[p]en^3 / ---	fan^3 / fan^3	fan^3 / faŋ^3	fan^3 / faŋ^3	fan^3 / fan^3	fan^3 / fan^3	pa:n^1	[p]ên / faŋ]
劍	sword	GHI:	*kɯ:mɦ	--- / ---	kɯ:m^2 / ---	kɯ:m^2 / ---	--- / kɯm^2	--- / ---	--- / ---	---	--- / ---

濺	splash	*[c/ɕ]inɦ	*tɕʰinɦ	tsʰ[e]n² / tɕin⁵	tsʰ[e]ŋ² / tsʰen²	tsʰen⁵ / tsʰen²	tsʰen⁵ / tsʰen²	tsʰin⁵ / tsʰen⁵	tsʰit⁷	--- / ---	--- / ---
箭	arrow	*C-ŋəːt NCHIː	*C-ŋəːt	ŋaːt⁷ / tθam³	ŋoːt⁷ / ---	ŋoːt⁷ / ---	ŋoːt⁷ / ŋoːk⁷	ŋoːt⁷ / ɬam³	ŋuɐt⁷	--- / ---	--- / ---
箭	arrow	*siːp	*siːp	tiːp⁷ / ---	tiːp⁷ / ---	tiːp⁷ / (tiːp⁷)	tiːp⁷ / tsʰiːp⁸	tiːp⁷ / tsʰiːp⁷	[peˑ¹]	tʃʰiːpꟸ	--- / ---
JIANG											
薑	ginger	*kɯːŋ	*kʰɯːŋ	kʰɯːŋ¹ / ---	kʰɯːŋ¹ / kʰeŋ¹	kʰɯːŋ¹ / kʰɯŋ¹	kʰuaŋ¹ / kʰɯŋ¹	kʰuaŋ¹ / kʰɯŋ¹	kʰɯeŋ⁵ / kʰ	xuɛ / kʰɯɯŋꟸ	---
繮繩	reins	*mən NCHIː	*hmən *ɗəː(y)	mɛn¹ / ɗɔː(y)¹	pan¹ / ɗɔy¹	pan¹ / pan⁴	pan⁴ / ɗ[ɔ]ːy¹	pʰan⁴ / paŋ¹	puɐn⁴	mɛ́n	---
降(落下)	fall	*ʈʰɯːʔ	*ʈuːʔ	tsʰəɯ³ / ---	tsʰauʔ³ / ---	tsʰauʔ³ / tsʰɐuʔ³	tsʰauʔ³ / tsʰauʔ³	tsʰauʔ³ / tsʰauʔ³	taːw¹	--- / ---	---
JIAO											
交換	exchange	GHIː CHIː	(*ɓəːk) *p-ləy	(ɓoː?⁷) / laːy⁴	ɓoː?⁷ / pjɛʔ⁴	play¹ / pay⁴	play¹ / play¹	pay¹ / pl[ɯ]y¹	ɓɔːkʔtʰaːˑ¹	(bɣː)	---
澆水	to water	*pʰəːŋʔ	*pʰəːŋʔ	pʰaŋ³ / ---	pʰoːŋ³ / pʰɔŋ³	pʰoːŋ³ / ---	pʰoːŋ³ / pʰoːŋ³	pʰɔːŋ³ / pʰuaŋ³	pʰɔŋ¹	fáŋ	vǎːy
教	teach	*sun	*sun	tun¹ / ---	tun¹ / ---	tun¹ / soŋ¹	tun¹ / soŋ¹	tɯn¹ / tsʰoŋ¹	---	--- / ---	---
嚼	chew	*saːk	*saːk	taː?⁷ / pʰɛkʔ²	teː?⁷ / pʰɛ?⁴	teː?⁷ / suɯːˑ²	teː?⁷ / tsʰiaʔ⁷	teː?⁷ / tsʰeʔ⁸	tsʰuɯa⁵	taː	---

字	gloss	Proto A	Proto B								
角	horn	*C-ɣəw	*ɦəw	haw¹/haw¹	haw¹/haw¹	haw¹/haw¹	haw¹/haw¹	haw¹/haw¹	haw¹/haw¹	haw⁴	háw/haⱡw
角落	corner	*ju:ŋ	*hju:ŋ	zu:ŋ¹/---	zu:ŋ¹/---	zu:ŋ⁴/zuŋ⁴	zu:ŋ¹/zuŋ⁴	zuaŋ⁴/zuŋ¹	zu:ŋ¹/zuŋ⁴	tsʰuəŋ¹ tsʰɔ:k⁹	---/---
腳	leg	*kɔk	*kʰok	kʰok⁷/kʰok²	kʰuk⁷/kʰoʔ⁴	kʰok⁷/kʰɔk⁷	kʰok⁷/kʰɔk⁷	kʰoʔ⁷/kʰɔk⁸	kʰɔk⁷/kʰɔk⁷	hɔ:k⁹	xók/kʰɔkⱡ
腳趾	toe	*sit / Run:	*sit / *lji:ŋɦ	tit⁷/---	tit⁷/---	tec⁷/---	tet⁷/(sip⁷)	tet⁷/ziŋ⁵	(tet⁷)/tsiŋ²	tsap⁹tsia⁴	---/---
攪拌	stir	*C-ɣunɦ / CHI:	*ɦunɦ / *runɦ	hun²/---	hun²/---	gun²/goŋ[4]	gun²/xoŋ²	(la:⁵)/xoŋ²	hun²/(kʰoŋ⁵)	[la:⁵]	hǔn/---
叫（馬）	cry (horse)	GHI:	*ʔi:ŋᴮ	ŋa:w¹/---	ʔi:ŋ²/---	ʔi:ŋ²/---	---/ʔiŋ²	---/---	---/---	[kow⁴]	ŋá:w/---
叫（馬）	cry (horse)	CHI:	*ki:k	---/kiek²	---/kiʔ⁴	---/kik⁷	kiaʔ⁷/kik⁷	kiaʔ⁷/---	kiak⁷/---	---	---/---
叫（鳥）	cry (bird)	*C-ɹə:ŋ		raŋ¹/---	ro:ŋ¹/---	ro:ŋ¹/---	ro:ŋ⁴/ro:ŋ¹	lɔ:ŋ⁴/ruaŋ¹	lɔ:ŋ⁴/ruaŋ⁴	[hu:¹]	dáŋ/---
叫做	be called	*C-ɟa:n	*tɕa:n	tsa:n¹/---	tsa:n¹/---	tsa:n¹/tsa:ŋ¹	tsa:n¹/tsa:ŋ¹	tsa:n¹/tsa:n¹	tsa:n¹/tuan¹	[kow⁴]	tʃǎn/---
覺	sleep clsfr	*puy	*pʰuy	pʰuy¹/pʰɔy¹	pʰuy¹/---	pʰuy¹/pʰuy¹	pʰuy¹/pʰuy¹	pʰuy¹/pʰoy¹	pʰuy¹/pʰow¹	[lem¹]	---/---

JIE

Char	Gloss	Proto	D1	D2	D3	D4	D5	D6	D7	Ext
結果	bear fruit	*C-ɟiːŋ / *tɕiːŋ	tsiːŋ^{1} / tsieŋ^{1}	tsiːŋ^{1} / tsin	tsiŋ^{1} / tsin^{1}	tsiŋ^{1} / tsin^{1}	tsiaŋ^{1} / tsin^{1}	tsiaŋ^{1} / ---	tseŋ^{1}	¦
結束	conclude	*teʔm / *tʃʰəːm	tsʰam^{1} / ham^{1}	tsʰoːm^{1} / hon^{1}	tsʰoːm^{1} / ---	tsʰoːm^{1} / tsʰoːm^{1}	tsʰoːm^{1} / tsʰoːm^{1}	tsʰɔːm^{1} / tsʰuam^{1}	muuat^{7} / tsʰuam^{1}	¦
結束	conclude	GHl: / *tɕʰəːp	---	tsʰoːp^{7} / soʁ^{4}	tsʰoːp^{7} / ---	tsʰoːp^{7} / tsʰoːp^{7}	tsʰoːp^{7} / tsʰoːp^{7}	tsʰuap^{8} / ---	[ləːy^{2}]	¦
結束	conclude	*C-baːyʔ / *baːyʔ (Run:) / *bəːyʔ	ɓaːy^{3}	---	ɓaːy^{3} / ɓuay^{3}	ɓaːy^{3} / ɓuːy^{3}	ɓaːy^{3} / ɓuːy^{3}	---	bàːy	¦
接	connect	*ʔɯː / *ʔɯː	ʔəɯ^{1}	ʔəɯ^{1}	ʔəɯ^{1} / ʔəɯ^{1}	ʔəɯ^{1} / ʔəɯ^{1}	ʔəɯ^{1} / ʔəɯ^{1}	ʔəɯ^{1} / ʔəɯ^{1}	[tsuː^{5}]	¦
揭開	uncover	*Cuɣaːŋ / *Cufiaːŋ (Qi: / *C-laːk) (Run: / *waːɦ)	haːŋ^{1}	leːʔ^{7}	leːʔ^{7} / hweːŋ^{1}	leːʔ^{8} / vaː^{2}	leːʔ$^{[9]}$ / vaː^{2}	luua^{5}	hàn / vaːↆ	¦
節	joint; node	*tunɦ / *tʰunɦ	tʰun^{2}	tʰun^{2} / tʰoŋ^{2}	tʰun^{5} / tʰoŋ^{2}	tʰun^{5} / tʰoŋ^{2}	tʰuun^{5} / tʰən^{5}	[tow^{1}]	tʰǔn	¦
劫	rob	GHl: / *kiːt	---	kiːt^{7}	kiːt^{7}	--- / kit^{7}	---	---		¦
姐夫	elder sister's husband	*jewʔ / *hjewʔ	zaw^{3}	zaw^{3}	zaw^{3} / zoː^{3}	zoː^{6} / zoː^{3}	zoː^{6} / zoː^{3}	zoː^{3} / zoː^{6}	tsiːw^{1}	¦
姐姐	elder sister	*iːɦ / *kʰɯːʔ (CHl:)	ʔey^{2}	ʔey^{2} / kʰaw^{3}	[ʔ]auɯ^{3} / kʰəɯ^{3}	kʰauɯ^{3} / ʔey^{2}	kʰauɯ^{3} / ---	[ʔuː^{1}]	ẽy / ɛyↆ	¦

解剖	cut open (fish belly)	*C-ɓuyɦ	*ɓuyɦ	ɓuy^2 / ɓɔɣ^5	ɓuy^2 / ---	ɓuy^2 / ɓuy^2	ɓuy^5 / ɓuy^2	ɓuy^5 / ɓuy^2	ɓuy^5 / ɓow^5	puy^1	---	---
疥瘡	small sore	*C-ni:ʔ	*C-ni:ʔ	ney^3 / ---	nay^3 / ---	nay^3 / nay^3	nay^3 / nay^3	nay^6 / nay^3	nay^3 / nay^6	na:y^1	ney	---
		GHl:	*kʰom	---	kʰ[ɯ]m^1 / kʰom^1	kʰom^1 / ---	kʰom^1 / ---	kʰom^1 / ---	kʰum^1 / ---	kʰam^1	---	---
JIN												
今天	today	*ŋwən	*hŋwən	ven^1 / hon^4	van^1 / vanʔ^4	hwan^1 / vaŋ^1	van^4 / vaŋ^1	van^4 / vaŋ^1	van^1 / van^4	vɔ:n^1	věn / vaŋ˧	---
		*C-ni:ɦ / Run:	*C-ni:ɦ / *C-ne:ɦ	ney^2 / n[a:]^5	ney^2 / ney^2	ney^2 / ney^3	ney^5 / ney^2	ney^2 / ne:^{2}	ney^5 / ne:^{2}	nɛ:^{5}	ňey / nɛ:ˀ	---
筋	tendon	*ri:w / Qi: / Run:	*ri:w / *hwən / *C-ɲi:w	ri:w^1 / ---	gi:w^1 / ---	gi:w^1 / ---	van^4 / xiw^1	van^4 / ɲiw^1	van^1 / ɲiw^4	[tat^7]	ďew / ɲi:w˧	---
僅	only	GHl:	*C-mən?	(man^3)	man^3	man^3	man^3	---	man^3	---	---	---
緊	tight	*hmə:n? / Qi:	*hmə:n? / *hwət	man^3 / ---	po:n^3 / pɔn^3	po:n^3 / po:ŋ^3	po:n^6 / po:ŋ^3	vat^7 / puaŋ^3	hwat^7 / pu:n^3	[ki:n^2]	---	---
緊	pull tight	*C-guɯŋ	*kɯŋ	kɯŋ^1	kɯŋ^1	kɯŋ^1 / kəŋ^1	kɯŋ^1 / kəŋ^1	kɯŋ^1 / kəŋ^2	kɯŋ^1 / (kəŋ^2)	kɯŋ^5	kɯɲ	---
緊密	dense	*ti:t	*tʰi:t	tʰi:t^7 / ---	tʰi:t^7 / ---	tʰi:t$^{[9]}$ / tʰit^7	tʰi:t$^{[9]}$ / tʰit^7	tʰi:t^7 / tʰit^7	tʰi:t^7 / ---	[ni:t^9]	---	---

汉字	gloss											
近	near	*p-lɯ:ʔ	*p-lɯ:ʔ	lòuɰ^3 / hìt^2	làuɰ^3 / hiʔ^4	plauɰ^3 / plauɰ^3	plauɰ^3 / plɐuɰ^3	pauɰ^3 / plauɰ^3	plauɰ^3 / plauɰ^3	la:^{1}	lèuɰ / pla:ɬ	plèuɰ
進	enter	*lu:t	*hlu:t	dɯ:t^7 / ---	ɬu:t^7 / lu:ʔ^4	ɬu:t^7 / ɬuk^7	ɬu:t^7 / ɬuk^7	ɬu:t^7 / ɬuk^8	ɬu:t^7 / ɬut^7	[tʰaw^4]	--- / ɬu:kɬ	---
浸泡	soak	CHI:	*rok	--- / lɔk^4	--- / laʔ^4	rok^7 / lɔʔ^7	rok^8 / ---	loʔ^8 / rɔk^8	lɔk^8 / rɔk^8	---	--- / ɮɔkɬ	---
浸泡	soak	GHl:	*dɜ:mʔ	(do:m^3) / ---	do:m^3 / ---	do:m^3 / ---	do:m^3 / ---	--- / ---	dɔ:m^3 / ---	tsiem^4	--- / ---	---
禁母	witch	*mi:ʔ / Qi:	*hmi:ʔ / *mbiʔ	mey^3 / ---	(mey^3) / ---	pay^3 / pay^3	pi:^{6} / pay^3	pʰi:^{6} / pay^3	pi:^{6} / pay^6	ma:y^5	--- / ---	---
		*C-gimʔ	*kimʔ	kim^3 / ---	kim^3 / ---	kim^3 / kem^3	kim^3 / kem^3	kim^3 / kem^3	kim^3 / kem^3	kim^1	--- / ---	---
禁忌	prohibit	*Cuɣəwɦ / NWHl:	*Cuɦəwɦ / *C-ŋwu:ɦ	haw^2 / ---	haw^2 / ---	hwow^2 / ŋaw^2	go:^{5} / ŋaw^2	vo:^{5} / ŋaw^2	hɔ:^{5} / ---	[ma:w^1]	--- / ---	---
JING												
經過	pass by	ECHl:	*Cuɦə:y	--- / ---	--- / ---	hwa:y^1 / ---	gwa:y^1 / ---	va:y^1 / ---	hwa:y^1 / ---	---	--- / ---	---
精稻	non-glutinous rice	*C-mu:nʔ / CHl:	*C-mu:nʔ / *C-muc	mu:n^3 / ---	mu:n^3 / muɛʔ^4	mu:n^3 / ---	mut^7 / ---	mut^8 / mot^8	--- / mɐt^8	muɐt^9	mùon	---
		*C-mɯ:ʔ / CHl:	*C-mɯ:ʔ / *tɕi:mʔ	meuɰ^3 / ---	meuɰ^3 / ---	tsi:m^3 / ---	tsi:m^3 / tsim^3	(tsiam^1) / ---	tsiam^1 / ---	tsiam^1	--- / ---	---

Char	Gloss	Src	Recon A	Recon B	1	2	3	4	5	6	7	8	9
精液	semen		*C-nəmʔ	*C-nəmʔ	nom^3	nam^3	nom^3	nam^3	nam^6 / nam^3	nam^6 / nam^3	na:m^1	--- / nam˥	---
井	a well	CHI: / NCHI:	*pleŋ / *hli:k	*pleŋ / *hli:k	tsu:^{2}	naŋ^2	pl[o]:ŋ^2 / [ʔ]ik^7	ple:ŋ^1 / ɬit^7	pe:ŋ^1 / ɬit^7	ple:ŋ^1 / ɬiʔ^7	[tam^1]	--- / ɬi:˥	---
頸瘤	neck tumor	GHI: / CHI:	*tʰoŋɦ / *tɕu:ŋʔ	*tɕə:m / *tʃʰə:m	(tʰuŋ^2) / tsʰoŋ^3	tʰuŋ^2	tsʰu:ŋ^3 / tsʰu:ŋ^3	tsʰo:m^1	tsʰo:m^1	tsʰɔ:m^1 / tsʰuam^1	tʰɔŋ^5 / [pam^2]	(tʰʌ̌ŋ) / tʰoŋ˩	---
		Qi: / Run:	*ljoŋʔ / *kʰə:k / *tˡi:w	*Cllonʔ / *kʰə:k / *tˡi:w	zoŋ^3	zuŋ^3 / zaŋ^3	zoŋ^3	kʰɔ:ʔ^7	kʰɔ:ʔ^7 / tˡiw^1	(ʔɔ:^{5}) / tˡiw^1	[ʔɔ:^{5}]	---	---

JIU

Char	Gloss	Recon A	Recon B	1	2	3	4	5	6	7	8	9
九	nine	*C-βɯ:ʔ	*C-βɯ:ʔ	pəuɟ^3	fauɟ^3 / faw^3	fauɟ^3 / kwauɟ^3	fauɟ^3 / ɣɤuɟ^3	fauɟ^3 / fauɟ^3	fauɟ^3 / fauɟ^3	fə:^{1}	pèŋ / fa:˥	heŋ
久	long ago	*C-ga:wʔ	*ka:wʔ	ka:w^3 / ka:w^3	ka:w^3 / kaw^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	[ʔjɔ:tˀ^9]	kǎ:w	---
酒	alcohol	*C-ŋa:wɦ	*C-ŋa:wɦ	ŋa:w^2 / pʰew^1	ŋa:w^3 / pʰɛw^1	ŋa:w^3 / ŋa:w^2	ŋa:w^5	ŋa:w^2	(ŋe:w^5) / ŋaw^2	ŋe:w^2	ŋà:w	---
酒窩	dimple	*C-nə:k	*C-nə:k	naʔ^7	to:ʔ^7	to:k^7	to:ʔ^8 / to:k^7	to:ʔ^8	tɔʔ^8	[dǐ:n^5]	---	---

漢	gloss	proto A	proto B								
酒藥	k.o. medicine	*C-luːmʔ CHI:	*Cuɦom	luːm³ —	luːm³ —	hwom¹ ŋom¹	gom¹ —	vom¹ ŋom¹	hum¹ ŋom⁴	hɔːm⁴ —	— —
舊	old	NECHI:	*zaː	— —	— —	— zaː⁴	— zaː¹	— zaː¹	— zaː⁴	—	—
舊	old	*C-maːn		— mɔn	maːn¹ —	maːn¹ maːŋ	maːn¹ maːŋ	maːn⁴ maːŋ¹	maːn¹ —	—	maːŋ⊣
舊	old	GHI:	*kʰəwɦ	kʰaw² —	kʰaw² —	kʰaw² —	raw¹ —	— —	— —	hiːw¹ —	(xǎw) —
臼	mortar	*C-ɾəw		raw¹ law⁴	raw¹ lawʔ⁴	raw¹ law⁴	raw⁴ raw¹	law⁴ raw⁴	law⁴ raw⁴	luˑ⁴ —	dráw —
舅父	mother's younger brother	*nuːʔ	*hnuːʔ	neŋ³ nɔˑ³	tauʔ³ —	tauʔ³ —	tauʔ⁶ təŋʔ³	tʰauʔ⁶ tauʔ⁵	tauʔ⁶ tauʔ²	niˑ⁴ —	— —
舅母	mother's y. brother's wife	*miː	*hmiː	m[iˑ]¹ —	pey¹ —	pey¹ —	pey⁴ pey¹	pʰey⁴ (pey⁴)	pey⁴ pey⁴	miˑ⁴ —	pey˥ —
JU											
橘黃	tangerine yellow	*C-daːŋʔ	*daːŋʔ	deːŋ² —	deːŋ³ —	deːŋ³ deːŋ³	deːŋ³ deːŋ³	deːŋ³ dianʔ³	deːŋ³ dianʔ³	— —	dɛ̂ŋ —
擧	lift	*Cɪɣunɦ	*rjɯunɦ	zɯun² —	zɯun² —	rɯun² —	tɯun² təŋ²	— təŋ²	tɯun² tɔn⁵	tiˑ¹ tɕɛŋ˥	— —
句	speech clsfr	GHI: NECHI:	*ʧ[a]ːk *ɦom	den² —	feːʔ⁷ —	feːk⁷ —	feːʔ⁷ hom¹	feːʔ⁷ hom¹	feːʔ⁷ —	[tɯeŋ⁵] tɔeŋ˥	— hom⊣

JUAN

	gloss	recon 1	recon 2										
聚集	assemble	*tuːnʔ / NECHI:	*tʰuːnʔ / *tɕʰumʔ	tʰuːn³ / ---	tʰuːn³ / ---	tʰuːn³ / tsʰum³	tʰuːn³ / tsʰum³	tʰuːn³ / tsʰum³	tʰuːn³ / tsʰum³	[leŋ⁵lem¹]	--- / ---	--- / ---
圈	animal pen	*suːnɦ	*suːnɦ	tuːn² / ---	tuːn² / fun²	tuːn² / ---	tuːn⁵ / suŋ²	tuːn⁵ / tsʰuŋ²	tuːn⁵ / tsʰun⁵	[lɔːŋ⁵]	--- / ---	--- / ---

JUE

	gloss	recon 1	recon 2										
蕨草	fern	GHI:	*Cifeːnʔ	tɯːn³ / ---	hoːn³ / ---	hjoːn³ / ---	zoːn³ / ---	--- / ɲuaŋ³	hjɔːn³ / ---	---	--- / ---	--- / ---
		GHI:	*kaːnɦ	tuːŋ¹ / ---	kaːn² / ---	kaːn² / ---	kaːn⁵ / kaːŋ²	kaːn⁵ / (kaːŋ⁵)	kaːn⁵ / kuan⁵	[kɯːt⁹]	--- / ---	--- / ---

KAI

	gloss	recon 1	recon 2										
開	open up	*tɯːn / GHI:	*tʰɯːn / *tɕʰwinɦ	tʰɯːn¹ / ---	tsʰiːn² / tʰɛn¹	feɲ² / ---	tʰɯːn¹ / fen²	tʰɯːn¹ / ---	--- / ---	[ʔow¹]	tʰuɨɣn / ---	--- / ---
開荒	open up land	*mɛc	*hmɛc	m[e]t⁷ / ---	pat⁷ / ---	pac⁷ / ---	pat⁸ / pat⁷	--- / pat⁸	--- / pat⁸	pet⁸	--- / ---	--- / ---
開荒	open up land	Qi:	*kut	--- / ---	--- / ---	--- / ---	kut⁷ / ---	kut⁷ / ---	kut⁷ / ---	---	--- / ---	--- / ---
開始	begin	*C-ɲoɲʔ	*C-ɲoɲʔ	ɲoŋ³ / ---	ɲuŋ³ / ---	ɲoŋ³ / noŋ³	non⁶ / ɲɔŋ³	non⁶ / ɲ[o]ŋ³	ɲoŋ³ / ---	---	--- / ---	--- / ---
		*Curɐwʔ	*Curɐwʔ	raw³ / ---	gaw³ / ---	gwow³ / goː³	hoː⁶ / voː³	hoː⁶ / voː³	hɔː⁶ / ---	---	--- / ---	--- / ---

開玩笑	joke	GHl: Run:	*Cuɦəːŋ *C-naːwʔ	(hoːŋ¹) ---	hoːŋ¹ ---	hwoːŋ¹ ŋoːŋ¹	hoːŋ¹ ŋoːŋ¹	voːŋ¹ naːw³	hɔːŋ¹ naːw³	[tsok⁷]		---
			*tʰəːŋʔ	tʰaŋ³ ---	tʰoːŋ³ ---	tʰoːŋ³ tʰoːŋ³	tʰoːŋ³ tʰoːŋ³	tʰɔːŋ³ tʰuaŋ³	tʰɔːŋ³ na:w³	tʰaː¹	vuaŋꜜ	---
	KAN											
砍	chop	GHl: CHl:	*vəːn *kaːyɦ	(voːn¹) van⁴	voːn¹ ---	voːn¹ voːŋ⁴	foːn⁴ voːŋ¹	kaːy⁵ vuaŋ¹	vɔːn¹ kuay⁵	[tʰaːn] ---		---
砍	chop	GHl:	*rəɐwɦ	ɓaw² ---	raw² ---	raw² ---	roː² roː²	loː² roː²	(l[aw⁵) roː²	[tʰaːn] [pʰat⁷]	ɓǎw	---
砍	chop	*C-biːwʔ	*ɓiːwʔ	ɓiːw³ ---	ɓiːw³ ---	ɓiːw³ ɓiw³	ɓiːw³ ɓiw³	ɓiw³ ɓiw³	ɓiːw³ ɓiw³			---
看	look	CHl: Run:	*ljuːyʔ *C-loː	--- ---	--- zuy³	zuːy³ ---	ɬuːy⁶ ---	--- loː¹	--- loː⁴	---	loːꜜ	---
看	look	*C-giw	*kiw	kiw¹ (ʔiw¹)	kiw¹ ---	kiw¹ ---	kiw¹ ---	kiw¹ ---	---	[may¹]	kíw	---
	KANG											
糠	polished rice	*rom		rom¹ ---	(gom¹) ŋ[we]nˀ⁴	gom¹ gom⁴	gom⁴ xom¹	hom⁴ xom¹	gum⁴ [ts]om⁴	kəm¹		---
糠心	rice core	*wa:ʔ	*hwa:ʔ	vaː³ ---	vaː³ ---	hwaː³ ---	vaː⁶ vaː³	vaː⁶ ---	vaː³ ---	[voːp⁹]	xomꜜ	---
扛	carry on shoulder	*C-biːk	*ɓiːk	ɓiːʔ⁷ ---	ɓiːʔ⁷ ɓiʔ⁴	ɓiːk⁷ ɓik⁷	ɓiaʔ⁷ ɓik⁷	ɓiaʔ⁷ ɓit⁸	ɓiak⁷ ɓiʔ⁷	fiː²		---

KAO

烤	roast	CHI:	*ʔi:ŋ	---	---	---	---	ʔiaŋ¹	---	---	
				ʔïenŋ	ʔiŋ¹	ʔiŋ¹	ʔiŋ¹	ʔiŋ¹	ʔiŋ¹	ʔiŋ¹	
烤火	warm by fire		*ʔuumɦ	ʔuum²	ʔuum²	ʔuum²	ʔuum⁵	ʔum⁵	ʔum⁵	ʔum⁵	[tu:⁵]
				ʔom⁵	ʔun²	ʔom²	ʔom²	ʔom²	ʔom⁵	ʔom⁵	
靠	lean on		*[c/ɕ]ɯ:ŋ	tsʰɯ:ŋ¹	tsʰɯ:ŋ¹	tsʰɯ:ŋ¹	tsʰɯ:ŋ¹	tsʰɯaŋ¹	tsʰɯ:ŋ¹	tsʰɯ:ŋ¹	---
				---	---	---	---	tsʰɯŋ¹	tsʰɯŋ¹	tsʰɯŋ¹	
靠	rely on	*mi:ŋɦ	*hmi:ŋɦ	pi:ŋ²	pi:ŋ²	pi:ŋ²	---	---	---	---	[ʔua⁵]
		NECHI:	*ʔɯ:ŋʔ	---	---	---	ʔuŋ³	ʔuŋ³	ʔuŋ³	ʔuŋ³	

KE

顆	tree clsfr			tʰu:n³	kʰɯ:ŋ²	kʰɯ:ŋ²	kʰɯ:ŋ⁵	tʰu:n³	tʰùon	tʰùon	kʰœŋɴ	
				---	tʰun³	---	kʰɯŋ²	kʰɯŋ²	kʰun²			
蝌蚪	tadpole	GHI:	*hnu:	(tow²)	tow²	tow²	tow²	tow²	(tʰo:⁵)	[ʔuəŋ⁵]		
		Run:	*tɕi:w	---	---	---	tsiw¹	tiw¹				
咳嗽	cough	GHI:	*ria	(gia¹)	gia¹	gia¹	gia⁴	hia⁴	hia⁴	(ɣea)	kia¹	
				hia¹	---	gi:⁴	xi:¹	xi:¹	kʰi:¹	xi:↓		
客人	guest	*C-ɓəwʔ	*C-ɓəwʔ	ɓaw³	ɓaw³	ɓow³	fa:[ŋ]⁴	---	fa:n¹	fuen¹	fuen¹	
		CHI:	*C-βa:n	---	---	---	ɣa:n¹	---	---			
		*ʔa:w	*ʔa:w	ʔa:w¹	ʔa:w¹	ʔa:w¹	ʔa:w¹	ʔa:w¹	ʔa:w¹	[low⁵]		
		Run:	*fa:w(ɦ)	---	---	---	fa:w⁴	fa:w⁵	fʰa:w⁵	faw↓		

KEN

Gloss	Proto-a	Proto-b									
嘴 gnaw	*Cuɣɛːt	*Cuɦɛːt	hat^7	ho:t^7	hwo:t^7	go:t^7	hɔ:t^7	hɔ:t^7	huɯɛt^{10}	hét	---
			---	---	ŋo:k^7	ŋo:k^7	ŋoʔ^8	---		---	---

KONG

Gloss	Proto-a	Proto-b									
空 empty	ECHIː	*ru:ʔ	---	---	gaw^3	gaw^6	haw^6	haw^6	---	---	---
	NECHIː	*rəwʔ	---	---	---	xo:^{3}	xo:^{3}	---	---	---	---
空 empty	*Cuɣɛɦ	*Cuɾɛyɦ	ray^2	ray^2	---	---	fay^2	fay^2	---	dǎy	fày
			vay^5	vay^2	gway^2	---	---	fay^2	---	---	---

KOU

Gloss	Proto-a	Proto-b									
口袋 pocket	GHIː	*hnɛyɦ	(tay^2)	tay^2	tsʰom^3	tay^2	tʰay^2	tay^2	[dɔŋ^2]	(tay)	---
	CHIː	*tɕʰəmʔ	tsʰam^3	dɑy^3	---	tsʰam^3	da:y^3	duay^3	---	---	---
	NCHIː	*da:yʔ									
口弦 k.o. bamboo instrument	*Ciːɾɛy	*ɾjɛy	(dʑay^1)	(ray^1)	ray^1	tay^4	tʰay^4	tay^4	tsay^2	---	---
			---	---	---	tay^1	tay^1	---	---	---	---

KU

Gloss	Proto-a	Proto-b									
枯枝 dry branch	*Cuɣinɦ	*Cuɦinɦ	hin^2	hin^2	hwɛŋ^2	gwen^5	(tʰey^4)	hin^5	[kʰowˈkʰaː^1]	---	---
	Run	*ndiː	---	---	---	ŋen^2	tey^1	tey^4	---	---	---
哭 cry	*C-ŋiːʔ	*C-ŋiːʔ	ŋey^3	ŋay^3	ŋay^3	ŋay^3	ŋay^6	ŋay^3	ŋa:y^1	ŋèy	---
			ŋay^3	ŋay^3	ŋay^3	ŋay^3	ŋay^3	ŋay^6	---	ŋa:y]	---
苦 bitter	*C-ɣɛːm	*C-ɦɛːm	ham^1	ho:m^1	ho:m^1	ho:m^1	hɔ:m^1	hɔ:m^1	ziam^4	hám	---
			ham^1	hɔn^1	ho:m^1	huam^1	huam^1	huam^1	---	---	---

KUA

Char	Gloss	Recon	C1	C2	C3	C4	C5	C6	C7	C8	C9
跨	step over	*Cⁱɣaːmɦ	haːm^2 / ɲɯm^5	haːm^2 / njɛn^2	zaːm^5 / ---	hjaːm^2 / ɲɛːm^2	zaːm^5 / ---	zaːm^5 / ---	(zaːm^5) / ---	---	hǎm / ---
跨	step over	*C-ɣaːmɦ	--- / ---	--- / ---	--- / ɲaːm^2	haːm^2 / ---	haːm^5 / ---	--- / ham^5	--- / haːm^2	hɔːm^2	--- / haːmˑ

KUAI

Char	Gloss	Recon	C1	C2	C3	C4	C5	C6	C7	C8	C9
快	fast	*jinʔ / *hjinʔ	zin^3 / (ɲɯm^3)	zin^3 / zen^3	zin^3 / zeŋ^3	z[ɯ]n^3 / zeŋ^3	zin^6 / zen^6	zin^3 / z[ə]ŋ^3	zin^6 / z[ə]ŋ^3	tsʰiaŋ^5	--- / ʒ[œ]ŋ^1
快樂	happy	GHl: *hlin	--- / ---	ɬin^1 / ɬen^1	ɬen^1 / ɬen^1	ɬeŋ^1 / ---	ɬin^1 / ɬen^1	ɬin^1 / ɬen^1	--- / ---	[tsʰeŋ^2]	--- / ---
		CHl: *ɬət / Qi: *tɕuːʔ	--- / ---	tseɯ^1 / ---	fat^7 / ---	tsaw^5 / faɬ^7	tsaw^5 / ---	tsaw^5 / ---	--- / ---	[kʰuay^4]	--- / ---
塊	piece	*tun / *tʰun	tʰun^1 / ---	tʰun^1 / tʰɛn^5	tʰun^1 / ---	tʰun^1 / tʰoŋ^1	tʰun^1 / tʰoŋ^1	tʰun^1 / tʰen^1	tʰun^1 / tʰen^1	[daɬ^7]	tʰǔn / tʰoŋˑ
筷子	chopsticks	*tiːp / *tʰiːp	tʰiːp^7 / ---	tʰiːp^7 / tʰiʔ^4	tʰiːp^7 / tʰip^7	tʰiːp^7 / tʰip^7	tʰiːp^7 / tʰip^7	tʰiːp^7 / tʰip^7	tʰiːp^7 / tʰip^7	tsʰep^7	tɕʰep / tʰiːpˑ

KUANG

Char	Gloss	Recon	C1	C2	C3	C4	C5	C6	C7	C8	C9
寬	wide	*C-ɓaːŋ	ɓeːŋ^1 / ɓeŋ^1	ɓeːŋ^1 / ɓɛŋ^1	ɓeːŋ^1 / ɓeːŋ^1	ɓeːŋ^1 / ɓiaŋ^1	ɓeːŋ^1 / ɓeːŋ^1	ɓeːŋ^1 / ɓiaŋ^1	ɓeːŋ^1 / ɓian^1	[vi:^{4}]	ɓɛ́ŋ / piːaŋˑ

KUN

Char	Gloss	Recon	C1	C2	C3	C4	C5	C6	C7	C8	C9
捆	tie up	GHl: *kʰəːnʔ	(kʰoːn^3) / ---	kʰoːn^3 / ---	kʰoːn^3 / kʰoːŋ^3	kʰoːn^3 / kʰoːŋ^3	kʰoːn^3 / kʰoːŋ^3	kʰɔːn^3 / kʰuaŋ^3	kʰɔːn^3 / kʰuːn^3	kʰuan^1	--- / ---

捆	bundle clsfr	*C-ɓi:k	*ɓi:k	ɓi:ʔ⁷ / —	ɓi:ʔ⁷ / ɓiʔ⁴	ɓi:k⁷ / ɓik⁷	ɓiaʔ⁷ / ɓik⁷	ɓiaʔ⁷ / ɓit⁸	ɓiak⁷ / ɓiʔ⁷	[puək⁹]	— / —	— / —
LA												
拉	pull (things)	*ji:t	*hji:t	zi:t⁷ / —	— / —	— / —	— / —	— / zit⁷	— / zit⁸	[tʰɯy¹]	ziet / ʒi:tɬ	— / —
拉	pull (rope)	*riwɦ	*riwɦ	riw² / —	giw² / —	giw² / giw²	giw² / xiw²	hiw² / xew²	hiw² / —	[tʰɯy¹]	— / —	— / —
辣	spicy	*rit	*rit	rit⁷ / het⁴	git⁷ / [z]eʔ⁵	gec⁷ / git⁷	get⁸ / xet⁷	het⁸ / xet⁸	hit⁸ / kʰet⁷	[kəŋ⁵]	drít / xetɬ	— / —
LAI												
來	come	*mɯ:n Run:	*hmɯ:n	mɯ:n¹ / ɓən⁴	pɯ:n¹ / penʔ⁴	pɯ:n¹ / pɯŋ⁴	pɯ:n⁴ / pɯŋ¹	pʰɯ:n⁴ / pʰ[e:]¹	pɯ:n⁴ / pʰəu[ʔ]⁷	pɯ:n⁴ / mɯŋ	múɤn / púɤn	— / —
癩蛤蟆	toad	CHI:	*Cuɲok	— / ŋ[ua]k⁵	— / —	— / ŋɔk⁷	— / ŋɔk⁸	voʔ⁷ / ŋɔk⁸	hok⁷ / ŋɔk⁸	[kəp⁷]	— / —	— / —
LAN												
藍色	blue	*[k/x]i:w	*kʰi:w	kʰi:w¹ / kʰiw¹	kʰi:w¹ / kʰi:¹	kʰi:w¹ / kʰiw¹	kʰiw¹ / kʰiw¹	kʰiw¹ / kʰiw¹	kʰi:w¹ / kʰiw¹	kʰew¹	xí:w / kʰi:wɬ	— / —
藍靛	indigo	*[c/ɕ]i:ŋ NCHI:	*tɕʰi:ŋ *fɯ:ʔ	tsʰi:ŋ¹ / —	tsʰi:ŋ¹ / —	tsʰi:ŋ¹ / —	(fauʔ³) / feuʔ³	tsʰiaŋ¹ / fauʔ³	tsʰiaŋ¹ / fʰauʔ³	[ta:¹]	ʃieŋ / —	— / —
懶惰	lazy	*C-la:nʔ	*C-la:nʔ	la:n³ / lɔn[⁵]	la:n³ / lan³	la:n³ / la:ŋ³	la:n³ / la:ŋ³	— / —	la:n³ / —	[luam²]	— / —	— / —

字	gloss	Proto A	Proto B									
爛	rotten	*ʔɯːnʔ	*ʔɯːn	ʔɯːn³ / ---	ʔɯːn³ / ---	ʔɯːn³ / ʔuŋ³	ʔɯːn³ / ---	[ŋɯːt⁸]	--- / ---	--- / ---		---
LAO												
撈	drag out	*[k/x]un?	*kʰun?	kʰun³ / ---	kʰun³ / ---	kʰun³ / kʰo[n]³	kʰun³ / kʰun³	[lu³]	kʰun³ / kʰən³	xùn / ---		---
撈	drag out	*Cuɣɛc Run:	*Cuɦɛc / *kʰəwʔ	hat⁷ / ---	hat[8] / ---	hwac⁷ / ---	vat⁸ / vat⁷	va:t⁹	v[ɯ]t⁷ / kʰoː³	--- / ---		---
唠叨	nagging	*C-ŋəm	*C-ŋəm	ŋam¹ / ---	ŋam¹ / ---	ŋam³ / ---	ŋam³ / ŋam³	ŋam⁵tsɔk⁸	ŋam³ / ---	ŋɛm / ---		---
老	old	*ja:	*hja:	za:¹ / zɔ:¹	za:¹ / zaʔ⁴	za:¹ / za:⁴	za:⁴ / za:¹	tsoː¹	za:¹ / za:⁴	zà: / ---		---
老	old	*C-giːnʔ	*kiːnʔ	kiːn³ / ---	kiːn³ / ---	kiːn³ / ---	kiːn³ / kiŋ³	---	kiːn³ / kiŋ³	--- / ---		---
老鼠	mouse	*niw	*hniw	niw¹ / tsɔy⁴	tiw¹ / tiwʔ⁴	tiw¹ / tiw⁴	tʰiw⁴ / tew¹	kew⁴	tiw⁴ / tiːw⁴	níw / tew]	tɕw	---
LE												
勒	strangle	*C-ɹɛc	*ɹɛc	rat⁷ / ---	rat[8] / ---	rac⁷ / ---	--- / [tʃat⁸]	lat¹⁰	lat⁸ / ---	--- / ---		---
LEI												
雷	thunder	*ʔɔm	*ʔom	ʔom¹ / ʔ[e]m¹	ʔom¹ / ---	--- / ---	--- / ---	[huˈvuəy¹]	ʔom¹ / ʔom¹	om / ---		---

雷公	thunder god	GHl:	*C-ɲa:mʔ	ʔom¹ / ---	ɲa:m³ / ---	ɲa:m³ / ɲa:m³	na:m⁶ / ɲa:m³	ɲa:m³ / ɲa:m³	[hu¹vuəy¹] / kʰe:ŋ¹	--- / ɲa:m]	--- / ---
肋骨	ribs	*[k/x]a:ŋʔ	*kʰa:ŋʔ	kʰa:ŋ³ / kʰɛŋ³	kʰe:ŋ³ / kʰɛŋ³	kʰe:ŋ³ / kʰe:ŋ³	kʰe:ŋ³ / kʰiaŋ³	kʰe:ŋ³ / ---	kʰe:ŋ¹	xã́ŋ / ---	---
壘	pile up	*C-ɣa:n / CHl:	*ɦa:n / *pʰəwʔ	ha:n¹ / ---	ha:n¹ / pʰɔ:³	ha:n¹ / pʰo:³	pʰo:³ / pʰo:³	pʰo:³ / ---	[tsʰuəy³]	--- / ---	---
LENG											
冷	cold	*[k/x]a:yɦ	*kʰa:yɦ	kʰa:y² / ---	kʰa:y² / kʰay²	kʰa:y² / kʰa:y²	kʰa:y⁵ / kʰa:y²	kʰa:y⁵ / kʰuay⁵	kʰuay¹	xǎy / kʰa:yv	---
LI											
犁鏡	[k.o. tool]	*C-di:k	*di:k	di:ʔ⁷ / ---	d[ik]⁷ / ---	di:k⁷ / ---	dia?⁷ / dik⁷	dia[ʔ]⁷ / ---	dia[ʔ]⁷	--- / ---	---
								diak⁹			
黎族	Hlai	*ləy	*hley	day¹ / tθay¹	ɬay¹ / lay¹	ɬay¹ / ɬay¹	ɬay¹ / ɬay¹	ɬay¹ / ɬay¹	ɬay⁴	day	hiày
籬笆	fence	GHl:	*e:p	(ko:pʔ) / ---	ko:p⁷ / ---	ko:p⁷ / ko:p⁷	ko:p⁷ / kuap⁸	ko:p⁷ / ---	[luɯy⁴]	--- / ---	---
裡面	inside	GHl:	*pʰəyʔ	--- / ---	pʰ[e]y³ / ---	pʰa[:]y³ / pʰay³	pʰay³ / ---	--- / ---	[tsʰu:¹]	--- / ---	---
		*ʔu:k	*ʔu:k	--- / ---	ʔu:ʔ⁷[8] / ʔuʔ⁴	ʔu:k⁷[8] / ʔuk⁷	ʔu:ʔ⁷ / ʔuk⁷	ʔuaʔ⁷ / ʔuk⁷	ʔu:ʔ⁷ / ʔuʔ⁷	[ke:⁴]	ṳ̌: / ---

漢字	Gloss	Reconstruction(s)	Attested forms
鯉魚	carp	*laː	ɗaː^{1} ; daː^{1} ; ɬaː^{1} / laː^{1} ; ɬaː^{1} ; ɬaː^{1} / ɬaː^{1} ; ɬaː^{1} / ɬaː^{1} ; ɬaː^{1} / ɬaː^{1} ; ---
力氣	strength	GHI: *hpaːt ; NWCHI: *C-min?	tsʰam ; (tsaːt^{7}) men^{3} ; tsaːt^{7} men^{3} ; tsaːt^{7} ; tsaːt^{8} tsaːt^{7} ; tsaːt^{8} ; tsaːt^{8} tsuat^{8} ; xʌ̌w
荔枝	lychee	*[k/x]uːɦ ; *tɕʰəːm ; *tɕʰəːyʔ	kʰow^{2} kʰaː^{5} ; kʰo^{5} kʰaw^{2} ; kʰaw^{5} kʰaw^{5} ; kʰaw^{2} kʰaw^{2} ; kʰo^{5} kʰaw^{2} ; kʰɔː^{5} kʰaw^{2} ; [kʰaːw^{1}] ; tsʰam ; tsʰoːm^{1} ; tsʰoːm^{1} ; tsʰoːm^{1} ; tsʰoːm^{1} / tsʰuam^{1} ; tsʰɔːm^{1} / tsʰuam^{1} ; [muat^{7}] ; tsʰaːy^{3} ; tsʰoːy^{3} ; tsʰoːy^{3} ; tsʰaːy^{3} ; tsʰaːy^{3} / tsʰuay^{3} ; tsʰaːy^{3} / tsʰuːy^{3} ; [tuan^{1}] ; tʃʰuay]

LIAN

漢字	Gloss	Reconstruction(s)	Attested forms
連接	connect	*[c/ɕ]uːnʔ ; NECHI: *ɓaː	tsʰuːn^{3} tsʰuɛn^{3} ; tsʰuːn^{3} sun^{3} ; tsʰuːn^{3} ɓaː^{1} ; tsʰuːn^{3} ɓaː^{1} ; tsʰuːn^{3} (tsʰun^{3}) ; tsʰuːn^{3} ɓaː^{1} ; [tsiap^{7}]
臉	face	*C-dəŋ	ɗoŋ^{1} tseŋ^{1} ; ɗaŋ^{1} ɗaŋ^{1} ; ɗaŋ^{1} ɗaŋ^{1} ; ɗaŋ^{1} ɗaŋ^{1} ; ɗaŋ^{1} ɗaŋ^{1} ; [pʰan^{1}] ; dóŋ taŋ˩
戀愛	fall in love	*Cɯɰːk	zṳːʔ^{7} ; zṳːʔ^{7} ; rɯɰːk^{7} tɯɰk^{7} ; tɯɰːʔ^{8} tɯɰk^{7} ; tɯɰːʔ^{8} tɯɰk^{7} ; tɯɰːʔ^{8} ; [ləː^{4}] ; zṳː

LIANG

漢字	Gloss	Reconstruction(s)	Attested forms
凉	cool (water)	GHI: *ren	(gan^{1}) han^{4} ; gan^{1} ; gan^{1} gan^{4} ; gan^{4} xaŋ^{1} ; han^{4} tsan^{4} ; [ɓeːk^{7}] ; (ɣɐn) ; ān
量	measure (fabric)	GHI: *pʰəŋ	tsʰeːʔ^{7} ; pʰaŋ^{1} ; pʰaŋ^{1} pʰaŋ^{1} ; pʰaŋ^{1} pʰaŋ^{1} ; pʰaŋ^{1} ; pʰaŋ^{1} ; [ɬɔːŋ^{4}] ; ʃɛː

字	Gloss	Recon 1	Recon 2								
量	measure (rice)	*C-lɯːŋʔ	*C-lɯːŋʔ	lɯːŋ^3	lɯːŋ^3	lɯːŋ^3 l[o]ŋ^3	lɯːŋ[6] luŋ^3	--- luŋ^3	lɯːŋ^3 luŋ^6	ɬɔːŋ^4	luỳŋ ---
兩	two	*C-lɯːŋɦ	*C-lɯːŋɦ	lɯːŋ^2 luəŋ^4	lɯːŋ^2 leŋ^2	lɯːŋ^2 ---	luŋ^2 ---	--- luŋ[11]	--- luŋ[6]	luaŋ^5	--- ---
亮	bright	*C-dinʔ	*dinʔ	dín^3 ---	dín^3 lin^1	deŋ^3 lin^1	den^3 lin^1	den^3 lin^1	dín^3 lin^4	dín^1	din liːŋ˥
晾	dry in sun	GHI: *kə:y Run: *ha:ɦ		(ko:y^1) ---	ko:y^1 ---	ko:y^1 ---	--- ko:y^1	--- ha:^{2}	--- ha:^{5}	---	--- ---
LIAO											
寮房	child's house	*C-guyʔ NECHI: Run:	*kuyʔ *ploŋʔ *ɬɯːk *ʔuːŋ	kuy^3 ---	kuy^3 ---	kuy^3 ---	kuy^3 ploŋ^3	kuy^3 ploŋ^3 ɬɯk^8 ʔuŋ^1	kuy^3 ploŋ^3 ɬɯʔ^7 ʔuŋ^1	[dɔ:^{1}]	---
LIE											
獵狗	hunting dog	*hma:	*hma:	ma^1 ---	pa:^{1} paʔ^4	pa:^{1} pa:^{1}	pa:^{4} pa:^{1}	pʰa:^{4} ---	pa:^{4} pa:^{1}	---	---
		*ɲaːwʔ	*hɲaːwʔ	ɲa:w^3 ---	tsa:w^3 ---	tsa:w^3 ---	tsa:w^6 tsa:w^3	tsʰa:w^6 tsa:w^3	tsa:w^6 ---	---	---
裂開	crack	*tiːŋʔ	*tʰiːŋʔ	tʰi:ŋ^3 tsʰɤɲ^3	tʰi:ŋ^3 tʰiŋ^3	tʰi:ŋ^3 tʰiŋ^3	tʰiaŋ^3 tʰiŋ^3	tʰiaŋ^3 tʰiŋ^3	tʰiaŋ^3 tʰiŋ^3	[ket^7]	tʰʲeŋ ---

LIN

Character	Gloss	Recon 1	Recon 2							
鱗	fish scale	*C-lɤːp	*C-lɤːp	lap^7	loːp^7	loːp^7	loːp^8	loːp^7	[liːt^9]	lap
				lap^2	lɔʔ^4	loːp^7	luap^8	luap^8		luapꜜ
吝嗇	stingy	*[k/x]iːt	*kʰiːt	kʰiːt^7	kʰiːt^7	kʰiːt^7	kʰiːt^7	kʰiːt^7	kʰiːt^9	xiet
				---	---	khik^7	---	kʰiːt^7		kʰiːt

LING

Character	Gloss	Recon 1	Recon 2							
靈魂	spirit	*Cuɣɯː	*Cuɬɯː	heɯ^1	heɯ^1	heɯ^1	heɯ^1	hɯeɯ^1	ha·^{4}	héɯ
				---	---	heɯɣ	heʋ	heʋ	hefɯ	---

LIU

Character	Gloss	Recon 1	Recon 2							
流	flow	*C-maːw	*C-maːw	maːw^1	maːw^1	maːw^1	maːw^1	maːw^4	[lɔːt^8]	máːw
				maːw^1	maw^1	maːw^1	maːw^1	maːw^4		---
留	stay	*jew / Qiː	*hjew / *tʃ(rʰ)əːnɦ	zaw^1	zaw^1	tsʰo:n^5	tsʰɔːn^5	tsʰɔːn^5	tɯɯan^1	záw
				(ɲow^1)	(ɲawʕ^4)	zaw^4	(zaw^4)	zaw^4	zaw^4	---
瘤	tumor	GHl:	*fəːn	nok^7	fo:n^1	fo:n^1	fo:n^1	fɔːn^1	[tʰup^7]	---
				---	---	f[o]n^1	fuaɲ^1	fuaɲ^1	fuaɲ^1	---
六	six	*nom	*hnom	nom^1	tom^1	tom^1	tom^4	tum^4	nɘm^4	nóm
				tsem^4	tonʕ^4	tom^4	tom^1	^{t}tom^4	tom^4	tomꜜ

LONG

Character	Gloss	Recon 1	Recon 2							
龍	dragon	ɬeu	*hneu	ʃou	taŋ^1	taŋ^1	thaŋ^4	taŋ^4	ɭɯːeɪ	---
				---	taŋʕ^4	taŋ^4	taŋ^1	tɕɪ^4		---

Chinese	Gloss	Recon A	Recon B										Note
龍眼	longyan	*tɕʰəːm	*ʈəːm	tsʰam¹	—	tsʰoːm¹ / tsʰoːm¹	tsʰɔːm¹	tsʰoːm¹ / tsʰoːm¹	— / tsʰuam¹	[muuat⁷]	—	l[ɣ]y	¦
聾	deaf	*C-ɓənʔ	*C-ɓənʔ	ɓen³	ɓan³	ɓan³ / ɓaɲ³	ɓan³	ɓan³ / ɓaɲ³	ɓan³ / ɓan³	pien¹			¦
		*ləːk	*hləːk	ɗak⁷ / tθɔk⁵	ɬoːʔ⁷	ɬoːkⁱ⁷ / ɬoːk⁷	ɬoːʔ⁷	ɬoːʔ⁷ / ɬoːk⁷	ɬoːʔ⁷ / ɬoʔ⁸	ɬaːˀtaŋ⁵		dɛ̆k / ɬuːʔH	¦
LOU													
漏 (雨)	leak	*Ciɣap	*Ciɣap	hop⁷	hap⁷	hjop⁷ / hjop⁷	zop⁷ / ɲap⁷	zap⁷ / ɲap⁸	hjap⁷ / ɲap⁷	hoːp⁹		hóp	¦
漏 (水)	leak	*C-rəɲ	*rəɲ	ran¹	ran¹	raɲ¹ / lan⁴	— / ran	— / ran¹	lan⁴ / —	—			¦
LU													
蘆葦	k.o. reed	GHI:	*faːw	(faːw¹)	faːw¹	faːw¹	faːw¹ / faːw¹	faːw¹	—	[muuay¹ tsʰaːŋ¹]			¦
路	road	*C-guːn	*kuːn	kuːn¹	kuːn¹ / kuɲ¹	kuːn¹ / kuɲ¹	kuːn¹ / kuɲ¹	kuːn¹ / kuɲ¹	kuːn¹ / kun¹	[tin¹]		kúon	¦
鹿	deer	GHI:	*rəːyʔ	(roːy³)	roːy³ / lcyʔ⁴	roːy³ / loːy³	r[o]ːyⁱ⁶ / roːy³	r[o]ːy⁶ / ruːy³	l[c]ːyⁱ⁶ / ru:y⁶	[haw⁴]		(dðy) ɬuay¹	¦
露水	dew	*C-nəmʔ	*C-nəmʔ	nom³	nam³ / nan³	nom³ / nam³	nam³ / nam³	nam³ / nam⁶	nam³ / nam⁶	naːm¹			¦
		*ləːŋʔ / CHI:	*hləːŋʔ / *ŋaːwʔ	daŋ³	ɬoːŋ³ / lɔn³	ɬoːŋ³ / lɔn³	ɬoːŋ³ / ɬoːŋ³	kʰaːw⁶ / kaːw³	kaːw³ / kaːw³	kɔːw⁴ / kaːw⁴			¦

Category	漢	Gloss	Proto (a)	Proto (b)								
LUAN												
	亂	messy (yarn)	*[k/x]u:t	*kʰu:t	kʰu:t⁷	kʰu:t⁷	kʰu:t⁷	kʰu:t⁷	kʰu:t⁷	kʰu:t⁷	---	⫶
					---	---	---	kʰuk⁷	kʰuk⁸	kʰut⁷	kʰut⁷	⫶
LUN												
	輪換	take turns	GHI:	*tɕʰen	(tsʰan¹)	tsʰan¹	tsʰan¹	tsʰan¹	---	tsʰan¹	tsʰan¹	⫶
					tsʰa[ŋ]³	san¹	---	tsʰaŋ¹	tsʰaŋ¹	tsʰan¹	---	⫶
LUO												
	蘿蔔	radish	CHI:	*C-ma:k	---	---	me:k⁷	me:ʔ⁷	---	---	mek˥	⫶
					---	---	---	muɯ:²	meʔ⁸	---	---	⫶
	钄	gong	*C-lo:ʔ	*C-lo:ʔ	lo:³	lo:³	lo:³	---	lo:⁶	lo:³	lo:ŋ¹	⫶
					lo:¹	---	---	lo:³	lo:³	lo:⁶	---	⫶
	籮筐	k.o. vine basket	*C-gu:ŋʔ NWCHI: Run:	*ku:ŋʔ *ɓoŋ *C-la:ʔ	ku:ŋ³	ku:ŋ³	ku:ŋ³	kuaŋ³	kuaŋ³	ku:ŋ³	kuaŋ¹	⫶
					ɓoŋ¹	ɓoŋ¹	---	kuŋ³	la:³	la:⁶	---	⫶
	螺螄	mollusk	*[c/ɕ]i:	*tɕʰi:	tsʰey¹	tsʰey¹	tsʰey¹	tsʰey¹	tsʰey¹	tsʰey¹	tsʰay¹tow⁴	⫶
					---	---	---	tsʰey¹	tsʰey¹	tsʰey¹	tʃʰɛy˥	⫶
	落	fall	*tɔk	*tʰok	tʰok⁷	tʰuk⁷	tʰok⁷	tʰoʔ⁷	tʰo²⁷	tʰok⁷	dɔ:k⁹	⫶
					tʰɔk²	tʰaʔ⁴	tʰɔk⁷	tʰɔk⁷	tʰɔk⁸	tʰɔk⁷	tʰɔk	⫶
MA												
	麻	hemp	*mi:n	*hmi:n	mi:n¹	pi:n¹	pi:n¹	pi:n⁴	pʰi:n⁴	pi:n⁴	mian¹	⫶
					---	---	---	piŋ¹	piŋ¹	piŋ¹	---	⫶

汉字	gloss												
麻木	hemp tree	*nənɦ	*hnənɦ	nen^2 / —	tan^2 / —	tan^2 / —	tan^4 tan^2	--- / tan^2	tan^4 / ---	tan^4 / ---	---	---	---
麻雀	sparrow	*pac	*pʰəc	pʰat^7 / —	pʰat^7 / —	pʰac^7 / pʰat^7	pʰat^7 / pʰat^7	pʰat^7 / pʰat^8	pʰaːt^7 / pʰaːt^7	ɓat^7	pʰat꜔	---
麻繩	hemp rope	*C-daːy	*daːy	daːy^1 / —	— / dɓy^1	— / —	daːy^1 / —	daːy^1 / duay^1	daːy^1 / (laːm^2)	[laːm^3]	---	---
馬	horse	*ŋaːʔ	*hɲaːʔ	ŋaː^3 / kɔ^4	kaː^3 / kaː^3	kaː^3 / kaː^3	kaː^6 / kaː^3	kʰaː^6 / kaː^3	kaː^6 / kaː^6	[peː^5]	ŋàː / kaː˥	káː
螞蟥	water leech	*Cʲliŋ	*ljiŋ	ziŋ^1 / (liŋ^4)	ziŋ^1 / zeŋʔ^4	ziŋ^1 / —	ɬiŋ^4 / zen^1	ɬiŋ^4 / zen^1	ɬiŋ^4 / tsen^4	tsiːŋ^4	---	---
螞蟻	ant	*muc	*hmuc	mut^7 / ɓet^4	put^7 / puɛʔ^4	puc^7 / pət^7	put^8 / pot^7	pʰut^8 / pot^8	put^8 / pet^8	puɜt^8	pot꜔	---
罵	scold	*C-laːk, Qiː	*C-laːk, *ʔənɦ	laːʔ$^{[9]}$ / —	laːʔ^7 / —	— / —	ʔan^5 / laːk^7	ʔan^5 / laːʔ^8	ʔan^5 / ---	[kəy^5]	laːʔ˧	---
MAI													
埋	cover up	*C-gɔm	*kom	kom^1 / kom^2	kom^1 / —	kom^1 / kom^1	kom^1 / kom^1	--- / kom^1	kum$^{[5]}$ / kom^1	---	---	---
埋葬	bury	*lɔmɦ	*hlomɦ	dom^2 / tθaːm^5	ɬɔm^2 / lon^2	ɬom^2 / ɬom^2	plom^5 / ɬom^2	pom^5 / kom^1	plum^5 / kom^1	ɬum^4	dòm / kom꜔	---
買	buy	*tɕəc	*tʃʰəc	tsʰat^7 / hiat^2	tsʰat^7 / ---	tsʰac^7 / tsʰiet^7	tsʰat^7 / tsʰat^7	tsʰat^7 / tsʰat^8	tsʰat^7 / tsʰat^7	taːt^9	ʃàt / tʃʰaːt	---

Gloss												
賣 sell	*ri:w?	*ri:w?	ri:w^3 / hiw^4	gi:w^3 / zi:^{3}	--- / giw^4	gi:w^6 / xiw^3	hiw^6 / xiw^3	gi:w^6 / kʰiw^3	ki:w^1	d[ï]w / hi:w]	---
MAN												
瞞 deceive	*Cirɔm	*rjom	zom^1 / ---	zom^1 / l[u]nɤ^4	rom^1 / tom^4	tom^4 / tom^1	tʰom^4 / tom^1	tum^4 / tom^4	[mua^2]	--- / ---	---
滿 full	*ti:k	*tʰi:k	tʰi:ʔ / tʰlɤk^2	tʰi:ʔ^7 / tʰiʔ^4	tʰi:k^7 / tʰik^7	tʰiaʔ^7 / tʰik^7	tʰiaʔ^7 / tʰiʔ^8	tʰiak^7 / tʰiʔ^7	ts'ʰia^5	tʰi:	tʰɤək
滿意 satisfied	*C-lɤ:m	*C-lɤ:m	lam^1 / ---	lo:m^1 / ---	lo:m^1 / ---	lo:m^1 / lo:m^1	lɔ:m^4 / luam^1	lo:m^4 / luam^4	---	--- / ---	---
	GHI:	GHI:	(ho:ʔ^7) / ---	ho:ʔ^7 / ---	hwo:k^7 / ---	go:ʔ^7 / ŋo:k^7	vɔ:ʔ^7 / ŋoʔ^8	vɔ:ʔ^7 / ---	---	--- / ---	---
慢 slow	GHI: / CHI:	*sɤyʔ / *fa:y	--- / ---	tay^3 / ---	tay^3 / ---	fa:y^3 / ---	fa:y^1 / ---	fa:y^1 / fay^1	[tseŋ^2]	--- / ---	---
慢騰騰 slow moving	*C-ŋa[:]y	*C-ŋa[:]y	ŋay^1 / ---	ŋa:y^1 / ---	ŋa:y^1 / ---	--- / ŋay^1	--- / ---	ŋa:y^1 / ---	[ŋɔ:w^2]	--- / ---	---
蔓 k.o. vine	ECHI:	*Cihɤw	--- / ---	--- / ---	hjaw^1 / ---	hjaw^1 / ---	--- / ---	hjaw^1 / ---	---	--- / ---	---
MANG												
芒草 sp of lg reed	*C-gɤw	*kɤw	kaw^1 / kaw^1	kaw^1 / kaw^1	kaw^1 / kaw^1	kaw^1 / kaw^1	kaw^1 / (kaw^4)	kaw^1 / kaw^1	nɔ:w^5 ku:.^{1}	káw	---
蟒蛇 python	*C-na:ɲʔ	*C-na:ɲʔ	--- / nɔn^3	--- / nɔn^3	na:ɲ^3 / ---	na:ɲ^3 / ---	na:n^3 / ---	na:n^3 / ---	---	--- / ---	---

MAO

貓	cat	*C-mi:wɦ	*C-mi:wɦ	mi:w² / miw⁵	mi:w² / mi:²	mi:w² / miw²	mi:w⁵ / miw²	miw² / miw[11]	mi:w⁵ / miw²	ɲa:w⁵	m̌iw / miw]	---
毛	fur, hair	*Cuɣun	*Cuɦun	hun¹ / ŋen¹	hun¹ / ŋɛn¹	hun¹ / ɲoŋ¹	hun¹ / ŋoŋ¹	hun¹ / ŋoŋ¹	hun¹ / ŋen⁴	hɔ:ŋ⁴	hún / ŋoŋ˦	---
毛蟲	caterpillar	GHl:	*Ciɦənɦ	za:w¹ / ɲan⁵	han² / ɲjɛn¹	hjan²	zan⁵	hjan⁵ / ɲan²	zɔ:t⁸	---	---	---
		GHl:	*tʰoŋʔ	hun¹ / tʰɔŋ⁵	tʰuŋ³ / tʰaŋ¹	tʰoŋ³	tʰoŋ³	---	tʰuŋ³ / tʰoŋ³	[ni:⁴]	---	---
茅草	thatch grass	*Ciɣa:	*Ciɦa:	ha:¹ / ɲɔ:¹	ha:¹ / ɲja:¹	hja:¹ / ɲɛ:	za:¹ / ɲa:¹	za:¹ / ɲa:¹	hja:¹ / ɲa:⁴	zow⁴	ha: / ɲa:˦	---
冒	to brave water	*C-ɟeŋ	*tɕeŋ	tsaŋ¹	tsaŋ¹	tsaŋ¹	tsaŋ¹ / tsaŋ¹	tsaŋ¹	tsaŋ¹	[pu:ʔ]	---	---
冒	to brave water	CHl:	*rjuɲʔ	---	---	---	---	tʰun⁶ / ton³	tʰun⁶ / ten³	---	---	---

MEI

沒有	not have	*ʔɛ:mɦ	*ʔe:mɦ	ʔe:m² / v[ɛ]n³	ʔe:m² / ʔwan³	ʔweɲ³	vey⁴ / yan³	van³ / van³	vey[4] / van³	[ŋɔ:¹]	ɛm / ---	---
		CHl:	*ʔweɲ									
		Qi:	*wi:									
		*C-du:k	*du:k	du:ʔ⁷ / dok²	--- / dɔʔ⁴	---	---	dua ʔ⁷	du:ʔ⁷ / dɔʔ[8]	tɔk⁹	dʉ: / ---	---
		NCHl:	*duk				---	---				

枚	needle clsfr	*[c/ɕ]uːŋ	tsʰuːŋ¹	tsʰ[ɯ]ːŋ¹ tsʰuːŋ¹	tsʰuːŋ¹ tsʰ[o]ŋ¹	tsʰuan¹ tsʰuŋ¹	tsʰuːŋ¹ tsʰuŋ¹	tsʰin⁵	ʃúoŋ	--¦--
每	every	GHl: *rənɦ	---	ran²	ran² raŋ²	lan² raŋ²	lan² ran²	---		--¦-- / --¦--
美麗	beauty	*lin	dín¹ tθen¹	ɬin¹ len¹	ɬeŋ¹ ɬen¹	ɬen¹ ɬen¹	ɬen¹ ɬen¹	dín	dín	--¦-- / --¦--
		*C-mɯːn	mɯːn¹ laː(y)³	mɯːn¹ ---	mɯːn¹ laːy³	mɯːn⁴ mɯɲ¹	mɯːn¹ men¹	[nɔk⁷]	mɯʕn	--¦--
		NCHl: *C-laːyʔ								
MEN										
門	door	CHl: *mbomʔ	tsʰom¹	---	pom³	--- pom³	--- pom⁶	[min⁴]	ʃóm	--¦--
		GHl: *C-mɯːn	---	mɯːn¹	kʰuːn¹	muːn⁴ kʰuŋ¹	muːn¹ mun¹[⁵]	muan¹	kʰuːʕ	--¦--
		CHl: *kʰuːn	---	---	---	kʰuːn¹ ---				
門閂	deadbolt	GHl: *kʰəŋ	---	kʰaŋ¹	kʰaŋ¹	kʰaŋ¹	kʰaŋ¹ tsʰuŋ³	tsʰua³		--¦-- / --¦--
		Run: *tʃʰuːŋʔ	---	---	---	kʰaŋ¹ tsʰuŋ³				
門牙	incisors	*Cɯən	pʰen¹ sen¹	fan¹	fan¹ sen¹	fan¹ faŋ¹	fan¹ fʰan¹	tsʰaŋ¹		--¦-- / --¦--
		*Cɯaːw	zaːw¹	raːw¹	taːw⁴ taːw¹	tʰaːw⁴ tsaːw⁴	taːw⁴ tsaːw⁴	tsuː⁴		--¦-- / --¦--
MENG										
蒙	cheat	*pəːŋ	pʰaŋ¹	pʰoːŋ¹	pʰoːŋ¹ pʰoːŋ¹	tʰaːw⁴ fʰan¹	pʰoːŋ¹ ---	---		--¦-- / --¦--

漢字	gloss	(recon 1)	(recon 2)	1	2	3	4	5	6	7	8	9
蒙	cheat	CHI:	*pʰɯːm	—	—	—	pʰɯ:m¹	pʰɯːm¹ / pʰum¹	pʰɯːm¹ / pʰum¹	pʰɔ:m¹	—	—
矇矓	dim	*mɯːŋʔ	*mɯːŋʔ	mɯ:ŋ³	pɯ:ŋ³	pɯ:ŋ³	pɯ:ŋ⁶	—	—	—	—	—
		*hmɯːŋʔ NECHI:	*hmɯːŋʔ / *pluŋɲ	mɯ:ŋ³ / ɓueŋ⁵	pɯ:ŋ³	pɯ:ŋ³	pɯ:ŋ⁶ / pluŋ²	— / pluŋ²	—	—	—	—
蠓	midge	GHI:	*C-mæt	(mat⁷) / mat²	mat⁷	mat⁷	mat⁷ / mak⁷	mat⁸	mat⁷	mɔ:t⁹	—	—
夢	dream	*fən	*fən	pʰen¹ / fon¹	fan¹ / fan¹	fan¹	fan¹ / faŋ¹	fan¹ / faŋ¹	fan¹ / fʰan¹	pɔ:n¹	— / faŋ┤	—
夢囈	sleeptalk	*fiŋʔ	*fiŋʔ	fiŋ³	fiŋ³	—	fiŋ³ / fen³	fiŋ³ / fen³	fiŋ¹ / fen³	[lɔ:w² mɔ:ŋ⁴]	—	—
MI												
迷路	get lost	*C-ŋɯ: / Run:	*C-ŋɯ: / *tʃʰunɦ	heɬ¹	heɬ¹	heɬ¹	heɬ¹ / heɬ¹	— / tsʰoŋ²	(pɯːŋ³) / tsʰən⁵	[pɯːŋ⁴]	—	—
米	rice	*Curæp	*Curæp	rop⁷	rap⁷	—	fop⁸	fap⁸	fap⁸ / fap⁸	ləp⁸	dóp	fap
米酒	rice wine	*C-ɓiːŋɦ NCHI:	*ɓiːŋɦ / *pʰuː	ɓiːŋ² / (pʰew¹)	ɓiːŋ² / pʰɛw¹	ɓiːŋ² / pʰow¹	ɓiaŋ⁵ / ɓiŋ²	ɓiaŋ⁵ / ɓiŋ²	ɓiaŋ⁵ / ɓiŋ⁵	ɓiːŋ⁵	—	—
密	dense	*ʔeːt	*ʔeːt	ʔat⁷	ʔo:t⁷	ʔo:t⁷	ʔo:t⁷ / ʔo:k⁷	ʔo:t⁷ / ʔoʔ⁸	ʔɔ:t⁷ / ʔuːt⁷	ʔɯət⁷	át	—

汉字	gloss		Proto A	Proto B	L8	L7	L6	L5	L4	L3	L2	L1
蜜蜂	bee		GHl: *kə:y	*kə:y	(ko:y^1)/ko:$^{.1}$	ko:y^1/koy^1	ko:y^1/ko:y^1	ka:y^1/ko:y^1	ka:y^1/kuay^1	ka:y^1/ku:y^1	[tey^1]	(kɔy)/kuay˧ ¦¦
		MIAN										
棉花	cotton		*C-bu:y?	*ɓu:y?	ɓu:y^3/ɓu:(y)^3	ɓu:y^3/ɓuy^3	ɓu:y^3/ɓuy^3	ɓu:y^3/ɓuy^3	ɓu:y^3/ɓuy^3	ɓu:y^3/ɓuy^3	[ɓɔk^7]	bùoy/puy˥ ¦¦
		MIAO										
苗准	aim at		GHl: *rəɲ	*rəɲ	---/---	gan^1/---	gaŋ^1/---	gan^4/xan^1	---/xan^1	gan^4/kʰan^1	[duy^4]	---/--- ¦
		MING										
明年	next year		*rmu:ɦ	*hmu:ɦ	mow^2/ɓa:$^{.5}$	paw^2/paw^2	pow^2/paw$^{2[4]}$	---/paw^2	pʰo:^{2}/paw^2	paw^2/paw^2	ma:$^{.1}$	mʌ̌w/pəwˋ ¦¦
			*C-dəŋ CHl:	*dəŋ / *ɦəwɦ	dóŋ^1/haw^5	daŋ^1/ho:^{2}	daŋ^1/ho:^{2}	---/ho:^{2}	ho:^{5}/ho:^{2}	daŋ^1/ho:^{5}	tʰiəŋ^4	dóɲ/ho:ˋ ¦¦
明年	next year		Qi: *ŋgom	*ŋgom	---/---	---/---	kom^4/---	---/---	kum^4/---	kum^4/---	---	---/--- ¦
			*C-ni:ɦ	*C-ni:ɦ	---/---	---/---	n[i:]^5/---	---/---	ney^5/---	ney^5/---	---	---/--- ¦
明天	tomorrow		*mi:? NECHl:	*hmi:?	mey^3/ɓay^4	p[e]y^3/---	---/ho:^{2}	---/ho:^{2}	pʰay^6/ho:^{5}	pay^6/---	[kɯ^2]	mèy/pa:y˥ ¦¦
			*C-ɣəwɦ	*ɦəwɦ	haw^2/h[i]aw^5	haw^2/---	haw^2/---	ho:^{5}/---	ho:^{5}/ho:^{2}	ho:^{5}/ho:^{5}	ziaw^4	hǎw/ho:ˋ ¦¦

名字											fáŋ / pʰiːaŋ˧	pʰèŋ
name	*pa:ŋ	*pʰa:ŋ	pʰa:ŋ1 / pʰɛŋ1	pʰe:ŋ1 / pʰɛŋ1	pʰe:ŋ1 / pʰe:ŋ1	pʰe:ŋ1 / pʰe:ŋ1	pʰe:ŋ1 / pʰiaŋ1	pʰe:ŋ1 / pʰiaŋ1	pʰu:1	fáŋ / pʰiːaŋ˧	pʰèŋ
命中 **hit target**	*C-lə:m	*C-lə:m	lam1 / lam1	lo:m1 / ---	lo:m1 / lo:m1	lo:m1 / lo:m1	lo:m1 / luam1	lo:m1 / luam4	[nuɯən4]	lém / ---	---
MO											
摸 **feel**	*C-ʋuɯ:m	*ʋuɯ:m	--- / ---	vuu:m1 / ---	vuu:m1 / ---	fuɯ:m4 / vuum1	fuɯ:m4 / vuum[2]	fuɯ:m4 / ---	---	--- / ---	---
摸仿 **imitate**	*[c/ɕ]ə:ŋ	*tɕʰə:ŋ	tsʰaŋ1 / ---	tsʰo:ŋ1 / soŋ1	tsʰo:ŋ1 / ---	tsʰo:ŋ1 / tsʰo:ŋ1	tsʰɔ:ŋ1 / tsʰuaŋ1	tsʰɔ:ŋ1 / tsʰuaŋ1	tsʰɔŋ5	--- / ---	---
磨刀 **sharpen**	*C-ra: / NWCHl:	*ra: / *ra:t	ra:1 / lɔt4	ra:1 / la?1	ra:1 / la:4	ra:4 / ra:1	la:4 / ra:4	la:4 / ra:4	lɔ:4	drá: / ---	---
磨菇 **mushroom**	*C-dit / Meifu:	*dit / *tʃʰin?	dìt7 / ---	dìt7 / ---	dec7 / tsʰen3	det7 / tsʰen3	det7 / ---	(det7) / det7	[tsʰaŋ1]	dìt / ---	---
磨米 **grind (rice)**	CHl:	*ka:nɦ	--- / ---	--- / ---	ka:n2 / ---	ka:n5 / ---	ka:n5 / ---	ka:n5 / ka:ŋ2	ka:n5	--- / ---	---
MU											
母雞 **hen**	GHl:	*rə:y	(ga:y1) / ho:(y)5	go:y1 / ŋɔyʔ4	go:y4 / go:y4	ga:y4 / xo:y1	ha:y4 / xuay1	ha:y4 / kʰu:y1	ka:y5	--- / ---	---
	*[k/kʰ/x]əy	*ɣeʰk	kʰay1 / kʰay1	kʰay1 / kʰay1	kʰay1 / kʰay1	kʰay1 / kʰay1	kʰay1 / kʰay1	kʰay1 / kʰay1	kʰay1	--- / ---	---

中文	English	Proto A	Proto B	1	2	3	4	5	6	7	8	9
母雞	hen	*mi:ʔ	*hmi:ʔ	mey^3 / ɓay^4	(mey^3) / pay^3	pay^3 / pay^4	p[i:]^6 / pay^3	pʰ[i:]^6 / [me:˩]	p[i:]^6 / [me]y^6	ma:y^5	mèy	---
		*[k/x]əɣ	*ɣəɣ[k/x]	kʰay^1 / kʰay^1	kʰay^1 / kʰay^1	kʰay^1 / kʰay^1	kʰay^1 / kʰay^1	kʰay^1 / kʰay^1	kʰay^1	kʰay^1	xáy	---
母親	mother	*mi:ʔ	*hmi:ʔ	mey^3 / ɓay^4	(mey^3) / pay^3	pay^3 / pay^4	p[i:]^6 / pay^3	pʰ[i:]^6 / [me:˩]	p[i:]^6 / [me]y^6	ma:y^5	mèy / me:˩	pí:
母指	thumb	*mi:ʔ	*hmi:ʔ	mey^3 / ɓay^4	(mey^3) / pay^3	pay^3 / ---	p[i:]^6 / pay^3	pʰ[i:]^6 / ---	p[i:]^6 / [me:^{5}]	ma:y^5	---	---
		*Cli:ŋɦ	*ɟi:ŋˀ	zi:ŋ^2 / ---	zi:ŋ^2 / zin^2	zi:ŋ^2 / ---	ɬiaŋ^2 / zin^2	ɬiaŋ^2 / (ziŋ^5)	ɬiaŋ^2 / tsiŋ^2	tsap^{9}tsia^4	--- / ʒi:ŋˀ	---
木板	board	*C-ɓɛ:nɦ	*ɓɛ:nɦ	ɓe:n^2 / ---	ɓe:n^2 / ɓen^2	ɓe:n^2 / ɓe:n^2	ɓe:n^5 / ɓe:n^2	ɓe:n^5 / ---	ɓe:n^5	ɓe:n^5	ɓěn	---
木杵	pestle	*[c/ɕ]a:k	*tɕʰa:k	tsʰa:ʔ^7 / tsʰɛk^2	tsʰe:ʔ^7 / tsʰɛʔ^4	tsʰe:k^7 / tsʰe:ʔ^7	tsʰe:k^7 / tsʰɯ:^{2}	tsʰe:ʔ^7 / tsʰe^8	tsʰe:ʔ^7 / tsʰia^7	tsʰɯ:^{5}	sa̰:	---
木耳	Auricularia auricula	*C-dit	*dit	dít^7[9] / ---	dit^7 / ---	dec^7 / ---	det^7 / det^7	det^7 / ---	--- / det^7	[kɔ:^{1}]	dít	---
		*Cljey	*Cləɣ	ɬay^4 / [n]ay?^{4}	zay^1 / ---	zay^1 / ---	ɬay^4 / ---	ɬay^4 / ---	ɬay^4 / ---	[tsə:^{2}]	---	---
木瓜	papaya	*Ciʔunɦ	*ʔjunɦ	ʔun^2 / ---	ʔun^2 / ---	--- / ---	zun^5 / zoŋ^5	ʔjun^5 / zən^5	[pɔ:^{5}]		ṷn / ʒoŋˀ	---
木棉	kapok	*C-ɣa:wʔ	*ɦa:wʔ	ha:w^3 / haw^3	ha:w^3 / haw^3	ha:w^3 / ha:w^3	ha:w^3 / ha:w^3	ha:w^3 / ha:w^3	ha:w^3 / ha:w^3	hɔ:w^4	ha̰:w	---

木薯	yam	*C-ɣaːwʔ	*ŋwəːy	vaːy¹	manˈ¹	man¹	muːɳ¹	muaɳ⁴	muːɳ¹	mɔːn¹	vàːy
			GHI:	h[ɔ]yy⁴	ɳɔyʔ⁴	maɳ¹	maɳ¹	maɳ¹	man⁴		┆┆
			Qi:								
			*C-məɳ								
			*C-muːɳ								
			*ɦaːwʔ	haːw³	haːw³	haːw³	haːw³	haːw³	haːw³	hɔːw⁴	
				haːw³	haw³	haːw³	haːw³	haːw³	haːw³		┆┆
NA											
拿	take	*[c/ɕ]iːwʔ	*tɕʰiːwʔ	tsʰiːw³	tsʰiːw³	tsʰiːw³	tsʰiːw³	tsʰiːw³	tsʰiːw³	[kʰɛː⁵ləːw⁴]	ʃiw
					---	tsʰiːw³	tsʰiːw³	tsʰiːw³	tsʰiːw³		┆┆
哪	which	*C-raː	*raː	raː¹	raː¹	raː¹	raː.[²]	laː.⁴	laː.⁴	laːy⁴	daː
					---	---	---	raː.⁴			┆┆
那	that (medial)	*C-ɣɯːɦ	*ɦɯːɦ	həɰ²	hauɰ²	hauɰ²	hauɰ⁵	hauɰ[²]	h[ə]ɰ⁵	[kɛː.⁴]	hěɰ
				hɔː.⁵	---	həɰ²	həɰ²		h[ə]ɰ⁵		┆┆
那	that (distal)	*C-maːɦ	*C-maːɦ	maː.²	maː.²	maː.²	maː.⁵	m[ɔ].ˈ²	maː.⁵	mɔː.⁵	màː
	Run:	*C-naː[ʔ]		---	mɔː.³	maː.²	maː.²	naː.³	n[o].ˈ⁵		naˈ
那樣	that way	*dɯɳ	*dɯɳ	ʔuɳ²	dɯɳ¹	dɔɳ¹	dɔɳ¹	dɯɳ¹	dɯɳ¹		
	GHI:			---	---	---	---	dɔɳ¹	dɯɳ¹		┆┆
		*C-maːɦ	*C-maːɦ	maː.²	maː.²	hauɰ²	hauɰ⁵	maː.⁵	həɰ⁵	mɔː.⁵	
	ECHI:	*ɦɯːɦ		---	mɔː.ˈ¹	---	maː.ˈ²	naː.ˈ³	n[o].ˈ⁵		┆┆
	Run:	*C-naː[ʔ]									

NAN

Gloss	Reconstruction	L1	L2	L3	L4	L5	L6	L7	L8
男人 man	*pa:ʔ / *pʰa:ʔ	pʰa:^{3} / pʰɔ:^{3}	pʰa:^{3} / pʰa:^{3}	pʰa:^{3} / pʰa:^{3}	pʰa:^{3} / pʰa:^{3}	pʰa:^{3} / pʰa:^{3}	pʰa:^{3} / pʰa:^{3}	pʰɯ:^{1}	fã: / pʰa:˥
	*C-ma:n	ma:n^{1}	ma:n^{1}	---	ma:n^{4} / ma:ŋ^{1}	ma:n^{1} / muan^{4}	---	[tsɤ^{4}]	mán / maŋ˨
南 south	*pəyʔ / *pʰəyʔ	duy^{1} / pʰuy^{3}	pʰey^{3} / pʰe:^{3}	pʰay^{3} / pʰay^{3}	pʰay^{3} / pʰay^{3}	pʰa[:]y^{3} / fiaŋ^{1}	pʰa[:]y^{3} / fiaŋ^{1}	[haɣ^{2}]	---
	*C-dəŋ NWCHI: / *kew	dɔŋ^{1} / kaw^{1}	daŋ^{1} / kaw^{1}	daŋ^{1} / daŋ^{1}	daŋ^{1} / daŋ^{1}	daŋ^{1} / daŋ^{1}	daŋ^{1} / daŋ^{1}	[mɯa^{5}]	---
南瓜 pumpkin	*ʔi: GHI: CHI: NECHI: / *ɦɯ:p *rə:yɦ *mbe:ŋʔ	ʔey^{1}	hɯ:p^{7}	ʔey^{1}	ga:y^{2} / pe:ŋ^{3}	ha:y^{2} / piaŋ^{3}	hɯ:p^{7} / kʰuay^{5}	huep^{8}	---
難 difficult	*Cira:k / *rja:k	za:ʔ^{7} / lek^{4}	ze:ʔ^{7} / leʔ^{4}	re:k^{7} / ze:ʔ^{7}	te:ʔ^{8} / tɯ:^{2}	tʰe:ʔ^{8} / teʔ^{8}	te:ʔ^{8} / tiaʔ^{7}	[ʔay^{1}]	zɐ: / teʔ˦

NAO

Gloss	Reconstruction	L1	L2	L3	L4	L5	L6	L7	L8
撓 scratch	*C-ɣɯ:t Meifu: / *kʰɯ:t	hɯ:t^{7}	hɯ:t^{7}	hɯ:t^{7} / kʰut^{7}	hɯ:t^{7} / huk^{8}	hɯ:t^{7} / kʰut^{7}	hɯ:t^{7}	kɯat^{7}	huɤt / hœk˨
腦 brain	*lu:k / *hlu:k	dü:ʔ^{7} / tθok^{2}	ɬu:ʔ^{7} / [n]uʔ^{4}	ɬu:k^{7} / ɬuk^{7}	ɬu:ʔ^{7} / ɬuk^{7}	ɬua^{7} / ɬuk^{8}	ɬu:ʔ^{7} / ɬuʔ^{7}	ɬu:ʔ^{8}	--- / ɬu:k˨

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NEN

嫩 tender

NENG

能幹 competent

NI

泥(土) mud

你 you

你們 you (pl)

溺 drown

膩 greasy

gloss	proto		C1	C2	C3	C4	C5	C6	C7	far
嫩 tender	*p-lɯːk	Run: *ɂuːt	luɯ:ɂ⁷ / luɯək⁴	lɯ:ɂ⁷ / pjuɂ⁴	plɯ:k⁷ / puɂ⁷	plɯ:ɂ⁷ / pluk⁷	(ɂu:t⁷) / ɂuk⁸	plɯ:ɂ⁷ / ɂut⁷	[nə:p⁸]	lɯ:
能幹 competent	GHI: *kiːw	NECHI: *dəyɦ	dɯw³	kiːw¹	kiːw¹ / day²	kiːw¹ / day²	--- / day²	kiːw¹ / day⁵	kiw¹	
泥(土) mud	GHI: *p-laːk		ren¹	le:ɂ⁷ / pjɛɣ⁴	ple:k⁷ / pe:ɂ⁷	ple:ɂ⁷ / plɯ:²	pe:ɂ⁷ / ple⁸	ple:ɂ⁷ / lɯa⁵		
你 you	*C-mɯː	*C-mɯː	mɯ:¹ / m[ɔ]:⁵	meɯ¹ / mɛ:¹	meɯ¹ / meɯ¹	meɯ¹ / meɯ¹	meɯ⁴ / m[e:]¹	meɯ¹ / mey¹ , meɯ¹ / meɯ[ɂ]⁸		méɯɯ / mɯ̀: / m[ɔ:]H
你們 you (pl)	GHI: *C-mɯː		(mey³) / ma:¹	meɯ¹ / mɛ:⁵	meɯ¹	---	---	---		
	*ees	*sew	t[u:]¹	taw¹	t[a:]¹ / saw¹	taw¹ / saw¹	taw¹ / tsʰ[e:]¹	taw¹ / tsʰaw¹ , tsʰ[eɯɂ]⁷		
溺 drown	*hlom NWCHI: *tʰɔk		dom¹ / tʰɔk²	tom¹ / tʰaɣ⁴	tom¹ / tom¹	tom¹ / tom¹	--- / tom¹	--- / tom¹	[dɔːk⁹]	dóm
膩 greasy	*ɂaːyɂ		ɂa:y³	---	--- / ɂa:y³	ɂa:y³	(ɂa:y⁶)	ɂa:y³ / ɂuay³	[ɂem¹]	

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Gloss												
NIAN											
年 year	*mu:ɦ	*hmu:ɦ	mow^2 / ɓa:^{5}	paw^2 / paw^2	pow^2 / paw^2	paw^2 / paw^2	pʰo:^{2} / paw^2	pɔ:^{2} / paw^2	ma:^{1}	máw / pǝdw⌐	pʌw
黏 sticky	*C-ɲɯt Rɯn:	*C-ɲɯt *ʔe:t	ɲɯt^7 / ---	ɲɯt^7 / ---	ɲɯt[9] / ---	ɲɯt[9] / ---	--- / ʔet^8	--- / ʔi:t^7	ɲɯt^{10}	--- / ---	---
NIAO											
鳥 bird	*sec	*sec	tat[9] / tsʰiat^2	tat^7 / faʔ^4	tac^7 / sat^7	tat^7 / sat^7	tat^7 / tsʰat^8	tat^7 / tsʰat^8	[nɔ:k^9]	tat / ---	---
尿 urine	*C-dɯ:	*dɯ:	dow^1 / ---	dow^1 / ---	dow^1 / dow^1	dow^1 / dow^1	dow^1 / dow^1	dow^1 / dow^1	[tsem^5]	dʌw / tow⌐	---
NING											
攆 twist	*Ciɣəɲʔ CHl:	*Ciɓəɲʔ *Ciɦet	hen^3 / ---	han^3 / ---	hjaɲ^3 / ---	zat^7 / ---	zat^7 / ɲat^8	hjat^7 / ɲat^8	[vu:t^8]	--- / ɲa:t⌐	---
凝固 solid	*teːmɦ	*tʰǝ:mɦ	tʰam^2 / ---	tʰo:m^2 / ---	tʰo:m^2 / ---	tʰo:m^5 / tʰo:m^2	tʰo:m^5 / tʰuam^2	tʰo:m^5 / tʰuam^5	tʰo:m^5	--- / ---	---
NIU											
牛虻 gadfly	*mi:ʔ	*hmi:ʔ	mey^3 / ---	pey^3 / ---	pɯ$^{(2)}$ / ---	--- / ---	--- / ---	--- / pɯ^3	[kɯ^2]	--- / ---	---
	*lja:k	*Cila:k	za:ʔ^7 / ---	ze:ʔ^7 / ---	ze:k^7 / zɯ:^{2}	te:ʔ^8 / zɯ:^{2}	te:ʔ^8 / zeʔ^8	te:ʔ^8 / (ziaʔ^8)	[nɯa^5]	--- / ---	---

NONG											
朦 pus	*Curiw?	*Curiw?	riw³	giw³	gwiw³	gwiw⁶	viw⁶	hiw⁶	ku:¹	d[è]w	---
	NECHI:	*C-ne:ŋ	vɔɣ³	(ʔiw³)	ni:ŋ¹	ɣiw³	niaŋ¹	niaŋ⁴		---	---
NU											
*努力 exert	*tɯ:n	*tʰɯ:n	tʰɯ:n¹	tʰɯ:n¹	tʰɯ:n¹	tʰɯ:n¹	tʰɯ:n¹	tʰɯ:n¹	dɑŋ¹	tʰuɤn	---
			tsʰɯn¹	tʰɛn¹	tʰuŋ¹	tʰuŋ¹	tʰuŋ¹	tʰən¹			---
	*[k/x]u:ɦ	*kʰu:ɦ	kʰow²	kʰaw²	kʰaw²	kʰaw⁵	kʰo:⁵	kʰɔ:⁵	kʰa:w¹	kʰᴧ̌w	---
			kʰa:⁵	kʰaw²	kʰaw²	kʰaw²	kʰaw²	kʰaw⁵			---
NUAN											
暖和 warm	*lunɦ	*hlunɦ	dun²	---	ɬun²	ɬun⁵	ɬun⁵	ɬun⁵	tʰu:n⁵	---	---
	NCHI:	*hlom	---	---	ɬom¹	ɬo[ŋ][2]	ɬom[2]	ɬom¹		---	---
NUO											
糯稻 glutinous rice	*C-mu:n?	*C-mu:n?	mu:n³	mu:n³	mu:n³	mut⁷	mut⁸	mut⁷	muɯ²	mùon	---
	CHI:	*C-muc	---	muɛʔ⁴	mət⁷	---	mot⁸	mət⁸		---	---
	*C-ŋa:?	*C-ŋa:?	ŋa:³	ka:³	ka:³	ka:⁶	kʰa:⁶	ka:⁶	ŋow¹	ŋà:	---
			kɔ:⁴	ka:³	ka:³	ka:³	ka:³	ka:⁶			---

漢字	gloss	Proto A	Proto B									
NY												
女兒	daughter	*lɯːk ; Qiː	*hlɯːk ; *dʑʔ	dɯː:ʔ^7 / tθɯək^2	ɬɯː:ʔ^7 / leʔ^4	ɬɯː:kʔ^7 / ɬuːk^7	dʑ^3 / ɬuːk^7	ɬɯaʔ^7 / ɬuːk^8	dʑ^3 / ɬuːk^7	ɬiək^8	dɯː	┊ ┊
女人	woman	*miʔ ; *[k/x]əwɦ	*hmiːʔ ; *kʰəwɦ	mey^3 / ɓay^4	pey^3 / ŋa^5	pay^3 / ---	--- / pʉ^3	pʰay^6 / pay^3	pʰay^6 / pay[4]	[mʉ^2]	mèy	┊
				kʰaw^2 / ---	kʰaw^2 / kʰɔː^2	kʰaw^2 / kʰoː^2	kʰoː^5 / kʰoː^2	kʰoː^5 / (kʰoː^5)	kʰ[o]ː^5 / kʰoː^5	[taːwↆ]	xʌw	┊
	woman	*miʔ ; *[k/x]əwɦ	*hmiʔ ; *kʰəwɦ	mey^3 / ŋaːw^1	pey^3 / ŋa^5	pay^3 / ---	--- / ---	pʰay^6 / pay^3	pʰay^6 / pay[4]	mʉ^2	mèy ; paːyↆ	┊
				kʰaw^2 / ---	kʰaw^2 / kʰɔː^2	kʰaw^2 / kʰoː^2	kʰoː^5 / kʰoː^2	kʰoː^5 / kʰoː^5	kʰ[o]ː^5 / kʰoː^5	[taːwↆ]	xʌw ; kʰoːˑↆ	┊
女婿	son-in-law	*lɯː	*hlɯː	dʑeuↆ^1 / tθowↆ^1	ɬeuↆ^1 / lowↆ[2]	ɬeuↆ^1 / ɬeuↆ^1	ɬeuↆ^1 / ɬeuↆ^1	ɬeuↆ^1 / ɬeuↆ^1	ɬeuↆ^1 / ɬeuↆ^1	ɬaːↆ^4	ɬheuↆ	┊
OU												
嘔吐	vomit	GHIː	*faːk	ʔaː:ʔ^7 / fek^2	fe:ʔ^7 / ---	fe:k^7 / fe:ʔ^7	fe:ʔ^7 / (fek^7)	fe:ʔ^7 / feʔ^8	fe:ʔ^7 / fʰiaʔ^7	[ʔɔŋ^1]		┊ ┊
PA												
趴 (行)	lie face-down	GHIː	*Cuɕaːmʔ	(ho:m^3) / ŋom[5]	ho:m^3 / ---	hwo:m^3 / ŋo:m^3	go:m[6] / ŋo:m^3	vɔ:m^5 / ŋuam^3	hɔ:m^3 / ŋuam^6	[pʰok^7]		┊ ┊
趴	climb (tree)	*C-naːn	*C-naːn	na:n^1 / ---	na:n^1 / ---	na:n^1 / na:ŋ^1	na:n^1 / na:ŋ^1	na:n^4 / na:ŋ^1	na:n^4 / nuan^4	[kʰuen^1]		┊ ┊

漢字	gloss											
爬	crawl	*Cuɣɯːm	*Cuɕɯːm	hɯːm^1 ŋum^1	hɯːm^1 ---	hwɯːm^1 ŋum^1	hɯːm^1 ŋum^1	vuːm^1 ŋum^1	hɯːm^1 ŋom^4	hɔːm^4	---	---
怕	afraid	*C-daːʔ / NCHIː	*ɗaːʔ / *C-meːŋ	ɗaː^3 meŋ^1	ɗaː^3 meŋ^1	ɗaː^3 meːŋ^1	ɗaː^3 ɗaː^3	ɗaː^3 ɗaː^3	ɗaː^3 ɗaː^3	ɬɔː^4	ɗàː ta:˥	tláː
PAI												
拍	clap	(*paːŋɦ)	(*pʰaːŋɦ)	pʰaːŋ^2 ---	pʰaːŋ^2 ---	pʰaːŋ^5 pʰaːŋ^2	pʰaːŋ^5 pʰaːŋ^2	--- ---	pʰaːŋ^5 ---	---	--- fɔŋ]	---
排列	arrange	*rey	*rey	ray^1 ---	gay^1 ---	gay^1 ---	gay^4 xay^1	hay^4 xay^1	hay^4 kʰay^1	[ɓaːy^2]	---	---
派遣	dispatch	GHIː	*ɓəy	--- ---	ɓay^1 ---	ɓay^1 ---	ɓay^1 ɓay^1	ɓay^1 ɓay^1	ɓay^1 ɓay^1	pʰaːy^4	---	---
PAN												
攀折	break (stem)	*ŋew / NCHIː	*hŋew / *ʔɛːwʔ	--- ʔɛw^3	kaw^1 ---	kaw^1 ʔew^3	kaw^4 kaw^1	--- kaw^1	kaw^4 ---	[ʔuːt^9]	---	---
攀折	break (stem)	Runː	*C-ɲuːt	--- ---	--- ---	--- ---	(ɲuːt^8) ɲut^7	(ɲuːt^8) ɲut^8	--- ---	---	---	---
PANG												
旁邊	side	*C-ɲeːyɦ	*C-ɲeːyɦ	ŋaːy^2 ---	ŋɔːy^2 ŋɔy^2	(ŋaːy^2) ---	ŋaːy^5 ŋɔːy^2	ŋaːy^2 ŋuay^2	ŋaːy^5 ---	---	ŋáːy	---
螃蟹	crab	*C-buːɦ / NCHIː	*ɓuːɦ / *kʰaːɦ	ɓow^2 ɓaː˥	ɓaw^2 ɓaw^2	ɓow^2 kʰaː^2	ɓaw^5 ɓaw^2	ɓoː^5 ɓaw^2	ɓɔː^5 kʰaː˥	[tsʰaːk^9]	ɓ̌ʌw	kʰaːN

		*A	*B								
胖	fat	*ruːyʔ	*ruːyʔ	ruːy^3 / huy^4	guːy^3 / vuy^3	g[we]y^3 / guy^3	guːy^6 / xuy^3	huːy^6 / xuy^3	huːy^6 / kʰuy^3	kuy^1	duoy / ---
PAO											
跑	run	*Curuːɦ	*Curuːɦ	row^2 / vaw^5	gow^2 / ŋɛw^2	gow^2 / gow^2	gow^2 / ɣow^2	haːm^5 / vow^2	how^2 / vow^5	kɔː^1	dǎw / ---
跑味兒	stale	*luyʔ	*hluyʔ	duy^3 / ---	ɬuy^3 / ---	ɬuy^3 / ---	--- / ɬuy^3	--- / ɬoy^3	ɬuy^3 / (ɬuːy^3)	[viː^{3}fin^4]	---
泡沫	foam	GHI:	*fuːt	(puat^7) fu[a]t^2	fuːt^7 / fuʔ^4	fuːt^7 / fuk^7	fuːt^7 / fuk^7	--- / ---	fuːt^7 / ---	puət^9	---
泡沫	foam	CHI:	*fuːŋʔ	--- / ---	--- / ---	--- / fuŋ^3	--- / ---	fuaŋ^3 / foŋ^3	fuaŋ^3 / foŋ^3	---	---
PEN											
噴	squirt (with mouth)	*puɦ	*pʰuɦ	pʰuː^2 / pʰuː^5	pʰuː^2 / ---	pʰuː^2 / ---	pʰuː^5 / pʰu[t]^7	ʔuː^5 / pʰuː^5	ʔuː^5 / pʰuː^5	ʔaːw^1	---
噴	squirt	*laːw	*hlaːw	daːw^1 / ---	ɬaːw^1 / ---	ɬaːw^1 / ---	ɬaːw^1 / ɬaːw^1	ɬaːw^1 / ɬaːw^1	ɬaːw^1 / ɬaːw^1	[vuŋ^5]	---
盆	basin	*ʔ[ɛ]ːŋɦ	*ʔ[e]ːŋɦ	ʔeːŋ^2 / ---	ʔeːŋ^2 / ---	ʔeːŋ^2 / ---	ʔeːŋ^5 / ---	--- / ---	ʔeːŋ^5 / ---	---	εŋ / ---
PENG											
朋友	friend	GHI:	*pʰiːnʔ	--- / ---	pʰiːn^3 / ---	pʰiːn^3 / ---	pʰiːn^3 / pʰiŋ^3	pʰiːn^3 / ---	pʰiːn^3 / pʰin^3	puɔn^5	---

	Gloss		Proto									
捧	hold in 2 hands	CHI:	*kʰop	---	kʰɔp⁷	---	kʰɔp⁷	kʰɔp⁷	[huŋ¹]	¦	¦	
		NWCHI:	*ʔʊn	ʔɛn¹	kʰɔp⁷	kʰɔp⁷	kʰɔp⁷	kʰɔp⁷		¦	¦	
碰見	meet	*[c/ɕ]uːɳɦ	*tɕʰuːɳɦ	tsʰuːŋ²	tsʰuːŋ²	tsʰuːŋ²	tsʰuːŋ²	tsʰuaŋ⁵	tsʰuːŋ⁵	---	¦	¦
		NWCHI:	*C-laːyʔ	laː³	lay³	---	tsʰuŋ²	tsʰuŋ²	---		¦	¦
PI												
劈	split	*C-ɓuːŋ	*ɓuːŋ	ɓuːŋ¹	ɓuːŋ¹	ɓuːŋ¹	ɓuːŋ¹	ɓuaŋ¹	ɓuːŋ¹	[puɯay¹]	bɯoŋ	¦
				ɓoŋ¹	ɓuŋ¹	ɓuŋ¹	ɓuŋ¹	ɓuŋ¹	ɓuŋ¹		pʰuːŋ꜒	¦
皮	skin (of fruit)	*faːk	*faːk	pʰaːʔ⁷	feːʔ⁷	feːk⁷	feːʔ⁷	feːʔ⁷	feːʔ⁷	pua⁵	faː	¦
				fɛk²	fɛʔ⁴	feːʔ²	fɯː²	feʔ⁸	fiaʔ⁷	---	¦	¦
皮膚	skin	*C-nəːŋ	*C-nəːŋ	naŋ¹	noːŋ¹	noːŋ¹	noːŋ¹	nɔːŋ⁴	nɔːŋ¹	naː¹	naŋ	¦
				naŋ¹	nɔŋ¹	noːŋ¹	noːŋ¹	nuaŋ¹	nuaŋ⁴		nuaŋ꜔	¦
屁	fart	*tuːt	*tʰuːt	tʰuːt⁷	tʰuːt⁷	tʰuːt⁷	tʰuːt⁷	tʰuːt⁷	tʰuːt⁷	dʉet⁹	tʰuot	¦
		NECHI:	*tʰuːc	tʰuɐt²	tʰuʔ⁴	tʰuʔ⁷	tʰut⁷	tʰut⁸	tʰut⁷		tʰuːt꜔	¦
PIAN												
片	land clsfr	*[c/ɕ]aːn	*tɕʰaːn	tsʰaːn¹	tsʰaːn¹	tsʰaːn¹	tsʰaːn¹	tsʰaːn¹	tsʰaːn¹	[huɯan¹]	¦	¦
				---	---	tsʰaːŋ¹	tsʰaːŋ¹	tsʰaːŋ¹	tsʰuan¹		tʰiaŋ꜔	
PIAO												
飄動	to wave	*C-lit	*C-lit	lit⁷	lit⁷	lec⁷	let⁷	---	lit⁷	---	¦	¦
		Run:	*ʔwit	---	---	---	let⁷	vet[7]	vet⁷		¦	¦
瓢	ladle	*Cuɣiː	*Cuɦiːɦ	hey¹	hwey¹	hwey¹	---	vey¹	---	[huəp⁸]	héɣ	¦
				---	ŋɛy¹	ŋey¹	ŋey¹	ŋey¹	ŋey⁴		¦	¦

字	gloss	proto A	proto B	D1	D2	D3	D4	D5	D6	D7	D8	D9
瓢	ladle	Qi:	*ruːy	—	—	huːy^1	guːy^1	huːy^1	huːy^1	—	—	—
PING												
平	level	CHI:	*tʰəːy	—	—	tʰoːy^1	tʰoːy^1	tʰoːy^1 / tʰuay^1	—	tʰuay^1	—	tʰuay˧
PO												
潑	pour	*C-baːnʔ	*ɓaːnʔ	ɓaːn^3	ɓaːn^3	ɓaːn[1]	ɓaːn^3 / ɓaːŋ^3	ɓaːn^3	ɓaːn^3	[tɔm^2]	—	bàn
潑	pour	CHI:	*hwiːt	— / tsɔː^2	—	hwiːt^7	tsɔː^5	tsɔː^5	tsɔː^5 / v[i]jt^8	tsɔː^5 / vet^8	—	—
		CHI:	*tɕeɕwɦ									
破	break	*pəːnʔ	*pʰəːnʔ	pʰan^3 / pʰan^3	pʰoːn^3 / pʰɔn^3	pʰoːn^3 / pʰoːŋ^3	pʰoːn^3 / pʰoːŋ^3	pʰɔːn^3 / pʰuaŋ^3	pʰɔːn^3 / pʰuːn^3	ɓuan^1	—	pʰuan˥
PU												
噗	puff	*p-liwɦ	*p-liwɦ	—	(piw^2)	pliw^2 / piw^2	pliw^5 / [pj]iw^2	—	—	[puːt^9]	—	—
噗	puff	*Ciruŋʔ	*rjuŋʔ	zun^3	zun^3	— / [dʒun^3]	tun^6 / tʃ[a]n^1	tun^6 / ton^3	tɯn^6 / tɐn[3]	—	—	—
QI												
七	seven	*tuː	*tʰuː	tʰ[uː]	tʰow^1 / tʰɛw^1	tʰow^1 / tʰow^1	tʰow^1 / tʰow^1	tʰow^1 / tʰow^1	tʰow^1 / tʰow^1	dɑw^1	tʰ[uː] / tʰow˧	tʰaw

漢字	Gloss	Reconstruction										
妻子	wife	*mi:ʔ	*hmi:ʔ	---	---	pay^3	pay^3	pay^6	pʰay^6	pay[4]	---	---
					---	pay^3	---	pɯ^3	---	pay[4]	---	---
		GHl:	*kʰəwɦ	---	---	kʰaw^2	kʰaw^2	kʰo:^{5}	kʰo:^{5}	kʰɔ:^{5}	[na:w^5]	---
					---	---	---	kʰo:^{2}	---	kʰo:^{5}		
妻子	wife	*mi:ʔ	*hmi:ʔ	mey^3	mey^3	---	---	---	---	---	---	pa:y˦
*C-jəwʔ		*C-liwʔ	liw^1	liw^1	dun^1	---	---	liw^1	---	liw	---
CHl:		*dun	lɔy^1	---	liw^1	dɔŋ^1	dɔŋ^4	---	---	toŋˀ	---
棲息	perch	*C-jəwʔ	*tɕəwʔ	tsaw^3	tsaw^3	tso:^{3}	tso:^{3}	tso:^{3}	tso:^{3}	[ŋɔm^2]	---
						tso:^{3}	tso:^{3}	tso:^{3}	to:^{3}		
漆	lacquer	GHl:	*tɕʰit	tsʰa:y^1	---	tsʰec^7	tsʰet^7	tsʰat^7	---	---	---
		NCHl:	*tɕʰet	tsʰat^1	---	---	tsʰa[t]^7	tsʰe[ʔ]^7	tsʰet^7		
起來	get up	*Cuʔuːɦ	*Cuʔuːɦ	ʔəuŋ^2	ʔauŋ^2	ʔwauŋ^5	gwauŋ^5	vauŋ^5	ʔwauŋ^5	ʔa:^{1}	ɕuŋ	vəŋ
				---	---	---	ɣəuŋ^2	vauŋ^2	vauŋ^5		va:N	
氣	air	*C-jɯ:	*tɕɯ:	tseŋ^1	tseŋ^1	heeŋ^1	heeŋ^1	heeŋ^1	teseŋ^1	---	tʃɕɯŋ	---
				heeŋ^1	---	---	teseŋ^1	heeŋ^1	heŋ		
QIA												
掐	pinch	*C-dəɲʔ	*C-dəɲʔ	dan^3	dan^3	dfaɲ^3	dfaɲ^3	---	dfaɲ^4	tɯɯən^1	---	---
				tsʰian^3	---	---	---	dan^3	---		
掐	pinch	Qi:	*re:w	---	---	---	re:w^4	---	le:w^4	---	---	---

		Recon. 1	Recon. 2									
掐	pinch	*C-mi:t	*C-mi:t	mi:t^7 / mit^2	mi:t^7 / mi:ʔ^4	mi:t^7 / mit^7	mi:t^7 / mit^7	mi:t^8 / mit^7	mit^7 / mit^8	pet^7	mjet / ---	---
QIAN												
千	1,000	*C-ŋu:n Qi: NECHI:	*C-ŋu:n *tʃʰe:y *C-ɲin	ŋu:n^1 / ---	ŋu:n^1 / ---	ŋu:n^1 / ŋ[i:]n	tsʰa:y^1 / ŋen^1	tsʰa:y^1 / (ŋen^4)	tsʰa:y^1 / ŋen[5]	tsʰa:y^5	ŋúon / ŋen┤	---
牽	lead	*tʃwun	*tʃʰwun	tsʰun^1 / fən^1	tsʰun^1 / fen^1	tsʰun^1 / foŋ^1	tsʰun^1 / foŋ^1	tsʰun^1 / fən^1	tsʰun^1 / fən^1	toŋ^1	ʃún / ---	---
前面	front	*pay?	*pʰəy?	pʰay^3 / pʰ[u]y[2]	pʰey^3 / pʰ[e:]^3	pʰay^3 / pʰay^3	--- / pʰay^3	pʰay^3 / ---	[h]lay^3 / ---	pʰa:y^5	fây / ---	---
		*C-dəŋ	*dəŋ	dɔŋ^1 / tse:ŋ^1	daŋ^1 / dan^1	daŋ^1 / daŋ^1	daŋ^1 / daŋ^1	daŋ^1 / daŋ^1	daŋ^1 / dɔŋ^1	tʰiəŋ^4	dóŋ / taŋ┤	---
前天	day before Yesterday	*ŋwen	*hŋwen	ven^1 / ---	van^1 / ---	pɯ:$^{1(1)}$ / ---	--- / ---	--- / pay^3	van^1 / puɯ^3	vɔ:n^1	vén / pa:y┤	---
		*C-rəw?	*rəw?	raw^3 / ---	--- / ---	raw^3 / ---	raw^6 / ---	law^3 / [pl]aw^3	law^3 / raw^3	tsa:w^4	dàw / [pl]aw┤	---
鉗子	tongs	*[c/ɕ]i:p	*tɕʰi:p	tsʰi:p^7 / ---	tsʰi:p^7 / ---	tsʰi:p^7 / tsʰip^7	tsʰi:p^7 / tsʰip^7	--- / ---	tsʰi:p^7 / ---	---	--- / ---	---
潛水	dive	*C-ɟɔm	*tɕom	tsom^1 / tsom^1	tsom^1 / ---	tsom^1 / tsom^1	tsom^1 / tsom^1	tsom^1 / tsom^1	tsum^1 / tom^1	tsem^1 muat^7	--- / ---	---
淺	shallow	*tɯ:n?	*tʰɯ:n?	tʰɯ:n^3 / [fɯ]n^3	tʰɯn^3 / tʰɛn^3	tʰɯn^3 / tʰəŋ^3	tʰɯn^3 / tʰəŋ^3	tʰɯn^3 / tʰəŋ^3	tʰɯn^3 / tʰəŋ^3	daŋ^1	tʰ[ɯ]ŋ┤	---

Gloss											
錢 money	*C-ɟi:n	*tɕi:n	tsi:n^1 / tɵin^1	tsi:n^1 / tsin^1	tsi:n^1 / tsiŋ^1	tsi:n^1 / tsiŋ^1	tsi:n^1 / tsiŋ^1	tsi:n^1 / tin^1	tsin^1	tʃien˥	—
QIANG											
牆 wall	*ri:ŋʔ / Run:	*ri:ŋʔ / *plɛ:k	ri:ŋ^3 / —	gi:ŋ^3 / —	gi:ŋ^3 / —	gian^6 / xiŋ^3	hiaŋ^6 / plɛʔ^8	— / plaʔ^7	— / pet˥	—	—
嗆 choke	GHI:	*kʰə:nʔ	(kʰo:n^3) / —	kʰo:n^3 / kʰɔn^3	kʰo:n^3 / kʰo:ŋ^3	kʰo:n^3 / kʰo:ŋ^3	kʰɔ:n^3 / kʰuaŋ^3	kʰɔ:n^3 / kʰu:n^3	kʰuan^1	—	—
QIAO											
悄悄地 quietly	*rip	*rip	(gip^7)	gip^7	gip^7	—	—	—	—	[tsɐŋ^2]	—
敲 knock	*tɔŋɦ	*tʰoŋɦ	tʰ[ɔ]ŋ^2	tʰuŋ^2	tʰoŋ^2 / tʰɔɲ^2	tʰoŋ^5 / tʰɔɲ^2	tʰ[u]ŋ^5 / tʰɔɲ^2	tʰ[u]ŋ^5 / tʰɔɲ^5	—	[dɔɔk^7]	—
敲 knock	Qi:	*ɓu:ʔ	—	—	—	(ɓuaŋ^3)	ɓuaŋ^3	ɓu:ŋ^3	—	[tep^8]	—
撬 pry	*[k/x]əŋɦ	*kʰəŋɦ	kʰaŋ^2 / —	kʰaŋ^2 / kʰ[e]ŋ^2	kʰaŋ^2 / —	kʰaŋ^1 / kʰaŋ^2	kʰaŋ^1	kʰaŋ^1	kʰaŋ^1	—	—
QIE											
切 cut	GHI:	*ret	(gat^7)	gat^7	gat^8 / xak^7	gat^8 / xak^7	hat^8 / xak^8	tak^8 / kʰat^7	—	xak˧	—
	CHI:	*tʰəmʔ	—	tʰam^3	tʰam^3	tʰam^3 / tʰam^3	tʰam^3 / tʰam^3	— / tʰam^3	tʰam^3	—	[la:ŋ^5]

漢字	Gloss	Recon 1	Recon 2	D1	D2	D3	D4	D5	D6	Written
QIN										
勤勞	hard-working	*ʔunʔ / Run:	*ʔunʔ / *dəɣ̊	ʔun^3 / ʔən^3	ʔun^3 / ʔen^3	ʔun^3 / ʔoŋ^3	ʔun^3 / ʔoŋ^3	— / dây^2	— / dây^5	ûn / —
QING										
青梅樹	plum tree	*C-muːy	*C-muːy	muːy^1 / —	muːy^1 / muːy^1	muːy^1 / muːy^1	mɯːy^1 / mɯːy^1	m[u]y^4 / mu[a]y^1	muːy^1 / mu[ː]y^4	— / —
青年	youth	*lɯːk	*hlɯːk	dɯːʔ^7 / tθɯɯek^2	ɬɯːʔ^7 / —	ɬɯːk^7 / —	ɬɯːʔ^7 / ɬɯk^7	ɬuaʔ^7 / ɬuk^8	ɬ[a]k / ɬuʔ^7	[mɯ^2] / —
		GHl:	*C-mɯːn	pʰaː^{3}tsan^3 / —	mɯːn^1 / —	mɯːn^1 / —	mɯːn^1 / mɯɯŋ^1	mɯːn^4 / mɯɯŋ^1	mɯːn^1 / men^4	[niaw^1] / —
青蛙	frog	*C-gaːt / Run:	*ka:t / *ka:p	ka:t^7 / —	ka:t^7 / —	ka:t^7 / —	ka:t^7 / —	ka:t^7 / ka:p^8	ka:t^7 / ka:p^7	[la:k^8] / —
輕	light	*[k/x]ɯːʔ	*kʰɯːʔ	kʰəuɟ^3 / kʰɔː^5	kʰauɟ^3 / kʰaw^3	kʰauɟ^3 / kʰauɟ^3	kʰauɟ^3 / kʰəuɟ^3	kʰauɟ^3 / kʰauɟ^3	kʰauɟ^3 / kʰɔː^5	kʰəuɟ / kʰaːl
傾聽	listen	GHl:	*hiːŋ	— / —	hiːŋ^1 / —	hiːŋ^1 / —	hiaŋ^1 / [ŋ]iŋ^1	hiaŋ^1 / —	hiːŋ^1 / hiŋ[5]	— / —
		*Ciley	*lʲey	— / —	zay^1 / —	zay^1 / —	ɬay^4 / zay^1	ɬay^4 / zay^1	ɬay^4 / tsay[1]	— / —
傾聽	listen	*p-lɯː	*p-lɯː	ləɟ^1 / —	— / —	— / —	pəuɟ^1 / —	pəuɟ^1 / —	pləuɟ^1 / [ŋey^2]	ləɟ / —
傾斜	slant	*C-giːŋ	*ki:ŋ	ki:ŋ^1 / —	ki:ŋ^1 / —	ki:ŋ^1 / —	kiaŋ^1 / kiŋ^1	kiaŋ^1 / —	kiaŋ^1 / kiŋ^1	kiˀeɟ / —

漢字	gloss									
清	clear	*ra:w	*ra:w	(ka:w¹)	ga:w¹	ga:w¹ / ga:w⁴	ga:w¹ / ga:w⁴	ga:w⁴ / ɣa:w¹	---	---
清	clear	*lɯːŋʔ	*hlɯːŋʔ	ɗɯːŋ³	---	--- / ---	ɬɯːŋ³ / ---	ɬuaŋ³ / ɬuŋ³	ɬɯːŋ³ / ɬuŋ³	ɬa:ŋ²
清理	to clean	*sɘc	*sɘc	tat⁷	tat⁷	tat⁷ / ---	tac⁷ / ---	sat⁷ / ---	--- / ---	---
清理	to clean	CHl:	*hlɯːŋʔ	---	---	--- / ---	--- / ---	--- / ---	ɬuan³ / ---	[tsʰeŋ³]
	ECHl:	ECHl:	*Cuɦɘːk	---	---	--- / ---	hwo:k⁷ / ---	go:ʔ⁷ / ---	hɔ:ʔ⁷ / ɬuŋ³	---
蜻蜓	dragonfly	*mi:ʔ	*hmi:ʔ	mey³	pey³	mey³ / ---	pɯ⁽¹⁾ / ---	--- / ---	--- / ---	tʰam¹/tʰap⁹
		*[c/ɕ]in	*tɕʰin	tsʰin¹	tsʰin¹	tsʰin¹ / ---	tsʰeŋ¹ / ---	--- / ---	--- / ---	[tʰiw⁵]
晴	clear (sky)	*lɯːŋʔ	*hlɯːŋʔ	ɗɯːŋ³	ɬɯːŋ³	ɬɯːŋ³ / ---	ɬɯːŋ³ / ---	ɬɯːŋ³ / ɬuŋ³	ɬuaŋ³ / ɬuŋ³	ɬa:ŋ²
請 (叫)	request	*rɘyʔ	*rɘyʔ	ɓay¹	gay³	gay³ / ---	gay⁶ / xay³	gay⁶ / xay³	hay⁶ / kʰay³	[kow⁴]
		GHl:	GHl:	---	---	--- / ---	--- / ---	--- / ---	--- / ---	[ʑ]aːyʋ

QIONG

漢字	gloss									
窮	poor	*C-ʋa:t	*ʋa:t	va:t⁷	va:t⁷	va:t⁷ / va:k⁷	fa:t⁸ / va:k⁷	va:t⁸ / va:ʔ⁸	va:t⁷ / vuat⁸	fɯːt⁸
				---	---	--- / ---	va:k⁷ / ---	va:ʔ⁸ / ---	--- / ---	vat / va:ʔɬ

QIU											
丘	mound	GHl:	*Cifɛ:n	---	---	ho:n¹ / ŋjɔn²⁴	hjo:n¹	zo:n¹	(hu:n¹) / ɲu:n⁴	huen³	¦
秋	autumn		*C-ɲa:n	ɲa:n¹	ɲa:n¹	ɲa:n¹	ɲa:n¹	ɲa:n¹ / ɲa:ŋ¹	ɲa:n¹	[taw¹ku¹nuen¹]	¦
		*tət C-mu:nʔ	*tʰət C-mu:nʔ	tʰet⁷mu:n³		tʰat⁷mu:n³ dáɲ³					¦
		CHl:	*daɲʔ	---	---	---	---	dan³	---		¦
蚯蚓	earthworm	*Cuɦɛn		hen¹	han¹	hwan¹	gwan¹ / ŋan¹	van¹ / low²	hwan¹ / low⁵	van¹	¦
		Meifu:	*ŋɛɲ	---	---	ŋan¹				ɲaŋ\ low\	
		Run:	*C-lu:ɦ								
QU											
驅逐	expel	*C-lu:yʔ		lu:y³	lu:y³	lu:y³ / luy³	lu:y³	lu:y⁶	lu:y³	[pʰe:k⁹] / luoy	¦
蛆	maggot	*ŋuy		ŋuy¹ / koy⁴	kuy¹	kuy¹ / de:ʔ⁷	kuy⁴ / dɯ:²	kʰuy⁴ / de:ʔ⁸	kuy⁴ / dia:ʔ⁷	---	¦
		NEChl:	*dɛ:k								
蛆	maggot	CHl:	*Ciɦɛnɦ	--- / ɲan⁵	--- / ɲjɛn²	---	zan⁵	zan⁵	hjan⁵	zɔ:t⁸	¦
		Qi:	*C-ɦa:yʔ	---	---	---	ha:y³	ha:y³	ha:y³	---	¦
取	take	GHl:	*hmɛt	--- / ɓat⁴	pat⁷ / paʔ⁴	pat⁷ / paʔ⁷	pat⁸ / pak⁷	pʰat⁸ / puy³	pat⁸ / puy⁶	pat⁸	¦
		Run:	*mbu:yʔ								

娶 marry	*C-ga:k	*C-ga:k	(ke:ʔ⁹)	ke:ʔ⁷	ke:k⁷	ke:ʔ⁷	ke:ʔ⁷	ke:ʔ⁷	---	(kɛ:)
	NCHI:	*dɯ:	tsow¹	dɛ:²	---	dəɯ¹	dəɯ¹	dəɯ¹		---
去 go	*C-ɣi:	*C-ɣi:	hey¹	hey¹	hey¹	hey¹	hey¹	hey¹		héy
	Run:	*pʰəɯ	---	hɛy¹	hey¹	hey¹	pʰə[:]¹	pʰəɯ[ʔ]⁷	hay¹	---
去年 last year	*mu:ɦ	*hmu:ɦ	mow²	paw²	pow²	paw²	pʰo:²	pɔ:	mɯ:²	
			ɓa:⁵	paw²	paw²	paw²	paw²	paw²		ᴺwad
	*pənʔ	*pənʔ	pʰen³	pʰan³	---	pʰan³	pʰan³	pʰan³	[ləy⁴]	---
			pʰan³	pʰan³	pʰaŋ³	pʰaŋ³	pʰaŋ³	pʰan³		pʰa:ŋ⌐
QUAN										
全部 all	*C-ba:yʔ	*ɓa:yʔ	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	pɯy⁵	
	NECHI:	*ri:k	---	---	rik⁷	---	rit⁷	ɓu:y³		
	*C-ba:yʔ	*ɓa:yʔ	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	ɓa:y³	pɯy⁵	
	NECHI:	*ri:k	---	---	rik⁷	li?⁷	rit⁷	ɓu:y³		
泉水 spring water	*C-nəmʔ	*C-nəmʔ	nom³	nam³	nom³	nam³	nam⁶	nam³	na:m¹	
			---	---	nam³	nam³	nam³	nam⁶		
	*C-ɟəŋ	*tɕəŋ	tsoŋ³	tsaŋ³	tsaŋ³	tsaŋ⁶	---	tsaŋ⁶	[tow¹]	
			---	---	---	tsaŋ³	tsaŋ³	tsaŋ⁶		
CHI:	CHI:	*rjuŋʔ	---	---	---	---	tʰun⁶	tʰun⁶	tɯn⁶	len⁴
			---	---	---	ton³	ton³	ton³		

字	gloss	proto		C1	C2	C3	C4	C5	C6	
拳頭	fist	*Curop	GHI:	gop⁷	gop⁷	gop⁸ / gap⁷	gop⁸ / ɣap⁷	--- / vop⁷	---	gop⁷ / --- · vop⊣
勸解	console	*C-muː *raːk *C-leːŋ	CHI: CHI:	--- / ---	meuɹ¹ / ---	meuɹ¹ / meuɹ¹	meuɹ¹ / meuɹ¹	--- / heuɹ	--- / heuɹ⁴	ɻheuɹ
				geːʔⁿ / ---	geːʔ⁷ / ---	geːkⁿ / geːʔ⁷	geːʔ⁸ / xɯː²	leːŋ⁴ / liaŋ⁴	leːŋ¹	leːŋ¹
QUE										
缺口	gap	*ʋ[e]ːŋɦ	*C-ʋ[ɛ]ːŋɦ	veːŋ² / lin⁴	veːŋ² / ---	veːŋ² / ---	feːŋ² / veːŋ²	veːŋ² / viaŋ²	veːŋ⁵ / viaŋ²	pəːŋ¹
QUN										
群	group	*kʰun	*[k/x]un	kʰun¹ / ---	kʰun¹ / ---	kʰun¹ / kʰoŋ¹	kʰun¹ / kʰoŋ¹	kʰun¹ / kʰən¹	kʰuen² / kʰən¹	kʰən² · xún
裙子	skirt	*riːn	*C-ɽiːnʔ	riːn³ / lin⁴	riːn³ / ---	riːn³ / ---	ɽiːn⁶ / ɽiŋ³	liːn⁶ / ɽiŋ³	liːn⁶ / ɽiŋ⁶	lien² · ʑiːŋ⌐
RAN										
染	dye	*tɕomʔ *tɕʰəm	*C-ɻɔm ʔ Qiː	tsom³ / ---	tsom³ / tsom³	tsom³ / tsom³	tsʰom³ / tsom³	tsʰam³ / ---	tsʰam³ / ---	tsʰaːm¹ · tʃóm
RANG										
讓路	make way	*pʰiːŋʔ *fiːŋʔ	*piːŋʔ Qiː	pʰiːŋ³ / ---	pʰiːŋ³ / pʰⁱiŋ³	pʰiːŋ³ / pʰⁱiŋ³	fiaŋ³ / pʰⁱiŋ³	fiaŋ³ / pʰⁱiŋ³	fiaŋ³ / pʰⁱiŋ³	pʰiː¹ · [v]iːŋ⌐

RAO											
繞週	make detour	*wi:ŋ	*hwi:ŋ	viŋ¹ / —	vi:ŋ¹ / —	vi:ŋ¹ / —	hwi:ŋ¹ / viŋ⁴	viaŋ⁴ / viŋ¹	viaŋ⁴ / viŋ¹	viaŋ⁴ / viŋ⁴ [ʔuan⁴]	— / —
RE											
熱	hot	[wewʔ	*tʃʰwewʔ	tsʰaw³ / faw³	tsʰʰaw³ / fɔ:³	fɔ:³	fow³ / fɔ:³	— / —	— / —	[ʔjuŋ¹]	ʃaw / —
熱	hot	CHI:	*si:t	— / —	— / —	ti:t⁷ / —	ti:t⁷ / —	ti:t⁷ / tsʰʰiːt⁸	ti:t⁷	tsʰit⁷	— / tsʰiːtɬ
熱	to heat	*C-rə:mʔ	*rə:mʔ	ram³ / —	ro:m³ / —	ro:m³ / lo:m³	ro:m⁶ / lo:m³	lɔ:m⁶ / ruam³	—— / ruam⁶	[hi:t⁸]	— / —
REN											
人	person	*ʔa:w	NCHI: *Cuɦa:w	ʔa:w¹ / ŋa:¹	ʔa:w¹ / ŋa:[5]	ʔa:w¹ / (ʔa:w¹)	ʔa:w¹ / ŋa:w¹	ʔa:w¹ / (ʔa:w¹)	ʔa:w¹ / ŋa:w¹	ʔa:w¹ / [ɬay⁴]	à:w / ŋawʔ
人们	people	*[k/x]un	*kʰun	kʰun¹ / —	kʰun¹ / —	kʰun¹ / kʰoŋ¹	kʰun¹ / kʰoŋ¹	kʰun¹ / kʰoŋ¹	kʰun¹ / kʰən¹	—	— / —
		*ʔa:w	NCHI: *Cuɦa:w	ʔa:w¹ / ʔa:¹	ʔa:w¹ / ŋa:[5]	ʔa:w¹ / —	ʔa:w¹ / (ʔa:w¹)	ʔa:w¹ / (ʔa:w¹)	ʔa:w¹ / ŋa:w¹	—	— / —
認識	know	GHI:	*kʰu:ŋ	—— / kʰoŋ¹	kʰu:ŋ¹ / —	kʰu:ŋ¹ / kʰoŋ¹	kʰu:ŋ¹ / —	pʰauʔ³	kʰu:ŋ¹	[min⁴]	hɕp / —
	know	*Curɯ:	*Curɯ:	˩heɹ / —	˩heɣ / —	heɣ⁴ ˩heⱱɣ ˩heɹ	˩heⱱɣ ˩heɹ	˩heɹ	˩heⱱɣ	[g]heⱱɣ⁴[ɬay²] ˩heⱱɣ	— / —

紉針	thread needle	*sɔk	*sok	tok⁷ / tθɔk²	tuk⁷ / ---	tok⁷ / sɔk⁷	tok⁷ / sɔk⁷	tok⁷ / tsʰɔk⁸	tok⁷ / tsʰɔk⁷	tsʰɔːk⁹	tǒk / ---
RENG											
扔	throw	*p[ɛ]:ŋʔ	*pʰ[e]:ŋʔ	pʰeːŋ³ / ---	pʰeːŋ³ / ---	pʰeːŋ³ / pʰeːŋ³	pʰeːŋ³ / pʰiaŋ³	--- / pʰiaŋ³	pʰeːŋ³ / ---	[fat⁷]	--- / ---
RI											
日	day	*ŋʷen	*hŋʷen	ven¹ / hon⁴	van¹ / vanʔ⁴	hwan¹ / van⁴	van⁴ / vaŋ¹	van⁴ / vaŋ¹	van¹ / van⁴	vɔːn¹	vén / vǎn
日常	daily	*rə:m		r[o]m¹ / ---	goːm¹ / ---	goːm¹ / goːm⁴	goːm⁴ / xoːm¹	hoːm⁴ / xuam¹	hoːm⁴ / kʰuam¹	---	---
		*ŋʷen	*hŋʷen	ven¹ / ---	van¹ / vanʔ⁴	hwan¹ / van⁴	van⁴ / vaŋ¹	van⁴ / vaŋ¹	van¹ / van⁴	---	---
RONG											
榕樹	banyan	*təwʔ	*tʰəwʔ	tʰaw³ / (tʰɔː³)	tʰaw³ / ---	tʰaw³ / ---	tʰoː³ / tʰoː³	tʰoː³ / tʰoː³	tʰoː³ / tʰoː³	[fuɐn¹]	---
榕樹	banyan	*ri:	*ri:	rey¹ / (huy⁴)	gey¹ / ŋeyʔ⁴	gey¹ / gey⁴	gey⁴ / xey¹	hey⁴ / xey¹	hey⁴ / [tsʲey⁴]	[dfiaw¹]	---
ROU											
肉	meat	GHl:	*rəmʔ	mam² / ---	gam³ / ŋan³	gom³ / ʔun¹	gam⁶ / xam³	ham⁶ / xam³	ham⁶ / kʰam³	kəːm¹	mǎm / xaːm] / âm
肉	flesh (of fruit)	*C-ma:k	*C-ma:k	maːʔ⁷ / mek²	meʔ⁷ / meʔʔ⁴	meʔ⁷ / muː:²	meːk⁷ / meʔ⁷	meʔ⁷ / meʔ⁴	meːʔ⁷ / miaʔ⁸	muua⁵	--- / ---

RU

字	gloss	proto		D1	D2	D3	D4	D5	D6	D7	D8	D9
乳房	breast	*C-ɟi:ɦ NCHI: Run:	*tɕi:ɦ *tɕi *tɕi:ʔ	tsi:^{2} / tsey^1	tsi:^{2} / tsey^1	(tsey^1) / tsey^1	tsi:^{5} / tsey^1	tsi:^{5} / ti:^{3}	tsi:^{5} / ti:^{3}	[ɲen^5]	tʃi: / tʃi:l	tʃey
入贅	marry into wife's family	*[k/x]a:n	*kʰa:n	kʰa:n^1 / ---	kʰa:n^1 / ---	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰuan^1	kuən^1	--- / ---	---
		*pu:nɦ	*pʰu:nɦ	pʰu:n^2 / ---	pʰu:n^2 / ---	pʰu:n^2 / pʰu:n^2	pʰu:n^2 / pʰuɲ^2	--- / pʰuɲ^2	--- / ---	---	--- / ---	---
		CHI:	*p-loŋʔ	--- / ---	--- / ---	ploŋ^3 / ---	ploŋ^3 / ---	poŋ^3 / ploɲ^3	pl[o]ŋ^3 / ploɲ^3	[ɬuɯ^2]	--- / ---	---

RUAN

字	gloss	proto		D1	D2	D3	D4	D5	D6	D7	D8	D9
軟	soft	*hmu:t ʔi:ŋʔ	GHI: NWCHI:	(pu:t^9) / ʔieŋ^3	pu:t^7 / ʔiŋ^3	pu:t^7 / ---	pu:t^8 / puk^7	pʰu:t^8 / puk^8	pu:t^8 / ---	puək^7	(pŭot) / pu:kɬ	f[ók]

SA

字	gloss	proto		D1	D2	D3	D4	D5	D6	D7	D8	D9
撒(沙)	cast (sand)	*Curuy	*Curuy	ruy^1 / ---	(ruy^1) / ---	guy^1 / guy^4	guy^4 / guy^1	guy^4 / ɣuy^1	huy^4 / ---	[tɔ:k^9]	(huy^1) / [xlɔy^1]	---
撒(種)	cast (seed)	*fɔ:nɦ	GHI:	(po:n^2) / fa:n^5	fo:n^2 / fon^2	fo:n^2 / fo:ɲ^2	fo:n^5 / fuaɲ^2	fo:n^5 / fu:ɲ^5	fɔ:n^5 / fʰu:ɲ^5	[ʔia^1]	--- / ---	---

SAI

字	gloss	proto		D1	D2	D3	D4	D5	D6	D7	D8	D9
塞	plug up	*ʔi:m *tɕʰi:m	CHI:	ʔi:m^1 / ---	ʔi:m^1 / sin^1	tsʰi:m^1 / tsʰi:m^1	tsʰi:m^1[2] / tsʰi:m^1	tsʰi:m^1 / tsʰi:m^1	tsʰi:m^1 / tsʰi:m^1	tsʰem^1	--- / ---	ĩem / ---

鰓 gill	*C-ŋaːk	ŋaː?^{7} / ŋɛk^2	ŋeː?^{7} / ŋeʔ^4	ŋeːk^7 / ŋeː?^{7}	ŋeː?^{7} / ŋɯː^2	ŋeʔ^8 / ŋeʔ^8	ŋeː?^{7} / ŋjaʔ^8	ŋɯa^5	ŋaː / —	—
SAN										
三 three	*tʂwuʔ	tsʰu^3 / fu^3	tsʰu^3 / fo^3	fu^3 / fu^3	tsʰu^3 / fu^3	tsʰu^3 / fu^3	tsʰu^3 / fʰu^3	taːw^1	ʃuː / fu˥	ʃuː
SAO										
掃 sweep *C-guc NCHI:	*kuc *pʰəːnɦ	kut$^{[9]}$ / pʰaːn^5	— / pʰɔn^2	kuc^7 / pʰ[a]ːn^2	— / pʰoːn^2	— / kot^8	— / kot^7	—	[]ut / kot˥	—
掃 sweep GHI:	*rjik	— / —	zik^7 / —	rik^7 / —	tiʔ^8 / —	tʰiʔ^8 / —	tik^8 / tset^8	tset^{10}	— / —	ʈit
嫂子 elder brother's Wife	*C-ɟuː	tsow^1 / —	tsow^1 / —	tsow^1 / tsow^1	tsow^1 / tsow^1	tsow^1 / (tsow^4)	tsow^1 / tow^1	tsʰuː^1	— / —	—
SE										
濇 astringent	*hmuunʔ	mɯn^3 / —	puun^3 / —	pɯn^3 / —	puun^6 / —	pʰuun^6 / peŋ^3	puun^6 / pen^6	paŋ^4	— / —	—
SEN										
森林 forest ʃeŋ* NWCHI:	*suːn	roŋ^1 / tθuen^1	gaŋ^1 / fun^1	gan^1 / —	gan^4 / xan^1	han^4 / xaŋ^1	han^4 / tsʰun^1	[ŋuen^5]	— / —	—
SHA										
殺 kill	*C-ɣuːʔ	how^3 / hay^3	haw^3 / haw^3	haw^3 / haw^3	haw^3 / haw^3	haw^3 / haw^3	haw^3 / haw^3	[tseː^2]	hàw / hæw˥	—

沙	sand	*puːɦ	*pʰuːɦ	pʰaw² / pʰaː⁵	pʰaw² / pʰaw²	pʰow² / pʰaw²	pʰaw⁵ / pʰaw²	pʰoː⁵ / pʰaw²	pʰɔː⁵ / pʰaw⁵	[dey˨]	pʰʌw / pʰawˌ	pʰɔ:
紗	yarn	CHI:	*dɵnɦ	--- / ---	--- / ---	dan² / ---	dan⁵ / pʰaw²	dan⁵ / dan⁵	dan⁵ / ---	---	--- / ---	---
		*Curuy Qi:	*Curuy *ɓuːɣʔ	ruy¹ / ʑʌɣ¹	guy¹ / ---	guy¹ / ---	ɓuːɣ³ / yuy¹	ɓuːɣ³ / voy¹	ɓuːɣ³ / vow¹	[ɓɔkˀ]	--- / Qi:	---
SHAI												
篩	sift	*Cirew NCHI: Run:	*Cirew *zɔɟ *rɔɟʔ	zaw¹ / zɔɟ⁴	zaw¹ / ---	raw¹ / [jua]ŋ⁴	taw⁴ / fɔɟ²	tʰaw⁴ / rɔɟ³	taw⁴ / rɔɟ⁶	tsi:w⁴	--- / ---	---
篩子	sieve	*C-dɔɟʔ NCHI: Run:	*C-dɔɟʔ *zɔɟ *rɔɟʔ	(dùŋ³) / zɔɟ⁴	dúŋ³ / ---	dɔŋ³ / [jua]ŋ⁴	dɔŋ³ / zɔɟ¹	dɔŋ³ / rɔɟ³	--- / rɔɟ⁶	---	(dùŋ) / ---	---
		*Cirew	*Cirew	zaw¹ / ---	zaw¹ / ---	raw¹ / ---	taw⁴ / ---	tʰaw⁴ / ---	taw⁴ / ---	tsi:w⁴	--- / ---	---
曬	sun-dry	*tʃiːŋʔ Run:	*tʃʰiːŋʔ *ʔwi:	tsʰiːŋ³ / ---	tsʰiːŋ³ / hiŋ³	tsʰiːŋ³ / tshiŋ³	tsʰiaŋ³ / (ɣey¹)	tsʰiaŋ³ / vey¹	tsʰiaŋ³ / vey¹	tuua⁵	ʃieŋ / ---	---
SHAN												
山	mountain	*Cuɣew?	*Cuɦew?	haw³ / ŋʲaw³	haw³ / ŋɔy³	hwow³ / ŋo:³	go:³ / ŋo:³	vo:³ / ŋo:³	hɔ:³ / ŋɔ:⁶	[tsow˨]	hàw / ŋo:˺	vó:
山谷	mountain valley	*[k/x]ɵːŋ	*kʰɵːŋ	kʰⁿ[o]ŋ¹ / ---	kʰoːŋ¹ / ---	kʰoːŋ¹ / kʰoːŋ¹	kʰoːŋ¹ / kʰoːŋ¹	kʰɔːŋ¹ / ---	kʰɔːŋ¹ / ---	kʰɔːŋ⁵	--- / ---	---

字	gloss	recon A	recon B	1	2	3	4	5	6	7	8	9
山林	mountain forest	*C-da:wʔ	*da:wʔ	da:w^3 / —	da:w^3 / —	da:w^3 / da:w^3	da:w^3 / da:w^3	da:w^3 / da:w^3	da:w^3 / da:w^3	da:w^3 / da:w^3	tɯ:w^{1}ɦʔuaɲ^1	¦ / ¦
山腰	mountainside	*Ciɣa:ɦ	*Ciɦa:ɦ	ha:^{2} / —	— / —	hja:^{2} / —	hja:^{2} / —	hja:^{5} / —	— / —	— / —	—	¦ / ¦
		*C-ɲa:ɦ CHI:	*C-ɲa:ɦ *tʰom	ɲa:^{2} / tsʰom^1	ɲa:^{2} / tʰon^1	ɲa:^{2} / —	ɲa:^{2} / —	ɲa:^{2} / —	ɲa:^{2} / —	ɲa:^{2} / ɲa:^{2}	tʰum^1 / tʰom^1	¦ / ¦
		*Cuɦɣəwʔ	*Cuɦəwʔ	haw^3 / ŋaw^3	haw^3 / ŋɔy^3	hwow^3 / —	go:^{3} / ŋo:^{3}	go:^{3} / ŋo:^{3}	vo:^{3} / ŋo:^{3}	hɔ:^{3} / ŋo:^{6}	—	¦ / ¦
閃電	lightning	*Cilip	*ljip	zip^7 / lep^4	zip^7 / ([f]i:ʔi^{2}ɣ^5)	(ɬip^7) / zep^7	ɬip^7 / zep^7	ɬip^7 / l[i]p^7	ɬip^7 / (ɬip^7)	ɬip^7 / lip^7	lip^7	ɕi:p̚ / ɓaw
扇子	a fan	GHI:	*hwoɲʔ	(vuɲ^3) / —	vuɲ^3 / van^3	hwoɲ^3 / vɔɲ^3	voɲ^6 / vɔɲ^3	voɲ^6 / vɔɲ^3	von^6 / vɔɲ^3	vɔɲ^3 / —	[pʰaɲ^5]	vuɲ / vɔɲ
騸子	pheasant	*[k/x]əy	*kʰkʰəy	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1 / kʰəy^1	kʰəy^1	xáɣ / —
		*C-dɯ:n	*dɯ:n	dɯ:n^1 / dɯun^1	dɯ:n^1 / —	dɯ:n^1 / dɯ[m]^3	dɯ:n^1 / dɯuŋ^1	dɯ:n^1 / dɯuŋ^1	dɯ:n^1 / dɯuŋ^1	dɯ:n^1 / dən^1	tʰuŋ^4	dɯ:ɣn / —
SHANG												
傷口	wound	GHI:	*Ciɦa:nʔ	za:ŋ^3 / —	ha:n^3 / —	hja:n^3 / ɲe:ŋ^3	za:n^3 / ɲa:ŋ^3	za:n^3 / ɲa:ŋ^3	hja:n^3 / ɲa:ŋ$^{3[11]}$	hja:n^3 / ɲa:ŋ^3	huən^2	¦ / ¦
上	ascend	*[k/x]ja:n	*kʰa:n	kʰa:n^1 / kʰɔn^1	kʰa:n^1 / kʰan^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰa:n^1 / kʰa:ŋ^1	kʰuan^1	xán / kʰa:ŋ

漢字	gloss	reconstruction	1	2	3	4	5	6	7	8
上	ascend	CHI: *tɕœnʔ	--- / ---	--- / ---	tsan³ / ---	tsan³ / ---	tsan³ / ---	tsan³ / tan³	--- / ---	¦ / ¦
上面	top	*pʰəyʔ	pʰay³ / ---	pʰ[e]y³ / ---	pʰay³ / pʰey³	--- / pʰay³	--- / ---	--- / ---	--- / ---	fᵃy / ¦
		*hnuː	nəᶣ¹ / tsow⁴	tɵᶣ¹ / tɛʔ⁴	tɵᶣ¹ / tɵᶣ¹	tɵᶣ⁴ / tɵᶣ¹	tʰɵᶣ⁴ / tɵᶣ¹	tɵᶣ⁴ / tɵᶣ⁴	[lawˡlawˡ]	nɛ́ᶣ / ¦
上午	noon	GHI: *pʰaːk	tsʰaꜜ¹ / pʰɛk²	pʰeːʔ⁷ / ---	pʰeːk⁷ / pʰeːʔ⁷	pʰeːʔ⁷ / pʰɯː[3]	pʰeːʔ⁷ / ---	pʰeːʔ⁷ / pʰiaʔ⁷	[towˡ]	ʃᵃː / ¦
		*ŋɥwen	ven¹ / hon⁴	van¹ / ---	hwan¹ / van⁴	van⁴ / vaɲ¹	van⁴ / vaɲ¹	van¹ / van⁴	vɔ:ⁿdaŋ⁵	vén / ¦
上衣	upper garment	*C-ʋ[e]ːŋʔ	veːŋ³ / veŋ⁴	veːŋ³ / veŋ³	veːŋ³ / veːŋ³	feːŋ⁶ / viaŋ³	veːŋ³ / viaŋ³	veːŋ³ / viaŋ⁶	voꜜ⁴	veŋ / viaŋ]

SHAO

漢字	gloss	reconstruction	1	2	3	4	5	6	7	8
燒	burn	GHI: *rəŋ / CHI: *ʔiːŋ / Run: *tʰɛːk	tsʰuːŋ¹ / ---	raŋ¹ / lanʔ⁴	raŋ¹ / ---	raŋ¹ / ʔiŋ¹	ʔiaŋ¹ / tʰeʔ⁸	--- / tʰiaʔ⁷	[haːŋ]	¦ / ¦
燒	burn	*tɕʰuyʔ	tsʰuy³ / tsʰɔy³	tsʰuy³ / soy³	tsʰuy³ / tsʰuy³	tsʰuy³ / tsʰuy³	tsʰuy³ / tsʰoy³	tsʰuy³ / tsʰow³	tsey¹	sɯːy / ¦
梢	tree top	*Cɨɣeːnʔ	han³ / ---	hoːn³ / ---	hjoːn³ / ɲoːɲ³	zoːn³ / ɲoːɲ³	zɔːn³ / ɲuaɲ³	(zɔːn) / ɲuːn⁶	[lɔŋ]	¦ / ¦
少	few	*Cɪɣɛwɦ / NCHI: *kʰəmʔ	zaw² / kʰam³	zaw² / kʰan³	raw² / kʰam³	tɔ:² / kʰam³	tʰɔ:² / tɔ:²	tɔ:² / tɔ:²	[tɛːk⁸]	zǎw / toːꜜ

漢字	gloss	proto A	proto B	1	2	3	4	5	6	7	8	9
潲雨	slanted rain	*pi:wɦ / Qi:	*pʰi:wɦ / *fɔ:nɦ	pʰi:w² / ---	pʰi:w² / ---	pʰi:w² / pʰiw²	pʰi:w⁵ / pʰiw²	pʰi:w² / pʰiw²	fɔ:n⁵ / pʰiw⁵	fɔ:n⁵ / pʰiw⁵	[pʰat⁷]	--- / ---	--- / ---
SHE												
舌頭	tongue	*li:nʔ	*hli:nʔ	di:n³ / tθin³	ɬi:n³ / lin³	ɬi:n³ / ɬiŋ³	ɬi:n³ / ɬiŋ³	ɬi:n³ / ɬiŋ³	ɬi:n³ / ɬin³	ɬi:n⁴	dien / ɬi:ŋ˥	tɬien
蛇	snake	*Cila:ɦ NWCHI:	*lja:ɦ / *C-nu:ʔ	za:² / nay³	za:² / naw³	za:² / za:²	ɬa:² / za:²	ɬa:² / za:²	ɬa:² / (pʰuat⁷)	[ɓuet⁷]	za: / ʒa:˩	tʰa:
射	shoot	*ɲuu: NWCHI:	*hɲuu: / *ɓi:wɦ	ɲəuɟ¹ / ɓiw⁵	tsəuɟ¹ / ɓiw²	tsəuɟ¹ / ɦestɟ	tsesɟ¹ / ɦestɟ	tsʰɦeɟ¹ / ɦestɟ	tsɦeɟ⁴ / ɦestɟ	ni:⁴	ɲəuɟ / ---	---
SHEN												
伸	stretch	*ja:ʔ	*hja:ʔ	za:³ / ---	za:³ / ---	za:³ / za:³	za:⁶ / za:³	z[ɔ]:⁶ / za:³	z[ɔ]:³ / za:³	tsɔ:⁴	za: / ʒa:˥	---
伸	stretch	*C-gəwʔ Run:	*C-gəwʔ / *ʔɯ:	ko:³ / zit⁵	ko:³ / (ziʔ⁵)	ko:³ / ---	ko:³ / ko:³	ko:³ / ʔəɟ¹	ko:³ / ʔəɟ¹	[ɓɔŋ⁵]	--- / ---	---
身體	body	*Cuɣu:n	*Cuɦu:n	hu:n¹ / ɲenɟ¹	hu:n¹ / ɲuɟ¹	hu:n¹ / ɲuɟ¹	hu:n¹ / ɲuɟ¹	hu:n¹ / ɲuɟ¹	hu:n¹ / ɲuɟ⁴	huən⁴	húon / ɲu:ɲ˩	---
呻吟	groan	GHI: Meifu:	*keŋ / *kuɯŋ	(kaŋ¹) / kaŋ¹	kaŋ¹ / kan¹	kaŋ¹ / keŋ¹	kaŋ¹ / keŋ¹	kaŋ¹ / kaŋ¹	kaŋ¹ / kɔŋ¹	kiəŋ¹	--- / kʰœŋ˥	---
深	deep	*lə:k	*hlə:k	dak⁷ / tθak²	ɬo:ʔ⁷ / lɔʔ⁴	ɬo:ʔ⁷ / ɬo:k⁷	ɬo:ʔ⁷ / ɬo:k⁷	ɬo:ʔ⁷ / ɬoʔ⁸	ɬo:ʔ⁷ / ɬoʔ⁷	ɬa:⁴²	dĕk / ɬu:ʔ˥	tɬɔ:

漢字	gloss	reconstruction	1	2	3	4	5	6	7	8	9
深夜	deep night	GHl: *pʰaːk	tʰun^1	pʰeː^7	pʰeːk^7	ɬoː^7	ɬɔː^7	ɬɔː^7	ɬaː^2	---	---
		CHl: *hlɔːk	---	lɔʔ^4	---	pʰeːk^7	ɬoʔ^8	ɬoʔ^7		---	---
		*[c/ɕ]əp	tsʰop^7	tsʰap^7	tsʰop^7	tsʰop^7	tsʰap^7	tsʰap^7	tsʰɔːp^9	---	---
			---	saʔ^4	---	tsʰap^7	tsʰap^7	tsʰap^7		---	---
嬸母	father's brother's wife	*mi: / *hmi:	m[iː]^1	pey^1	pey^1	pey^4	pʰey^4	pey^4	miː^4	---	---
			ɓay^4	---	---	pey^1	pey^4	pey^4		---	---
腎	kidney	*C-nəːm / *C-nəːm	nam^1	noːm^1	noːm^1	nɔːm^4	nɔːm^4	nɔːm^1	nam^1	---	---
			---	---	noːm^1	---	---	---	---	---	---
滲透	permeate	GHl: *ɟ]əp	---	zap^7	rop^7	---	---	zup^8	[ɓɯːn^{5}daŋ^1]	---	---
			---	---	tap^7	tap^7	tsap^8	tsap^8		---	---
SHENG											
生	raw	*Cuɾi:p / *Cuɾi:p	ri:p^7	ri:p^7	vi:p^7	fi:p^8	fi:p^8	fi:p^8	[ɬuet^8]	diep	ɟiep
			vip^4	---	gip^7	ɣip^7	fip^8	fip^8		fi:pɬ	
生	give birth	*lu: / *hlu:	dow^1	ɬow^1	ɬow^1	ɬow^1	ɬow^1	ɬow^1	ɬaw^4	tʌw	tɬʌw
			---	lɛw^1	---	ɬow^1	ɬow^1	ɬow^1		---	
生火	make fire	*C-mu: / *C-mu:	mow^1	mow^1	mow^1	---	---	---	[ɲin^4]	---	---
			---	---	mow^1	mow^1	mow^1	mow[1]		---	---
		*fi: / *fi:	(pey^1)	fey^1	fey^1	fey^1	fey^1	fey^1	pay^1	---	---
			---	---	fey^1	fey^1	fey^1	fʰey^1		---	---

Gloss		Proto		1	2	3	4	5	6	7	8	9
生氣	angry	*tɯːn	*tʰɯːn	tʰɯːn¹	tʰɯːn¹	tʰɯːn¹	tʰɯːn¹ tʰɯɲ¹	---	--- tʰən¹	---	tʰúɤn	---
	Qi: Run:	*Cuʔaːɦ *rinɦ		gwaː⁵ ---	---	gwaː⁵	vaː⁵ ren²	vaː⁵ ren²	ʔwa[y]⁵ ren²	ʔaː¹	---	---
生鏽	rust	*C-ŋaːn	*[k/x]ən	ŋaːn¹	ŋaːn¹	ŋaːn¹	ŋaːn⁴	ŋaːn¹	ŋaːn¹ ŋuan[1]	ŋuən¹	ŋán	---
		*k^hən		(kʰan¹) kʰɔn¹	kʰan¹	kʰan¹ kʰan¹	kʰan¹ kʰaːŋ	kʰan¹ kʰaːŋ	kʰan¹	---	---	---
	NECHI:	*hlaːc *C-ŋwəyʔ		tan²	taːt⁷	ɬaːc⁷ ŋay³	ɬaːt⁷ ŋay³	ɬaːt⁷ ŋay³	ɬaːt⁷ ŋay⁶	---	---	---
聲音	voice	*tiːw	*tʰiːw	tʰiːw¹	tʰiːw¹ tʰiː¹	tʰiːw¹ tʰiw¹	tʰiːw¹ tʰiw¹	tʰiːw¹ tʰiw¹	tʰiːw¹ tʰiw¹	tsʰew¹	---	---
繩子	rope	*C-ɗəːy		daːy¹ ɗɔː(y)¹	ɗoːy¹ ɗɔy¹	ɗoːy¹ ɗoːy¹	daːy¹ ɗoːy¹	daːy¹ duay¹	daːy¹ ɗuːy¹	tuɯy¹	dáːy	---
繩子	rope	*[k/x]aː		kʰaː¹	kʰaː¹	kʰaː¹ kʰaː¹	kʰaː¹ kʰaː¹	kʰaː¹ kʰaː¹	kʰaː¹ kʰaː¹	---	---	---
剩餘	remainder	*Cljaː		zaː¹	zaː¹	zaː¹	ɬaː⁴ zaː¹	zaː¹	--- tsaː⁴	tsow⁴	---	---
剩餘物	remainders	*C-daːn		daːn¹	daːn¹	daːn¹ daːŋ¹	daːn¹	daːn¹	---	ɗuən¹	---	---
SHI												
失火	catch fire	*təŋ	*tʰəŋ	tʰoŋ¹	tʰaŋ¹	tʰaŋ¹ tʰaŋ¹	tʰaŋ¹ tʰaŋ¹	tʰaŋ¹ tʰaŋ¹	tʰaŋ¹ tʰ[a]ŋ¹	[nɯuən⁴]	---	---

		Proto A	Proto B										
失時	lose time	*C-ruyʔ	*ruyʔ	ruy^3 / ---	ruy^3 / loy^3	ruy^3 / luy^3	ruy^6 / ruy^3	luy^6 / roy^3	luy^6 / row^6	[kua^{5}luːn^2]	--- / ---	--- / ---
虱子	louse	*tən NWCHl:	*tʰən *mbət	tʰen^1 / ɓat^5	tʰan^1 / paʔ^4	tʰan^1 / ---	tʰan^1 / tʰaŋ^1	tʰan^1 / tʰaŋ^1	tʰan^1 / tʰan^1	ten^1	--- / ---	--- / ---
濕	wet	*mənʔ	*hmənʔ	men^3 / ɓan^4	pan^3 / pan^3	pan^3 / pan$^{[11]}$	pan^6 / paŋ^3	pʰan^6 / paŋ^3	pan^6 / pan^6	pəːn^4	mèn / paŋ˥	pan
十	ten	*fu:t NCHl:	*fu:t *fu:c	pʰu:t^7 / ---	fu:t^7 / fuʔ^4	fu:t^7 / fu:t^7	fu:t^7 / fu:t^7	fu:t^7 / fut^7	fu:t^7 / fut^7	puət^9	pʰúot / fu:t˥	fŭot
石精	benzine	*[c/ɕ]i:n	*tɕʰi:n	tsʰiːn^1 / ---	tsʰiːn^1 / ---	tsʰiːn^1 / tsʰiŋ^1	tsʰiːn^1 / tsʰiŋ^1	tsʰiːn^1 / (tsʰiŋ^4)	tsʰiːn^1 / tsʰin^1	tsʰiːn^1	--- / ---	--- / ---
		*ja:	*hja:	za:^{1} / ---	za:^{1} / ---	za:^{1} / ---	za:^{4} / ---	za:^{4} / za:^{1}	za:^{1} / za:^{4}	tso:^{1}	--- / ---	--- / ---
石頭	stone	*[c/ɕ]i:n	*tɕʰi:n	tsʰiːn^1 / sin^1	tsʰiːn^1 / sin^1	tsʰiːn^1 / tsʰiŋ^1	tsʰiːn^1 / tsʰiŋ^1	tsʰiːn^1 / (tsʰiŋ^4)	tsʰiːn^1 / tsʰin^1	tsʰiːn^1	ʃien / tʃʰiːŋ˥	--- / ---
食指	index finger	*Cli:ŋɦ	*lji:ŋɦ	ziːŋ^2 / zak^4	ziːŋ^2 / ---	ziːŋ^2 / ---	ɬiaŋ^2 / ziŋ^2	ɬiaŋ^2 / (ziŋ^5)	ɬiaŋ^2 / tsiŋ^2	tsap^{9}tsia^4	--- / ---	--- / ---
	GHl: CHl:	*tɕək	*tɕok	(tsak^9) / tsak^4	tsak^7 / ---	tsak^7 / tsɔk^7	tsak^7 / tsɔk^7	tsoʔ^8 / tsɔʔ^8	tsok^7 / -----	tsɔk^7	--- / ---	--- / ---
		*C-ɲa:wʔ	*C-ɲa:wʔ	ɲa:w^3 / ɲa:w^3	ɲa:w^3 / ---	ɲa:w^3 / ɲa:w^3	ɲa:w^6 / ɲa:w^3	ɲa:w^3 / ---	ɲa:w^3 / -----	nɔːw^4	--- / ---	--- / ---

漢字	gloss	Reconstruction		D1	D2	D3	D4	D5	D6	D7	D8
使用	use	*C-guɯ:ŋɦ	*kuɯ:ŋɦ	kɯ:ŋ² / kɯɯŋ⁵	kuɯ:ŋ² / keŋ²	kɯ:ŋ² / ---	kuɯ:ŋ⁵ / kuŋ²	kuɯ:ŋ⁵ / kuɲ²	kuɯ:ŋ⁵ / ---	[zoŋ⁵] / ---	--- / ---
屎	excrement	*C-ɣa:yʔ	*ha:yʔ	ha:y³ / ha:(y)³	ha:y³ / hay³	ha:y³ / ha:y³	ha:y³ / ha:y³	ha:y³ / ha:y³	ha:y³ / huay³	huay² / ---	hày / ha:yˀ
試	try	*C-ɓuɯ:n	*ɓi	ɓuɯ:n¹ / ---	ɓuɯ:n¹ / ---	ɓi¹ / ɓi¹	ɓi¹ / ɓi¹	--- / ɓi¹[²]	ɓuɯ:n¹ / ɓi¹	---	buɯˠn / ---
		CHI:									
世代	generation	*puɯ:n		pʰuɯ:n¹ / ---	pʰuɯ:n¹ / ---	pʰuɯ:n¹ / pʰuŋ¹	pʰuɯ:n¹ / pʰuŋ¹	pʰuɯ:n¹ / pʰuŋ¹	pʰuɯ:n¹ / pʰən¹	[kit⁷]	--- / ---
是	be	CHI:		(tsaŋ³) / man¹	(tsaŋ³) / ---	man¹ / maŋ¹	man¹ / maŋ¹	man⁴ / maŋ¹	man¹ / man⁴	tsaŋ¹	tʃàŋ / ---
SHOU											
收殮	prepare for burial	*C-lu:t	*tʃˈhuɯ:mʔ	lu:t⁷ / ---	lu:t⁷ / lu:ʔ⁴	lu:t⁷ / lut⁷	lu:t⁷ / lut⁷	lu:t⁷ / tsˈhum³	lu:t⁷ / tsˈhum³	---	--- / ---
		Run:									
手	hand	*C-muɯ:		meɯɯ¹ / mow¹	meɯ¹ / mɛw¹	meɯ¹ / ---	meɯ¹ / meɯɯ¹	meɯ⁴ / heɯ¹	meɯ¹ / heɯⁿ⁴	ma:¹	méɯɯ / ɬˈmeɯ
手指	finger	*Cili:ŋɦ		zi:ŋ² / ---	zi:ŋ² / ziŋ²	ziŋ² / ziŋ²	tiaŋ² / ziŋ²	tiaŋ² / (ziŋ⁵)	tiaŋ² / tsiŋ²	tsap⁹tsia⁴	žieŋ / ʑi:ŋˀ; tɬèəŋ
瘦	thin	*C-li:ʔ		ley³ / lɛy³	ley³ / lɛy³	ley³ / ley³	ley⁶ / ley³	ley³ / ley⁶	ley³ / ley⁶	[ɲa:wˀ]	lêy / lɛyˀ
SHU											
叔父	father's younger brother	*fɯ:		pʰˈeɯ¹ / ---	feɯ¹ / ---	feɯ¹ / feɯⁿ¹	feɯ¹ / feɯⁿ⁴	feɯ¹ / feɯⁿ⁴	feɯ¹ / tʰeɯⁿ¹	pa:¹	--- / fˈɯeʔ

漢字	gloss												
梳	comb	*s[ɛ]ŋ	*s[e]ːŋ	teːŋ¹ / ---	teːŋ¹ / ---	teːŋ¹ / seːŋ¹	teːŋ¹ / seːŋ¹	teːŋ¹ / tsʰiaŋ¹	teːŋ¹ / tsʰiaŋ¹	tsʰiː¹ / ---	┆	tɛŋ / tʃʰiaŋ
疏	sparse	*waːnʔ	*hwaːnʔ	vaːn³ / hoŋ⁴	vaːn³ / van³	hwaːn³ / vaːŋ³	vaːn⁶ / vaːŋ³	vaːn⁶ / vaːŋ³	vaːn³ / vuan⁶	fuən¹ / vuən⁶	┆	vàn
贖	redeem	*təːmʔ	*tʃʰəːmʔ	tsʰam³ / ---	--- / ---	tsʰoːm³ / ---	tsʰoːm³ / tsʰoːm³	--- / tsʰuam³	tsʰɔːm³ / tsʰuam³	tiam¹ / tsʰuam³	┆	---
熟	cooked	*C-buy	*C-βuy	puy¹ / fɕy¹	fuy¹ / fɕy¹	fuy¹ / guy¹	fuy¹ / ɣuy¹	fuy¹ / foy¹	fuɣy¹ / fow¹	fuey¹ / ---	┆	puɾy / foy˦
數	count	*[k/x]aːyʔ	*kʰaːyʔ	kʰaːy³ / ---	kʰaːy³ / kʰay³	kʰaːy³ / kʰaːy³	kʰaːy³ / kʰoːy³	kʰaːy³ / kʰuay³	kʰaːy³ / kʰuːy³	kʰaː⁴ / ---	┆	xày
樹	tree	*tʃey	*tʃʰey	tsʰay¹ / ---	tsʰay¹ / hay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / ---	┆	ʃây / tʃʰay˦
樹漿	sap	*teːŋ	*tʰeːɬ	tʰaŋ¹ / tsʰaŋ¹	tʰoːŋ¹ / tʰɔŋ¹	tʰoːŋ¹ / tʰoːŋ¹	tʰoːŋ¹ / tʰoːŋ¹	tʰɔːŋ¹ / tʰuaŋ¹	tʰɔːŋ¹ / tʰuaŋ¹	ɗaː¹ / ---	┆	---
樹心	tree core	*Cuɣec	*Cuɦec	hat⁷ / ---	hat⁷ / ŋwaʔ⁴	hwac⁷ / ŋat⁷	hwat⁷ / ŋat⁷	hwat⁷ / ŋat⁸	hwat⁷ / ŋat⁸	[ʔiet⁷] / ---	┆	---
樹枝	tree limb	GHI:	*kʰaː	ʔaː³ / ---	kʰaː¹ / kʰ[ɛ]ː¹	kʰaː¹ / kʰaː¹	kʰaː¹ / kʰaː¹	kʰaː¹ / kʰaː¹	kʰaː¹ / kʰaː¹	kʰow¹ / ---	┆	ǎː / kʰaː˦
		Qi:	*nduːŋ	--- / ---	--- / ---	tuːŋ⁴ / ---	tuːŋ⁴ / ---	tʰuaŋ⁴ / ---	tuːŋ⁴ / ---	--- / ---	┆	---
		*tʃəy	*tʃʰəy	tsʰay¹ / ---	tsʰay¹ / ---	tsʰay¹ / ---	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / ---	┆	ʃây

Gloss		Proto (A)	Proto (B)	1	2	3	4	5	6	7
豎	vertical	*C-rinɦ	*rinɦ	riŋ^2	rin^2	reɲ^2	ren^2	len^2	lin^2	[ləŋ^4]
		NWCHI:	*dɑ:ɲ	dɔn^1	dɔn^1	lin^2	ren^2	ren^2	ren^2	
SHUAI										
捼	throw	*se:s	*se:s	tap^7	to:p^7	to:p^7	to:p^7	tɔ:p^7	tɔ:p^7	[ʔɔ:p^9]
				---	---	so:p^7	so:p^7	tsʰuap^8	---	
SHUAN										
拴	tie	*C-ŋɛ:nʔ	*C-ŋɛ:nʔ	ŋan^3	ŋo:n^3	ŋo:n^3	ŋo:n^3	(ŋuan^2)	ŋɔ:n^3	[kuɲ^1]
				ŋa:n^3	ŋɔn^3	ŋo:ŋ^3	ŋo:ŋ^3	ŋuaŋ^3	ɲu:n^6	
SHUANG										
雙	pair	*lɯ:mʔ	*hlɯ:mʔ	dɯ:m^3	ɬɯ:m^3	ɬɯ:m^3	ɬu:m^3	ɬu:m^3	ɬɯ:m^3	[ʔum^1]
				---	---	ɬum^3	ɬum^3	ɬum^3	ɬom^3	
雙	pair	CHI:	*fi:k	---	fi:k^7	---	---	---	---	---
				---	fiʔ^7	---	---	---	---	
雙生子	twins	*lɯ:k	*hlɯ:k	---	---	diˀ^3	diˀ^3	ɬua^{2}ˀ	diˀ^3	ɬiek^8
		Qi:	*diʔ	---	---	ɬuk^7	ɬuk^7	ɬuk^8	ɬɯʔ^7	
		*pa:	*pʰa:	---	---	pʰa:^{1}	pʰa:^{1}	pʰa:^{1}	pʰa:^{1}	6ow^1
				---	---	pʰa:^{1}	pʰa:^{1}	pʰa:^{1}	pʰa:^{1}	
霜	frost	GHI:	*ljin	---	zi[ŋ]^1	zeɲ^1	ten^4	ten^4	ɬin^4	[nɔ:w^{4}vuey^1]
				---	zenʔ^4	zen^4	zen^1	---	---	

SHUI

漢字	gloss	Reconstruction									
誰	who	*ʔaːʔ Ruŋː *ʔaː	ʔa³ ʔa[w][⁵]	ʔa³	ʔa³	ʔa³	ʔa[y][¹] ʔa¹	ʔa[y][⁴] ʔa¹	[ka:y⁵]	à ---	--- ---
		*C-ɾaː *ɾaː	ra:¹ la[ʔ]⁴	ra:¹ la:¹	ra:[²] la:[³]	ra:¹ la:¹	la:[²] ra:[⁵]	la:[¹] ra:[⁶]	---	da: ɮaˀ	---
水	water	*C-nəmʔ *C-nəmʔ	nom³ nam³	nom³ nam³	nam³ nam³	nam⁶ nam³	nam³ nam⁶	na:m¹	na:m¹	nòm nam˥	nám
水壩	dam	*tʰeːmʔ *teːmʔ	tʰam³ tʰam³	tʰoːm³ ---	tʰoːm³ tʰoːm³	tʰoːm³ tʰoːm³	tʰoːm³ tʰuam³	tʰoːm³ tʰuam³	[ti:ŋ⁵]	---	---
水車	waterwheel	GHl:	--- van⁵	van²	van² vaŋ²	van²	van²	van²	---	---	---
水溝	ditch	*saːyɦ *saːyɦ	ta:y² sa:(y)⁵	ta:y² fay²	ta:y² sa:y²	ta:y² sa:y²	--- sa:y²	ta:y²	[va:y⁵]	---	---
		*C-nəmʔ *C-nəmʔ	nom³ nam³	nam³ nam³	nam³ nam³	nam³ nam³	nam³ nam⁶	na:m¹	na:m¹	---	---
水溝	ditch	Qi:	--- ---	--- ---	diŋ⁵	diŋ⁵	diŋ⁵	diŋ⁵	---	---	---
水牛	water buffalo	*suyʔ *suyʔ	tuy³ tθɤy³	tuy³ foy³	tuy³ suy³	tuy³ suy³	tuy³ tsʰoy³	tuy³ tsʰoy³	tsʰey¹	tùːy tʃʰoy	---
水獺	otter	*hna:k *na:k	na:ʔ⁷ tsɛk⁴	te:k⁷	te:ʔ⁷ tɯː²	te:ʔ⁸ tɯː²	tʰe:ʔ⁸ teʔ⁸	te:ʔ⁸ tiaʔ⁸	nɯ:²	na:	---
稅	tax	*ɦiːŋ *C-ɣiːŋ	hi:ŋ¹ hiaŋ[⁵]	hi:ŋ¹	hiaŋ¹	hian¹	hian¹	hian¹	---	---	---

睡	sleep	GHI:	*tɕəːn	(tsoːn¹) tsan¹	tsoːn¹ tsɔn¹	tsoːn¹ tsoːŋ¹	tsoːn¹ tsoːŋ¹	tsoːn¹ tsuaŋ	tsoːn¹ tuːn¹	---	(tʃɔn) ɬuay˥	‖ ‖
睡	sleep (lay down)	*ŋuːɦ	*ŋuːɦ	ŋow² kaˑ⁵	kaw² kaw²	kaw² kaw²	kaw² kaw²	kʰoː² kaw²	koː² kaw²	ŋɔː⁴	ŋʌ̌w -	‖ ‖
SHUO												
說	talk	*C-riːn NECHI:	*riːn *tʃʰimɦ	riːn¹ ---	riːn¹ ---	riːn¹ tsʰem²	riːn⁴ tsʰem²	--- tsʰem²	liːn⁴ ---	[huː¹]	dɕen tʃʰemʌ	‖ ‖
SI												
絲瓜	sponge gourd	*meːŋʔ NECHI:	*meːŋʔ *raːŋɦ	meːŋ³ ---	peːŋ³ ---	peːŋ³ leːŋ[3]	peːŋ² peːŋ³ reːŋ²	pʰeːŋ² riaŋ⁵	peːŋ² riaŋ⁵	peːŋ² ---	‖ ‖
絲線	silk thread	GHI:	*funɦ	--- ---	fun² ---	fun² fɔŋ²	fun⁵ fɔŋ²	fun⁵ fɔŋ²	fun⁵ fɤn⁵	[tuɰɣ˩ɬuːw⁴]	‖
私生子	bastard	*hluːk	*lɰːk	dɰːʔ tθuɰek²	ɬuːkˀ ---	ɬuːkˀ ---	ɬuːʔ⁷ ɬuk⁷	ɬuaʔ⁷ ɬuk⁸	ɬuaʔ⁷ ɬuɰʔ⁷	ɬiek⁸	‖ ‖
		CHI: Run:	*hju: *tʃʰaː[ɦ] *ŋaːwʔ	dɕeɰɭ ---	--- ---	zow¹ ---	zow⁴ zow¹	zow⁴ tsʰaː² kaːw³	zow¹ tsʰaː¹ kaːw⁶	[vuɰam¹]	‖ ‖
撕	tear	*ʔiːk NWCHI: NECHI:	*ʔiːk *dɛːŋʔ *ʔwiːk	ʔiːʔ[9] dɛŋ³	ʔiːʔ⁷ dɛŋ³	ʔiːk⁷ giʔ⁷	ʔiaʔ⁷ γik⁸	ʔiaʔ⁷ vit⁸	ʔiaʔ⁷ viʔ⁷	---	γ̌iː -	‖ ‖

Character	Gloss	Reconstruction	Proto										
撕	tear	*C-ɲi:k	ECHI:	---	---	ɲi:k⁷	ɲiaʔ⁷	niaʔ⁸	ɲiak⁷	ɲi:t⁹		---	---
				---	---	---	---	---	---			ɲi:t˩	
死	die	*hla:wɦ	*la:wɦ	dfa:w²	---	ɬa:w²	---	---	ɬa:w²	---		---	---
				---	---	---	---	ɬa:w²	---			ɬaw˩	
死	die	*ɦɯt	CHI:	---	---	hɯt⁷	ɬu:y⁴	ɬu:y⁴	ɬu:y⁴	[lɔ:t⁹]		dóm	t^huy
	die	*lju:y	CHI:	---	---	h[ɯ]ʔ⁷	h[ɔ]k⁷	zuy³	zuy⁶			ʒuy˩	
四	four	*tʃ^ha:wʔ	*ta:wʔ	tsʰa:w³	tsʰa:w³	tsʰaw³	tsʰɔ:³	tsʰo:³	tsʰɔ:³	tiew¹		ʃa:w	ʃɔ́:
		*tʃ^həwʔ	CHI:	haw³	hɔ:³	tsʰo:³	tsʰo:³	tsʰo:³	tsʰo:³			tʃ^hoː˩	
四腳蛇	lizard	*ʔi:ŋɦ	*ʔi:ŋɦ	ʔi:ŋ²	ʔi:ŋ[1]	ʔi:ŋ[1]	ʔi:ŋ⁵	ʔiaŋ⁵	ʔiaŋ⁵	ʔiaŋ⁵		---	---
				---	---	---	ʔiŋ²	ʔiŋ²	ʔiŋ⁵			---	
四腳蛇	lizard	*rjɯ:ŋ	CHI:	tsʰəɰ³	zaɰ⁷	rɯ:ŋ⁴	tɯ:ŋ⁴	t^hɯaŋ⁴	tɯ:ŋ⁴	lieŋ⁴pow⁴tse²		---	---
				---	---	tɯŋ⁴	tuŋ¹	tsɯŋ¹	tsɯŋ⁴			---	
飼料	feed (n.)	*k^hən	GHI:	(k^han˩)	k^han¹	k^han¹	k^han¹	k^han¹	k^han¹	han¹		---	---
				k^hɯn¹	k^han¹	k^haŋ¹	k^haŋ¹	k^haŋ¹	k^han¹			---	
SONG													
松鼠	squirrel	*C-ɲa:t	*C-ɲa:t	ɲa:t⁷	ɲa:t⁷	ɲa:t⁷	ɲa:t⁷	na:t⁷	ɲa:t⁷	[lɔ:n⁵]		---	---
				---	---	---	ɲ[o]:t⁷	ɲa:t⁸	ɲuat⁸			---	
SU													
甦醒	arouse	*sɯ:	*sɯ:	hɕɯ¹	hɕɯ¹	hɕɯ¹	hɕɯ¹	hɕɯ¹,sɻ	hɕɯ¹	[tsʰe:t⁹]		---	---
				---	---	---	hes	hes	hɕɯ¹			---	
肅靜	solemn silence	*ʔət	*ʔət	ʔət⁷	(ʔet⁷)	ʔat⁷	---	---	---	---		---	---
		*tɯ:ŋʔ	Run:	---	---	---	---	ɬuŋ³	ɬuŋ³			---	

字	gloss	source	proto	1	2	3	4	5	6	7	8	9	10	11
肅靜	solemn silence	GHl:	*ʔik	---	---	ʔik⁷	ʔik⁷	ʔik⁷	ʔi:ʔ⁷	ʔi:ʔ⁷	ʔi[:]k⁷	ʔi:k⁹	---	---
		Run:	*lji:[ʔ]	---	---	---	---	---	ʔik⁷	zey⁴	tsey⁶	---	---	---
嗦子	crop	GHl:	*kʰən	(ʔo:²)	---	kʰan¹	kʰan¹	kʰan¹	---	kʰaɲ¹	kʰan¹	[dɛ:⁵ʔɔ:⁵]	---	---
				---	---	---	---	---	kʰaɲ¹	kʰan¹	kʰan¹	---	---	fa:˩
SUAN														
酸	sour	*C-ba:ʔ	*C-βa:ʔ	pa:³	---	fa:³	fa:²	fa:³	fa:³	fa:³	fa:³	fow¹	---	---
				---	---	fa:³	---	---	fa:³	fa:³	fa:³	---	---	---
酸菜	pickled cabbage	*Ciri:ŋ	*rji:ŋ	zi:ŋ¹	---	zi:ŋ¹	ri:ŋ¹	tian⁴	tʰian⁴	tian⁴	tiaŋ⁴	[pa:⁵]	---	---
				---	---	---	---	tin¹	tsiŋ¹	tsiŋ⁴	tsiŋ⁴	---	---	---
算盤	abacus	GHl:	*lju:ɦ	---	---	zauɟ²	zauɟ²	ɬauɟ²	ɬauɟ²	ɬauɟ²	ɬauɟ²	---	---	---
				---	---	---	---	---	---	---	tsauɟ²	---	---	---
SUI														
碎	smash	*nɔm	*hnom	nom¹	---	tom¹	tom¹	tom⁴	---	tum⁴	---	---	---	---
		Run:	*ɲɲomɦ	ɗom⁴	---	---	---	tom¹	tsom²	tsom²	---	---	---	---
SUN														
孫子	grandson	*C-ɣəɲ	*ɦəɲ	han¹	---	han¹	ɬɯ:k⁷	ɬuk⁷	ɬua?⁷	ɬ[a]k⁷	ɬiek⁸	---	---	Ɦɛn
		CHl:	*hlɯ:k	tθɯek²	---	---	ɬuk⁷	ɬuk⁷	ɬuk⁸	---	---	---	---	ɬœkˡ
		*pʰu:ʔ	*pʰu:ʔ	pʰow³	---	pʰaw³	fow³	pʰaw³	faw³	(pə·w⁶)	---	---	---	---
		CHl:	*fu:ʔ	---	---	---	[v]aw³	faw³	faw³	pə:w⁴	---	---	---	pɑwˡ
SUO														
梭子	shuttle	GHl:	*kʰuc	---	---	kʰut⁷	kʰuc⁷	---	---	kʰut⁷	kiet⁷	---	---	---
				kʰuat²	---	---	---	kʰot⁷	kʰot⁷	kʰət⁷	---	---	---	---

漢字	gloss	Recon 1	Recon 2								
蓑衣	straw rain cape	*C-ɓi:nɦ	*ɓi:nɦ	ɓi:n²	ɓi:n²	ɓi:n²	ɓɵuŋ¹	---	ɓɵuŋ¹	[tsʰuaŋ¹]	---
		Qi:	*ɓɯ:	---	---	---	---	---	---	---	---
TA											
他	he/she	*C-na:	*C-na:	na:¹	na:˩	na:˩	na:¹	na:⁴	na:¹	ney⁵	nà: / na:
				na:˩[5]	na:˩	na:˩	na:¹	n[e]:˩	na[ʔ]⁸	---	n[ɔ:]˩
他們	they	CHI:	*kʰun	---	---	kʰun¹	---	---	---	---	---
				ki¹	---	---	kʰoŋ¹	kʰoŋ¹	kʰən⁵	---	---
		*C-ɾu:ɦ	*ɾu:ɦ	(ɾaw¹)	ɾaw²	---	ɾaw²	(law²)	lɔ:²	[mow⁵]	---
		NCHI:	*C-na:	na:˩[5]	na:˩[5]	na:˩	ɾaw²	na:˩[5]	n[o]:˩[2]	---	---
TAI											
台風	typhoon	*wənɦ	*hwənɦ	vɛn²	van²	hwan²	van²	van²	van⁵	[pʰa:ŋ¹]	vɛ̀n
				---	van⁵	vaŋ²	vaŋ²	vaŋ²	van²	---	---
苔鮮	moss	GHI:	*C-nə:ŋʔ	---	no:ŋ³	no:ŋ³	no:ŋ³	nɔ:ŋ⁶	nɔ:ŋ³	---	---
				---	---	no:ŋ³	no:ŋ³	nuaŋ³	nuaŋ⁶	---	---
抬	lift (two people)	*ʈa:m	*ʈʰa:m	tsʰa:m¹	tsʰa:m¹	tsʰa:m¹	tsʰa:m¹	tsʰa:m¹	tsʰa:m¹	tɔm¹	---
				hɔm¹	han¹	tsʰa:m¹	tsʰa:m¹	tsʰa:m¹	tsʰam¹	---	---
太陽	sun	*ʈa:	*ʈʰa:	tsʰa:˩¹	tsʰa:˩[2]	tsʰa:˩	tsʰa:˩¹	tsʰa:˩	tsʰa:˩¹	tow¹	ʃǎ:
				---	hɔ:³	tsʰa:˩[3]	tsʰa:˩[3]	tsʰa:˩	---	---	tʃʰa:˩
		*ŋʷən	*hŋʷən	vɛn¹	van¹	hwan¹	van⁴	van⁴	van¹	vɔ:n¹	vɛ̌n
				hon⁴	vanˀ⁴	vaŋ⁴	vaŋ¹	vaŋ¹	van⁴	---	vaŋˀ

字	Gloss	Proto A	Proto B	1	2	3	4	5	6	7	8
太陽穴	temples	*C-ɣəw	*C-ɦəw	haw^1 / ¦	haw^1 / ¦	haw^1 / haw^1	haw^1 / haw^1	haw^1 / haw^1	haw^1 / ---	haw^4	¦ ¦
		*fiːŋ	*fiːŋ	p^{h}iːŋ^1 / ¦	fiːŋ^1 / fiŋ^1	fiaŋ^1 / fiŋ^1	fiaŋ^1 / fiŋ^1	fiaŋ^1 / fiŋ^1	fiaŋ^1 / fiŋ^1	pia^1	¦ ¦
TAN											
罎子	earthen jar	*C-gəy	*C-gəy	kay^1 / ¦	kay^1 / kay^1	kay^1 / ---	kay^1 / kay^1	kay^1 / kay^1	kay^1 / kay^1	kiːw^4	¦ ¦
		*ʔuŋɦ	*ʔuŋɦ	ʔuŋ^2 / ¦	ʔuŋ^2 / ---	ʔ[o]ŋ^7 / ---	ʔuŋ^2 / ʔoŋ^2	ʔuŋ^2 / ---	ʔuŋ^2 / fiŋ^1	t^{h}uŋ^4	¦ ¦
痰	phlegm	*C-nəmʔ	*C-nəmʔ	nom^3 / nam^3	nom^3 / ---	nam^3 / nan^3	nam^3 / nam^3	nam^3 / nam^3	nam^3 / nam^6	naːm^1	nam⌐
	GHI: NWCHI:	*C-ɦaːk *k^{h}ək		(he:ʔ^9) / k^{h}ak^5	he:ʔ^7 / k^{h}aʔ^4	h[a]ːk^7 / he:ʔ^7	h[a]ːp^7 / huːː^2	h[a]ːp^7 / (heʔ^7)	h[a]ːt^7 / hiaʔ^7	ha:k^8	¦ ¦
潭	deep pool	*wɑːŋ	*hɲwaːŋ	vaːŋ^1 / ¦	veːŋ^1 / ---	hweːŋ^1 / ---	veːŋ^4 / veːŋ^1	--- / viɑŋ^1	veːŋ$^{[4]}$ / (viɑŋ^1)	[t^{h}aː^2]	vɑ́ŋ
彈	flick (cotton)	*ɲuː	*hɲuː	ɲəuɻ^1 / ¦	tseeɻ^1 / ---	tseeɻ^1 / tseeɻ^4	tseeɻ^4 / tseeɻ^1	ts^{h}əuɻ^4 / tseeɻ^1	tseeɻ^1 / tseeɻ^4	niː^4	¦ ¦
炭	coal	*luːɦ	*hluːɦ	dəuɻ^2 / tθɔ:^{5}	ɬauɻ^2 / ---	ɬauɻ^2 / ---	ɬauɻ^2 / ɬeuɻ^2	--- / ---	--- / ---	[ʔaːŋ^{1}pay^1]	¦ ¦
探望	visit	GHI: *k^{h}əmɦ		¦	k^{h}oːm^2 / ---	k^{h}oːm^5 / k^{h}oːm^2	k^{h}ɔ:m^5 / k^{h}uam^2	k^{h}ɔ:m^5 / k^{h}oːm^2	k^{h}ɔ:m^3 / k^{h}uam^5	[tak^{8}tey^1]	¦ ¦
探望	visit	*ʔiːp	*ʔiːp	ʔiːp^7 / ¦	ʔiʔ^4 / ---	ʔiːp^7 / ---	ʔiːp^7 / ---	ʔiːp^7 / ---	ʔiːp^7 / ---	---	¦ ¦

TANG

趯	trip clsfr	*ŋaːyʔ	*ŋaːyʔ	ŋaːy³	---	kaːy³	kaːy⁶	kʰaːy⁶	kaːy⁶	[lem¹]			
		Ruŋ:	*ŋɵːyʔ	---	zuy³	kaːy³	kaːy³	kuay³	kuːy⁶				

TAO

逃脫	get away	*C-luɲʔ	*C-luɲʔ	lum³	lum³	luŋ³	lum³	(lum³)	lum³	lɔn¹			
				---	(lum²)	(lum³)	lɔn³	lɔn³	lən⁶				
討厭	annoying	*ʔaːyʔ	*ʔaːyʔ	ʔaːy³	ʔaːy³	ʔaːy³	ʔaːy³	ʔaːy³	ʔaːy³	[ʔjam⁴]			
		Meifu:	*ʔɵyʔ	---	(ʔay⁵)	ʔay³	ʔay³	ʔaːy³	ʔuay³				

TENG

藤籮	bamboo basket	*[j/Ci]juːk	*[hj/Ij]uːk	zuːʔ⁷	zuːʔ⁷	tsʰaw²	tsʰoː⁵	tsʰoː⁵	tsʰɔː⁵	[ɓiːn¹lɔː¹]			
		CHI:	*t[ʃ/ɕ]əwɦ	---	---		----	tsʰoː²	----				
藤篗	bamboo slat basket	*C-buŋ	*ɓuŋ	ɓuŋ¹	ɓuŋ¹	ɓoŋ¹	ɓoŋ¹	ɓ[o]ŋ¹	ɓuŋ¹	puŋ¹			
				ɓoŋ¹	ɓoŋ¹	ɓo[m]¹	ɓoŋ¹	ɓoŋ¹	ɓoŋ¹				

TI

梯子	ladder	GHI:	*pʰɯː	---	pʰəuŋ¹	pʰəuŋ¹	pʰəuŋ¹	pʰəuŋ¹	pʰəuŋ¹	ɓaː¹	tʰaː	pʰeɯ	
				---	pʰɛː¹	pʰeuŋ¹	pʰeuŋ¹	pʰeuŋ¹	pʰeuŋ¹		pʰeɯ¹		
啼（雞）	cry (chicken)	*Ciɣəːn	*Ciɣəːn	han¹	hoːn¹	hjoːn¹	zoːn¹	zɔːn¹	(zɔːn¹)	huan⁴	han		
				ɲan¹	ɲɔn¹	ɲoːŋ¹	ɲoːŋ¹	ɲuaŋ¹	ɲuːn⁴				
蹄	hoof	*C-leːʔ	*C-leːʔ	leː³	leː³	tsʰiːn³	tsʰiːn³	tsʰiːn³	tsʰiːn³	[kaːw⁵]			
		CHI:	*tɕʰiːnʔ	[s]ip²	fiʔ⁴	tsʰiŋ³	tsʰiŋ³	tsʰiŋ²	tsʰin⁵				
		NWCHI:	*siːp										

gloss	proto									
剃頭 shave head	ECHI: *pʰaːw / NECHI: *rji:nɦ	--- / ---	--- / ---	pʰaːw¹ / tin²	pʰaːw¹ / tin²	--- / tin²	pʰaːw¹ / ---	[tʰɘːŋ]	--- / ---	--- / ---
TIAN										
天 sky	*faːʔ	(pa:˧) / fɔ:˧	fa:˧ / fa:˧	fa:˧ / fa:˧	fa:˧ / fa:˧	fa:˧ / fa:˧	fa:˧ / tʰa:˧	[vuəy¹]	(pa:) / fa:˩	---
田 wetfield	*na:ɦ	na:² / ---	ta:² / ta:²	ta:² / ta:²	ta:² / ta:²	tʰa:² / ta:²	ta:² / ta:²	tow⁴	nǎ: / ta:˩	tà:
田埂 field dike	*Ciɣeːn	hɐn¹ / ɲan¹	ho:n¹ / ɲɔn¹	hjo:n¹ / ɲo:ŋ¹	zo:n¹ / ɲo:ŋ¹	zɔ:n¹ / ɲuaŋ¹	hjɔ:n¹ / ɲu:n⁴	huan⁴	hɐ̌n	---
	*na:ɦ	na:² / ---	ta:² / ta:²	ta:² / ta:²	ta:² / ta:²	tʰa:² / ta:²	ta:² / ta:²	tow⁴	nǎ:	---
田雞 k.o. frog	*ŋɰuːɦ	ŋɐɰ² / ---	kaɰ² / kawʔ⁴	kaɰ² / ---	kaɰ² / ---	kʰaɰ² / kaɰ²	kaɰ² / kaɰ²	ŋay¹	---	---
田雞 k.o. frog	Qi: *si:t / NCHI: *ʔɰup	--- / ʔɛʔ⁵	--- / ʔɛʔ⁵	--- / ʔep⁷	--- / ʔep⁷	ti:t⁷ / ʔop⁷	ti:t⁷ / ʔop⁷	ti:p⁷	--- / ---	---
田(野) mountain field	*ʔəŋ	ʔɔŋ¹ / ʔeŋ¹	ʔaŋ¹ / ---	ʔaŋ¹ / ʔaŋ¹	ʔaŋ¹ / ʔaŋ¹	ʔaŋ¹ / ʔaŋ¹	ʔaŋ¹ / ʔɔŋ¹	ʔuan¹	[ɔ]ŋ / aŋ˦	---
甜 sweet	*C-d[e]ŋ	de:ŋ¹ / tsɛŋ¹	de:ŋ¹ / dɛŋ¹	de:ŋ¹ / de:ŋ¹	de:ŋ¹ / de:ŋ¹	de:ŋ¹ / dian¹	de:ŋ¹ / dian¹	tɯ:ʔ⁷	dɛn / ti:aŋ˦	---
甜瓜 muskmelon	*ʔəy	ʔay¹ / ---	ʔ[e]y¹ / ---	ʔay¹ / ʔay¹	ʔay¹ / ʔay¹	ʔay¹ / ʔay¹	ʔay¹ / ʔay¹	[huəpˀhaŋ]	--- / ay˦	---

	Gloss	Proto-L	Proto-R							iso		
填	fill with earth	*C-luːp	*C-luːp / *plom / Run:	luːp^7 / plom^1	luːp^7 / plom^1	--- / plom^1	luːp^7 / lup^7	luːp^7 / ---	--- / ---	[ɟeːp^8] ... ---	¦	¦
跿	lick	*ʃ̪ji:mɦ / *C-liːmɦ / *C-ɲiːmɦ	*Cʲliːmɦ / NCHI: / NCHI:	ziːm^2 / lim^2	ziːm^2 / lim^2	ziːm^2 / ---	ɟiːm^2 / ɲim^2	--- / ɲim^2	ɟiːm^2 / ---	[ɟeːp^8]	¦	ɲiːmɬ
	TIAO											
挑	pick out (thorn)	*[c/ɕ]uɱɦ	*tɕʰuɱɦ	tsʰɯn^2 / ---	tsʰɯn^2 / ---	tsʰɯn^5 / tsʰ[o]ŋ^2	tsʰɯn^5 / tsʰɯŋ^2	tsʰɯn^5 / tsʰən^5	tsʰɯn^5 / tsʰən^5	[tɔk^7]	¦	¦
挑	carry on shoulder	*tʃʰaːp	*ɬaːp	tsʰaːp^7 / haʔ^4	tsʰaːp^7 / tsʰaːp^7	tsʰaːp^7 / tsʰaːp^7	tsʰaːp^7 / tsʰaːp^8	tsʰaːp^7 / tsʰaːp^7	tsʰaːp^7 / tsʰap^7	tɔːp^9	ʃáp	tʃʰaːpɬ
挑	load clsfr	*fiːk	*fiːk	(piː?^{9}) / ---	fiːk^7 / fiʔ^4	fiː?^{7} / fik^7	fiaʔ^7 / fik^7	fiaʔ^7 / fit^7	fiak^7 / fʰiʔ^7	pia^9	¦	¦
條	pants clsfr	*Cʲɦaːɦ	*Cʲɣaːɦ	haː^2 / ---	haː^2 / ---	hjaː^2 / ɲɛː^2	daːy^1 / ɲaː^2	daːy^1 / ɲaː^2	daːy^1 / ɲaː^2	tuɯy^1	hǎː	¦
條	skirt clsfr	*rjuːt	*Cʲruːt	zuːt^7 / ---	zuːt^7 / ---	ruːt^7 / ---	tuːt^8 / tuk^7	--- / tuk^7	tuːt^8 / ---	---	¦	¦
條	long/thin clsfr	*dəɲɦ	*C-dənɦ	dén^2 / daːn^2	daːn^2 / daːn^2	daːn^2 / daːn^2	daːn^5 / daːɲ^2	daːn^5 / daːn^2	daːn^5 / daːn^5	tiɐn^1	dén	¦
調皮	naughty	*C-naː:	*C-naː:	naː^1 / ---	naː^1 / ---	naː^1 / naː^1	naː^1 / naː^1	naː^4 / naː^1	naː^1 / naː^4	now^1	¦	¦
		*neːŋ / GHI:	*hnɯːŋ / *ljej	naŋ^1 / lay^4	zay^1 / ---	zay^1 / ---	noːŋ^1 / zay^1	noːŋ^1 / zay^1	nɔːŋ^4 / tsay^4	naː^1	¦	¦

		Proto-1	Proto-2									
跳	jump	*C-ɟuːnʔ	*tɕɯːnʔ	tsuːn³ ---	tsuːn³ ---	tsuːn³ tsuŋ³	tsuːn³ tsuŋ³	tsuːn³ tsuŋ³	tsuːn³ tuŋ³	tsɯɐn¹	tʃʉon ---	--- ---
跳躍	jump	*pit	*pʰit	pʰit⁷ (pʰit⁷)	pʰit⁷ ---	pʰet⁷ ---	pʰet⁷ pʰet⁷	pʰet⁷[⁹] [fʃet⁷]	pʰit⁷[⁹] ---	[dʃet⁷]	--- ---	--- ---
跳蚤	flea	*mɤːt	*hmɤːt	mat⁷ ɓat⁴	poːt⁷ paɾ⁴	poːt⁷ (pət⁵)	poːt⁸ ---	pʰɔːt⁸ poʔ⁸	poːt⁸ pət⁸	[taw¹pow⁴]	mə̂t ---	pə̰t
TIE												
貼	stick to	*pɤk	*pʰek	pʰak⁷ ---	pʰak⁷ ---	pʰa[ː]k⁷ ---	pʰak⁷ pʰa[ː]k⁷	pʰak⁷ pʰak⁷	pʰak⁷ pʰak⁷	pʰak⁷	[b]ák ---	---
鐵	iron	*rɤːy	*rɤːy	raːy¹ ---	goːy¹ ---	goːy⁴ goːy⁴	gaːy⁴ xoːy¹	haːy⁴ xuay⁷	haːy⁴ kʰuːy¹	kuy¹	dáːy xuay˧	haːy
鐵鏟	iron shovel	*t[ʃ/ɕ]ɛːwʔ CHI:	*t[ʃ/ɕ]ʰɛːwʔ *tʰeːw	tsʰeːw³ ---	tsʰeːw³ ---	tʰeːw¹ ---	--- tʰeːw¹	--- ---	--- ---	---	--- ---	--- ---
鐵鍬	spade	*Cɬaːwɦ	*ljaːwɦ	zaːw² ---	zaːw² zaː˧²	zaːw² ---	ɬaːw² zaːw²	ɬaːw² zaːw²	ɬaːy² tsaːw²	zaːw⁴	ʒawɬ	
TING												
聽	listen	*p-lɯː NWCHI:	*p-lɯː *lɟiːŋɦ	leu¹ lieŋ⁵	leu¹ ziŋ²	pleu¹ peu⁴	pleu¹ pleu¹	peu¹ pleu¹	pleu¹ pleu¹	[ɲey²]	léɯ pléɯ˧	--- pléɯ
聽說	hear it said	GHI:	*hliːŋ	(tiːŋ¹) (lieŋ³)	ɬiːŋ¹ ---	ɬiːŋ¹ ---	ɬiŋ¹ ---	--- ɬiŋ¹	--- ---	[ɲey²low¹vuːn⁴]	--- ---	--- ---
停	stop (turn off)	*C-ŋaːc	*C-ŋaːc	ŋaːt⁷ ŋət²	ŋaːt⁷ ---	ŋaːc ŋoːt⁷	ŋaːt⁷ ŋoːt⁷	ŋaːt⁸ ŋaːt⁸	ŋaːt⁷ ŋuat⁸	ŋaːt⁹	--- ---	--- ---

		Proto	Proto								
TONG											
同	same	*C-duŋ	*C-duŋ	dʊŋ¹ / —	dʊŋ¹ / —	dɔŋ¹ / —	dɔŋ¹ / dɔŋ¹	dʊŋ¹ / dɔŋ¹	dʊŋ¹ / dʊŋ¹	da:ŋ²	— / —
同伴	companion	*tə:ŋʔ	*tʰə:ŋʔ	tʰaŋ³ / —	tʰo:ŋ³ / —	tʰo:ŋ³ / —	tʰɔ:ŋ³ / tʰo:ŋ³	tʰɔ:ŋ³ / tʰuaŋ³	tʰɔ:ŋ³ / tʰuaŋ³	[tʰaw¹kʰoŋ¹]	tʰàŋ / —
銅	copper	*C-du:ŋ	*du:ŋ	du:ŋ¹ / dɔŋ¹	du:ŋ¹ / —	— / dʊŋ¹	duaŋ¹ / dʊŋ¹	— / —	tu:ŋ¹	tu:ŋ¹	dúoŋ / —
痛	hurt	[t/c]ok	*t[ʃ/ɕ]ʰok	tsʰok⁷ / sɔk²	tsʰuk⁷ / saʔ⁴	tsʰok⁷ / tsʰɔk⁷	tsʰok⁷ / tsʰɔk⁸	tsʰoʔ⁷ / tsʰɔk⁷	tsʰɔ:k⁷ / tsʰɔk⁷	ta:k⁹	sók / tʃʰɔk˦
童山	bare hills	*C-giŋ	*kiŋ	kiŋ¹ / —	kiŋ¹ / —	kiŋ¹ / ken¹	kiŋ¹ / ken¹	kiŋ¹ / ken¹	kiŋ¹ / ken¹	—	— / —
TOU											
偷	steal	*Cilok	*Cljok	zok⁷ / —	zuk⁷ / zaʔˤ	zok⁷ / zɔk⁷	ɬok⁸ / zɔk⁷	ɬoʔ⁸ / zɔk⁸	ɬɔk⁸ / tsɔk⁸	tsa:k⁸	zok / ʒɔk˦
偷聽	overhear	*pə:k	*pʰə:k	(pʰo:ʔ⁸) / —	pʰo:ʔ⁷ / pʰɔʔˤ	pʰo:k⁷ / —	pʰo:k⁷ / pʰɔk⁷	— / pʰɔʔ⁸	pʰɔ:ʔ⁷ / —	pʰɔk⁷	— / —
頭	head	*Curəwʔ	*Curəwʔ	raw³ / vaw³	gaw³ / ŋɔ:³	gwow³ / go:³	go:⁶ / vo:³	ho:⁶ / vo:³	hɔ:⁶ / vo:³	ki:w¹	daw / vo:˦ [f]ó: vo:˥]

漢字	gloss	Proto 1	Proto 2	D1	D2	D3	D4	D5	D6	D7	D8	D9
頭髮	hair (head)	*nɔm	*hnom	nom[1]	tom[1]	dɑn[2]	dɑn[5]	dɑn[5]	dɑn[5]	tiəm[3]	nôm	tôm
		ECHI:	*ɗənɦ	ŋen[1]	ŋen[1]	---	rom[1]	rom[1]	ŋen[4]		ŋoŋ⁻	
		NCHI:	*Cuɦun									
		NCHI:	*rom									
頭蝨	head louse	*ʈwu:	*tʃʰwu:	raw[3]	gaw[3]	gwow[3]	go:[6]	ho:[6]	ho:[6]	ki:w[1]	ɗaw	ó:
				vaw[3]	ŋɔ:[3]	---	ɣo:[3]	vo:[3]	vo:[3]		vo:˩	
				tsʰow[1]	tsʰow[1]	fow[1]	fow[1]	tsʰow[1]	tsʰow[1]	taw[1]	ʃaw	
				few[1]	few[1]	fow[1]	fow[1]	fʰow[1]	fʰow[1]		---	
TU												
凸	protrude	GHI:	*ɗun?	tʰun[2]	dɯun[3]	dɯun[3]	---	---	dɯun[3]	dɯ:n[1]	---	---
				---	---	---	---	---	---		---	
塗抹	erase	*C-ni:nɦ	*C-ni:nɦ	ni:n[2]	ni:n[2]	ni:n[2]	gwa:t[8]	(me:[2])	hwat[8]	[me:k[9]]	---	---
		Qi:	*Cura:t	---	---	---	niɲ[2]	ʔet[8]	ʔi:t[7]		etɭ	
		Run:	*ʔe:t									
吐	spit silk	*C-βun?	*βun?	vun[3]	v[ɯ]n[3]	vun[3]	fun[3]	vun[3]	vun[3]	[ʔɔŋ[1]]	---	---
				---	---	---	vo[n][3]	vun[3]	nen[3]		vɯ:n˩	
吐痰	to spit	*pʰ[w]iɦ	*pʰ[w]iɦ	pʰʔi:[2]	pʰʔi:[2]	pʰʔi:[2]	pʰʔi:[5]	pʰʔi:[5]	pʰʔi:[2]	pʰi:[1]	---	---
				---	pʰuy[2]	---	pʰʔi:[2]	pʰuy[5]	pʰʔi:[1]		---	
吐奶	spit up (milk)	*C-ɓunɦ	*ɓunɦ	ɓun[2]	ɓun[2]	ɓun[2]	ɓun[5]	---	ɓun[5]	[ʔak[7]]	---	---
				---	---	ɓəŋ[2]	ɓəŋ[5]	ɓəŋ[5]	ɓəŋ[5]		---	
TUI												
推	push	*C-ɲu:nɦ	*C-ɲu:nɦ	ɲu:n[2]	ɲu:n[2]	ɲu:n[2]	---	---	ɲu:n[5]	---	---	---
				---	---	ɲuŋ[2]	ɲuŋ[5]	ɲuŋ[5]	ɲ[u:][5]		---	

漢字	gloss	Branch	Proto	1	2	3	4	5	6	7	8	9
腿	thigh	GHI: / CHI:	fe:ɲɦ / ɦa:	(peːŋ²) / fɛŋ⁵	feːɲ² / [ɓ]ɛɲ²	haː¹ / ɦaː¹	haː¹ / ɦaː¹	haː¹ / ɦaː¹	haː¹ / ɦaː¹	[hɔːk⁹]	(pɛ̌ŋ) ɦaː˦	---
TUN												
吞	swallow	GHI:	*Ciʔəːmɦ	(ʔoːm²) / zam⁵	ʔoːm² / ʔjon²	ʔjoːm² / zoːm²	zoːm⁵ / zoːm²	zɔːm⁵ / zuam²	ʔjoːm⁵ / zuam⁵	[kuat¹⁰]	(ɔ̌m) / ʒuam˩	zɔm
臀部	butt	*C-biɲɦ	*ɓiɲɦ	ɓiŋ² / ---	ɓiŋ² / ---	ɓiŋ² / ---	ɓiŋ⁵ / ɓen²	--- / ---	--- / ---	---	---	---
臀部	butt	Qi:	*C-maːk	--- / ---	--- / ---	--- / ---	--- / ---	meːʔ⁸ / ---	meːʔ⁷ / ---	[pʰaŋ⁵]	---	---
		Qi: / NECHI:	*ɦaːyʔ / *tʃʰiː	--- / ---	--- / ---	--- / ---	--- / tsʰey¹	ɦaːy³ / (tsʰey⁴)	ɦaːy³ / tsʰey¹	huuay²	tʃʰeyˠ	---
TUO												
脱	take off	*Cila:wɦ / Run:	*ljaːwɦ / *ljuc	zaːw² / law⁵	zaːw² / z[ɔ]:²	zaːw² / zaːw²	ɬaːw² / zaːw²	ɬaːw² / zot⁸	ɬaːw² / tsət⁸	[tsuet¹⁰]	ʒǎːw / ʒotˌ	---
脱	separate	*C-ləŋʔ	*C-ləŋʔ	lan³ / tʰuət³	lan³ / ---	laɲ³ / ---	lan³ / lan³	lum⁶ / lan³	lan³ / lan⁶	---	---	---
脱	separate	*C-guːɲ	*kuːɲ	kuːn¹ / ---	kuːn¹ / ---	kuːɲ¹ / ---	kuːn¹ / kun¹	kuːn¹ / kun¹	kuːn¹ / kun¹	[pun¹]	---	---

字	Gloss	Subgroup / Proto-form	Cognate forms (left→right; upper / lower register)
駝背	hunchback	NCHI: *ɦomɦ	hom[4] / — ; hom² ; hom² ; hom² ; hom⁵ ; hom⁵ ; [kɔŋ¹kuː⁴]
		GHI: *roŋɦ	(guŋ²) ; guŋ² ; goŋ² ; vuaŋ¹
		NWChI: *tɕʰɯːn?	tsʰən³ ; sɛn³
		Run: *wəːn	vuaŋ¹ ; vuːn⁴ ; [kɔːmˀ]
庹	armspan	*laːnɦ · *hlaːnɦ	(taːn²) ; ɬaːn² ; ɬaːn² ; ɬaːn⁵ ; ɬaːn⁵ ; ɬaːn⁵ ; [tʰuet⁸] ; (tăn)
			tθɔn⁵ · lan² ; ɬaːŋ² ; ɬaːŋ² ; ɬaːŋ² ; ɬaːŋ² ; ɬuan⁵
睡沫	saliva	*C-nəm?	nom³ ; nom³ ; nam³ ; nom³ ; nam³ ; nam⁶ ; nam³ ; naːm¹ ; nòm
			nam³ · nan³ ; nam³ ; nam³ ; nam³ ; nam⁶ ; nam⁵ ; nam˥
		*ləːy · *hləːy	[l]aːy¹ ; ɬoːy¹ ; ɬoːy¹ ; ɬoːy¹ ; ɬaːy¹ ; ɬaːy¹ ; ɬaːy¹ ; ɬɯy⁴ ; [l]aːy
			— · [n]ɔy¹ ; ɬoːy¹ ; ɬoːy¹ ; ɬuːy¹ ; ɬuay¹ ; ɬuːy¹ ; ɬuay˧

WA

字	Gloss	Subgroup / Proto-form	Cognate forms (left→right; upper / lower register)
挖	dig hole	*Ciɣut · *Ciɦut	hut⁷ ; hut⁷ ; hjut⁷ ; — ; — ; (ʔjut⁷) ; [taw¹] ; hṵt
		Meifu: *kʰɯːt	— · kʰut⁷ ; kʰut⁷ ; kʰut⁷
挖	dig hole	*C-bənɦ · *bənɦ	— ; ɓan² ; ɓan² ; ɓan[3] ; ɓan[3] ; ɓan⁵ ; —
挖	dig with knife	*C-bəwɦ · *bəwɦ	ɓaw² ; ɓaw² ; ɓow² ; ɓɔː⁵ ; ɓɔː⁵ ; ɓɔː⁵ ; [hok⁸]
			— · — ; — ; ɓɔː² ; ɓɔː² ; ɓɔː² ; ɓɔː⁵
挖	dig out	GHI: ɦuy?	— ; huy³ ; huy³ ; — ; — ; huy³ ; [taw¹]
挖	dig out	CHI: *kʰuy	kʰᵇoy¹ ; kʰᵇoy¹ ; — ; kʰuy¹ ; kʰuy¹ ; kʰuy¹ ; kʰuy¹ ; kʰow¹
			kʰᵇoy¹ · kʰᵇoy¹ ; kʰuy¹ ; kʰuy¹ ; (kʰuy¹) ; kʰuy¹

Chinese	Gloss												
瓦	tile	GHI: *feːŋ	—	—	—	feːŋ¹	—	feːŋ¹	—	feːŋ¹	—	—	—
			—	—	—	—	—	—	fiaŋ¹	—	—	—	—
		CHI: *tʰəw	—	—	—	—	—	tʰaw¹	—	tʰaw¹	—	—	—
			—	—	—	—	—	—	—	—	—	—	—
WAI													
外	outside	*Cilɯːn *ljɯːn	zɯːn¹	zɯːn¹	feːŋ¹	zɯːn¹	zɯːn¹	ɬɯːn⁴	ɬɯːn⁴	ɬɯːn⁴	[lɔːw⁴]	—	—
		Run: *lji:nʔ	—	—	—	zuɲ⁴	—	zuɲ¹	ziŋ³	zuɲ³	tsin⁶	—	—
外祖父	mother's father	*ṭaʔ *tʃʰaːʔ	tsʰaː³	tsʰaː³	—	tsʰaː³	tsʰaː³	tsʰaː³	—	tsʰaː³	təː¹	—	—
			—	haː³[1]	—	tsʰaː³	tsʰaː³	tsʰaː³	tsʰaː³	tsʰaː³	—	—	—
外祖母	mother's Mother	*naʔ *hnaːʔ	naː³	(naː³)	—	taː³	taː⁶	taː⁶	—	taː⁶	nɔː⁴	—	—
			—	—	—	taː³	taː³	taː³	taː³	taː⁶	—	—	—
外孫	maternal Grandson	*lɯːk *hlɯːk	han¹	ɬɯːʔ⁷	—	ɬɯːkʔ	ɬɯːk⁷	ɬɯːk⁷	—	ɬ[a]k⁷	ɬiek⁸	hɛ̃n	—
			tθiek²	—	—	—	ɬɯːk⁷	ɬɯːk⁸	ɬɯːk⁸	—	—	—	—
		*ṭaʔ *tʃʰaːʔ	tsʰaː³	tsʰaː³	—	tsʰaː³	tsʰaː³	tsʰaː³	—	tsʰaː³	təː¹	—	—
			—	—	—	—	—	tsʰaː³	tsʰaː³	tsʰaː³	—	—	—
WAN													
彎	crooked, curved	*Ciʔut	ʔut⁹	ʔut⁷	—	ʔjut⁷	ʔut⁷	ʔuːt⁹	ʔuːt⁹	ʔjut[9]	ʔuːt⁹	u̠t	—
			—	—	—	—	—	—	—	—	—	—	—
彎	crooked, curved	CHI: *hwɛ:ɲ	(noːŋ²)	noːŋ²	—	hwoːŋ²	noːŋ²	voːŋ²	voːŋ	voːŋ²	vɔːŋ⁵	(nɛ̌ŋ)	—
			ɲcʌ³	vaɲ²	—	ɲcʌ	ɲcʌ²	ɲcʌ	ɲcʌ	ɲcʌ[4]		—	—
完結	end	*C-baːyʔ *ɓaːyʔ	ɓaːy³	ɓaːy³	—	ɓaːy³	ɓaːy³	ɓaːy³	ɓaːy³	ɓaːy³	puɰy⁵	bàːy	—
		*ɣəːyʔ	—	—	—	ɓoːy³	ɓoːy³	ɓuːy³	ɓuay³	ɓuːy³	—	—	—

完盡	finish	*p-lunɦ / NECHI:	*p-lunɦ / *ri:t	lun^2 / ---	lun^2 / ---	plun^2 / liʔ^7	plun^5 / ri[k]^7	pun^5 / rit^7	plun^5 / rit^8	--- / ---	lǔn / ---	---
完整	complete	*C-mu:ŋʔ	*C-mu:ŋʔ	mu:ŋ^3 / ---	mu:ŋ^3 / ---	mu:ŋ^3 / ---	mu:ŋ^3 / ---	muaŋ^6 / muŋ^3	mu:ŋ^3 / muŋ^3[3]	--- / ---	--- / ---	---
玩	play	*Cirɯ:k / Run:	*rjɯ:k / *ʔu:ŋʔ	zɯ:ʔ^7 / zɯək^4	zɯ:ʔ$^?$ / leʔ^4	rɯ:k^7 / tɯɯk^7	tɯ:ʔ^8 / tɯɯk^7	tʰɯɯaʔ^8 / ʔuŋ^3	tɯ:ʔ^8 / ʔuŋ^3	[liaw^1]	zúi	---
玩弄	dally	*C-ɲa:m	*C-ɲa:m	ɲa:m^1 / ---	ɲa:m^1 / ---	ɲa:m^1 / ɲa:m^1	ɲa:m^1 / ɲa:m^1	na:m^4 / ɲa:m^1	ɲa:m^1 / ɲam^4	[tsum^1]	ɲám	---
玩耍	play	GHI: / Run:	*Cuɦə:ŋ / *ʔu:ŋʔ	(ho:ŋ) / ---	ho:ŋ^1 / ---	hwo:ŋ^1 / ŋo:ŋ^1	go:ŋ^1 / ŋo:ŋ^1	----- / ʔuŋ^3	hɔ:ŋ^1 / ʔuŋ^3	[liaw^1]	--- / ---	---
晚	evening	*[c/ɕ]əp	*tɕʰəp	tsʰop^7 / ---	tsʰap^7 / saʔ^4	tsʰop^7 / tsʰap^7	tsʰop^7 / tsʰap^7	tsʰap^7 / tsʰap^7	tsʰɔ:p^9 / tsʰap^7	tsʰɔ:p^9	ʃóp	---
晚飯	dinner	GHI:	*hɲəwɦ	ru:y / ---	kaw^2	--- / ---	--- / ---	ko:^{2} / ---	--- / ---	[tʰow^1]	dǔoy	---
晚上	evening	GHI:	*fən	tsʰop^7 / fon^1	fan^1 / ---	fan^1 / faŋ^1	fan^1 / ---	fan^1 / fan^1	fan^1 / fan^1	---	ʃóp / faŋˀ	---
		*hmi:ʔ	*hmi:ʔ	mey^3 / ---	p[e]y^3 / p[u:]^1[2]	pay^6 / pay^3	pay^3 / ---	pʰay^6 / pay^3	pay^6 / pay^3[3]	[kɯ^2]	mèy	---
		*[c/ɕʰ]əp	*tɕʰəp	tsʰop^7 / ---	tsʰap^7 / saʔ^4	tsʰop^7 / tsʰap^7	tsʰop^7 / ---	tsʰap^7 / tsʰap^7	tsʰɔ:p^9 / tsʰap^7	tsʰɔ:p^9	ʃóp / tʃʰap˥	---
碗	bowl, basin	*Cuʔa:w	*Cuʔa:w	ʔa:w^1 / va:w^1	ʔa:w^1 / ʔwa^1	gwa:w^1 / ɣa:w^1	ʔwa:w^1 / ---	va:w^1 / va:w^1	ʔwa:w^1 / va:w^1	[la:k^9]	á:w / vàw˩	vva:w

	gloss	recon 1	recon 2									
碗櫥	cupboard	*C-ɟa:nɦ	*tɕa:nɦ	tsa:n^2 / ---	ʔa:w^1 / ---	tsa:n^2 / ---	tsa:n^5 / tsa:ŋ^2	tsa:n^5 / tsa:ŋ^2	tsa:n^5 / tuan^5	[ka:n^5]	tʃan	---
		*Cuʔa:w	*Cuʔa:w	ʔa:w^1 / va:w^1	--- / ---	ʔwa:w^1 / ---	gwa:w^1 / ---	--- / va:w^1	ʔwa:w^1 / ---	[tʰow^1]	---	---
WANG												
網	net	*rə:yʔ	*rə:yʔ	ra:y^3 / hɔ:(y)^4	go:y^3 / ŋɔy	go:y^3 / go:y^3	ga:y^6 / xo:y^3	ha:y^6 / kʰu:y^3	---	[piw^1]	dà:y / huay↓	---
網袋	net bag	*C-da:yʔ	*C-da:yʔ	da:y^3 / ---	da:y^3 / dày^1	da:y^3 / ---	da:y^3 / da:y^3	--- / da:y^3	da:y^3 / duay^3	---	dà:y	---
忘記	forget	*C-lɯ:mɦ	*C-lɯ:mɦ	lɯ:m^2 / ---	lɯ:m^2 / lon^2	lɯ:m^2 / ---	lɯ:m^5 / lum^2	lu:m^2 / (lɯm^5)	lɯ:m^5 / lɯm^2	[ŋɔm^3]	luɤm	---
WEI												
煨	simmer	CHI:	*plomʔ	--- / ---	--- / ---	plom^3 / ---	plom^3 / [puʔ]m^3	l[ɔ]m^3 / plom^3	plum^3 / plom^3	tʰum^4	---	---
圍	surround	GHI:	*ku:ɲɦ	--- / ---	ku:ŋ^2 / ---	ku:ŋ^5 / ---	kuaŋ^5 / ---	ku:ŋ^5 / kuŋ^5	ku:ŋ^5 / kuŋ^5	ʔuy	---	---
圍	surround	CHI:	*tʰu:k	--- / ---	--- / ---	tʰu:ʔ^7 / tʰuk^7	tʰu:ʔ^7 / tʰuk^8	--- / tʰuk^8	tʰu:ʔ^7 / ---	---	---	---
尾巴	tail	*[c/ɕ]uc	*tɕʰuc	tsʰut^7 / tsʰət^2	tsʰut^7 / sɛʔ^4	tsʰuc^7 / tsʰət^7	tsʰut^7 / tsʰot^7	tsʰut^7 / tsʰot^8	tsʰut^7 / tsʰət^7	tsʰuet^9	ʃót / tʃʰu:tɦ	---
餵	feed	*C-bu:ɦ	*bu:ɦ	ɓow^2 / ɓa:^{5}	ɓaw^2 / ɓaw^2	ɓow^2 / ɓaw^2	ɓaw^5 / ɓaw^2	ɓɔ:^{5} / ɓaw^2	ɓɔ:^{5} / ɓaw^5	fo:^{4}	bǎw	---

WEN

		Reconstruction	1	2	3	4	5	6	7	8	9
紋面	tattoo face	*C- ŋu:	ŋow[1] / ŋoŋ	ŋow[1]	ŋow[1]	ŋow[1]	ŋow[4]	ŋow[1]	ŋaw[5]	---	---
		NECHI: *C-bəwɦ	---	---	---	ɓo:[2]	ɓo:[2]	ɓo:[5]	---	---	---
		NECHI: *wet	---	---	---	vak[7]	vak[8]	vat[8]	[tɯp[8]]	vak˧	---
蚊帳	mosquito net	*rə:y?	ra:y[3]	go:y[3]	go:y[3]	ga:y[6] / xo:y[3]	fay[3] / xuay[3]	ga:y[6]	---	---	---
		*C-ɲu:ŋ	ɲu:ŋ[1]	ɲu:ŋ[1]	ɲu:ŋ[1]	ɲu:ŋ[1] / ɲuŋ[1]	nuaŋ[4] / ɲuŋ[1]	ɲu:ŋ[1] / ɲuŋ[4]	---	ɲu:ŋ˧ / [h]uay˥	---
蚊子	mosquito	*C-ɲu:ŋ	ɲu:ŋ[1] / ɲoŋ	ɲu:ŋ[1] / ɲ[iw][1]	ɲu:ŋ[1] / ɲuŋ[1]	ɲu:ŋ[1] / ɲuŋ[1]	nuaŋ[4] / ɲuŋ[1]	ɲu:ŋ[1] / ɲuŋ[4]	tsʰak[7]	ɲúoŋ / ɲu:ŋ˧	---
瘟疫	plague	*lu:n?	(tu:n[3])	ɬu:n[3]	ɬu:n[3]	tsay[1]	tsay[1] / kuay[1]	tsay[1] / ku:y[1]	tsay[1]	---	---
	Run:	*kə:y	---	---	---	---	---	---	---	---	---
聞	smell	*C-ɣa:y	ha:y[1] / ɲɔ:(y)[1]	ha:y[1] / ɲɔy[1]	ha:y[1] / ɲɔy[1]	ha:y[1] / ɲo:y[1]	ha:y[1] / ɲuay[4]	ha:y[1] / ɲu:y[4]	huey[4]	há:y / ɲɣay˧	---
	NCHI:	Cihe:y									
吻	kiss	*Ciru:c	zu:t / lu:t[2]	zu:t[7]	ru:c[7] / tut[7]	tu:t[8] / zuŋ[2]	(tu:t[8]) / zun[2]	tu:t[8] / tut[7]	tsuet[9]	zʊot	---
		*te:ŋ?	tʰaŋ[3]	tʰo:ŋ[3]	tʰo:ŋ[3]	tʰo:ŋ[3] / tʰo:ŋ[3]	tʰɔ:ŋ[3] / tʰuaŋ[3]	tʰɔ:ŋ[3] / tʰuaŋ[3]	tʰa:[1]	---	---
		*tʰə:ŋ?	---	---	---	---	---	---	---	---	---
問	ask	GHI: ra:m	(ga:m[1]) / hɔm[4]	ga:m[1] / ŋanʔ[4]	ga:m[1] / ga:m[4]	ga:m[4] / xa:m[1]	ha:m[4] / xa:m[1]	ha:m[4] / kʰam[1]	kɔ:[1]	(ɣam)	hǎm

WO

漢字	gloss	Proto		D1	D2	D3	D4	D5	D6	D7	iso
蝸牛	snail	*[c/ɕ]i:	*tɕʰi:	tsʰey[1]	tsʰey[1]	tsʰey[1]	tsʰey[1]	tsʰey[1]	tsʰey[1]	tsʰay[1]	¦
				---	---	tsʰey[1]	tsʰey[1]	tsʰey[1]	tsʰey[1]	[vuey[4]]	¦
		*C-ɲa:mʔ	*C-ɲa:mʔ	roŋ[1]	ɲa:m[3]	---	ɲa:m[3]	na:m[6]	ɲa:m[3]	[vuey[4]]	¦
			Meifu: *fa:ʔ	---	---	fa:[3]	fa:[3]	ɲa:m[3]	ɲam[6]		¦
窩	nest	*C-ru:k	*ru:k	ru:ʔ[7]	ru:ʔ[7]	ru:k[7]	ru:ʔ[8]	lua ʔ[8]	lu:ʔ[8]	lu:ʔ[8]	¦
				lok[4]	luʔ[4]	luʔ[7]	ruk[7]	ruk[8]	ruʔ[8]		¦
我	I	*C-ɣu:	*ɦu:	how[1]	how[1]	how[1]	how[1]	how[1]	how[1]	[kaw[1]]	hʌw
				(ka:[5])	hew[1]	how[1]	how[1]	h[o:][1]	how[ʔ][7]		h[o:]H
我們	we (excl)	CHl: *fəw	Run: *fɯ:	row[1]	taw[1]	fa[:][1]	faw[1]	faw[1]	fow[1]	[ʔaw[1]]	du:
				(ha:[5])	faw[1]	faw[1]	faw[1]	f[ə:][1]	fəu[ʔ][7]		---

WU

漢字	gloss	Proto		D1	D2	D3	D4	D5	D6	D7	iso
烏龜	turtle	*tu:ɦ	*tʰu:ɦ	tʰow[2]	tʰaw[2]	tʰaw[2]	tʰaw[5]	tʰo:[5]	tʰo:[5]	da:w[1]	tʰʌ̌w
				---	---	---	tʰaw[2]	tʰaw[2]	tʰaw[5]		tʰawˇ
烏鴉	crow	*ʔa:k	*ʔa:k	ʔa:ʔ[9]	(ʔa:ʔ)	ʔe:k[7]	ʔe:ʔ[7]	ʔe:ʔ[7]	ʔe:ʔ[7]	ʔu:[5]	a:
				ʔa:k[3]	ʔɛʔ[4]	ʔe:ʔ[7]	ʔu:[2]	ʔeʔ[8]	ʔia ʔ[7]		ɛʔH
污垢	filth	CHl:	*kʰʰi:	---	kʰey[1]	---	kʰey[1]	kʰey[1]	tʰa:m[3]	---	¦
		CHl:	*tʰa:mʔ	kʰey[1]	kʰey[1]	---	---	tʰa:m[3]	tʰa:m[3]	kʰey[1]	¦
污垢	filth	*C-nɯnɦ	*C-nɯnɦ	nuun[2]	---	nuun[2]	nuun[5]	---	nuun[5]	nuua[1]	¦
				---	---	nuunŋ[2]	nuunŋ[2]	nenŋ[2]	---	---	¦
巫婆	witch	*mɯ:ŋ	Run: *hmɯ:ŋ *C-le:k	mɯ:ŋ[1]	pɯ:ŋ[1]	pɯ:ŋ[1]	pɯ:ŋ[4]	pʰuaŋ[4]	pɯ:ŋ[4]	[tsʰua[5]]	¦
				ɓueŋ[4]	---	---	pɯŋ[1]	(liak[8])	liaʔ[7]		¦

	gloss	proto A	proto B	1	2	3	4	5	6	7	8	9
吳蚣	centipede	*C-ri:p	*ri:p	ri:p⁷ lip⁴	ri:p⁷ ---	ri:p⁷ lip⁷	ri:p⁸ rip⁷	li:p⁸ rip⁸	li:p⁸ rip⁸	lip⁸pow⁴	dr[i]p ɟi:p˧	---
五	five	*ma:	*hma:	ma:¹ ɓɔ:⁴	pa:¹ paʔ⁴	pa:¹ pa:⁴	pa:⁴ pa:¹	pʰa:⁴ pa:¹	pa:⁴ pa:⁴	pu:⁴	má: pa:˧	pǎ:
搗	cover mouth with hand	*pu:m	*pʰɯ:m	pʰu:m¹	pʰu:m¹ pʰum¹	pʰu:m¹ pʰum¹	pʰɯ:m¹ pʰum¹	pʰu:m¹ pʰum¹	pʰɯ:m¹ pʰum¹	pʰɔ:m¹	---	---
霧	fog	*Cuɣə:n	*Cuɦə:n	han¹	ho:n¹	hwo:n¹	ŋo:ŋ¹	--- ŋuaŋ¹	---	---	--- ---	---
	CHI:		*ŋga:wʔ	kuwʔ⁹	kuwʔ⁷	ka:w³	ka:w⁶ ka:w³	kʰa:w⁶ ka:w³	ka:w⁶ ka:w⁶	kɔ:w⁴	---	---

XI

	gloss	proto A	proto B	1	2	3	4	5	6	7	8	9
西	west	*pʰəyʔ	GHI:	--- pʰuy³	pʰ[e]y³ pʰe:³	pʰay³ pʰay³	--- pʰay³	--- pʰay³	---	---	---	---
	west	*tʰɯ:ʔ	GHI:	--- tʰɔ:³	tʰaɯ³ tʰaw³	tʰauɟ³ tʰauɟ³	--- tʰauɟ³	---	---	---	---	---
西	west	*pəyʔ	*pʰəyʔ	pʰay³	pʰay³	---	pʰa[:]y³ ---	pʰay³ fiaŋ¹	pʰa[:]y³ fiaŋ¹	---	---	---
	*ŋwen Qi: *tʃʰa: hŋwen	*ŋwen	*hŋwen	ven¹	---	---	tsʰa:¹van⁴ tsʰa:¹van¹	tsʰa:¹van⁴ van¹	van⁴ vaŋ¹	---	---	---
	*tok		*tʰok	tʰok⁷	tʰok⁷	tʰok⁷	tʰoʔ⁷ tʰɔk⁸	tʰɔk⁷ ---	tʰɔk⁷ ---	---	---	---

漢字	gloss	Recon (label)	Recon	D1	D2	D3	D4	D5	D6	D7	D8	D9
吸氣	inhale	*wɯp / NECHI:	*hwɯp / *tɕuːt	vɯp⁷ / ---	vvup⁷ / ---	hwɯp⁷ / ---	vɯp⁸ / tsut⁷	vup⁸ / [tʃut⁸]	vɯp⁷ / tut⁷	[tan¹] / ---	--- / ---	╎ / ╎
錫	tin	*laːk / GHI:	*hlaːk	dfaː?⁷ / ---	ɬe:ʔ⁷ / liː˧	--- / ---	ɬe:ʔ⁷ / ---	--- / ɬeʔ⁸	ɬe:ʔ⁷ / ---	[ɬap⁸ɬiən²] / ---	daː / ---	╎ / ╎
熄滅	extinguish	GHI:	*tɕəp	[z]op⁷ / ---	tsap⁷ / tsaʔ⁴	tsop⁷ / tsap⁷	tsop⁷ / tsap⁷	tsap⁷ / tsap⁸	(tsep⁷) / tap⁷	tsep⁷ / ---	---	╎ / ╎
膝蓋	knee	*Curəw? / NECHI:	*Curəw?	raw³ / vaw³	gaw³ / ---	gwow³ / ---	go˞⁶ / ---	ho:⁶ / ---	hɔ:⁶ / vo:³	[tʰɔk⁹] / ---	dàw / ---	╎ / ╎
		*C-ruː	*ruː	row¹ / ---	row¹ / lɛwʔ⁴	row¹ / low⁴	row⁴ / row¹	low⁴ / (row⁴)	low⁴ / row⁴	lu˞⁴	dʌw / ɭow˥	╎ / ╎
螻蟀	cricket	*miː?	*hmiː?	mey³ / ---	pey³ / ---	pɯ⁽¹⁾ / ---	pʰay⁶ / ---	pʰay⁶ / ---	--- / ---	[kɯ²] / ---	---	╎ / ╎
		*Curuːŋ? / NECHI:	*Curuːŋ? / *kit	ruːŋ³ / ---	ruːŋ³ / ---	[g]uːŋ³ / ---	fuːŋ⁶ / ket⁷	fuːŋ⁶ / ket⁷	fuːŋ⁶ / ket⁷	fuəŋ⁴ / ---	---	╎ / ╎
習慣	habit	*C-raːyɦ	*raːyɦ	raːy² / ---	raːy² / ---	raːy² / ---	raːy² / raːy²	(lɔːy¹) / raːy²	laːy² / raːy²	---	---	╎ / ╎
蓆草	mat grass	GHI: / Qi:	*rɟiːw? / *mbiːw?	raːp⁷ / [h]liw⁴	ziːw³ / liː˧	riːw³ / tiw³	piːw⁶ / tsiw³	(liw⁶) / tsiw³	piːw⁶ / tsiw⁶	[lɛːp⁷] / ---	---	╎ / ╎
蓆子	mat	GHI:	*tʰɯːk	tʰɯ:?⁷[⁹] / ---	tʰɯːk⁷ / ---	tʰɯːk⁷ / tʰɯk⁷	tʰɯːkʔ⁷ / tʰɯk⁷	tʰuaʔ⁷ / tʰuk⁸	tʰɯːʔ⁷ / tʰɯʔ⁷	tsiek⁸	tʰɯ: / tʰœk˥	╎ / ╎
洗	wash	*ʔuːt / NCHI:	*ʔuːt / *ɕaːw?	ʔuːt⁷ / saw³	ʔuːt⁷ / faː˧	ʔuːt⁷ / ---	ʔuːt⁷ / sa:w³	--- / ---	ʔuːt⁷ / ---	ʔuət⁹	úot / ---	╎ / ╎

漢字	English	Source	Proto										
洗	wash	CHIː	*Curəːy	---	---	gwaːy¹ / ---	gwaːy⁴ / ---	gwaːy⁴ / ---	vaːy⁴ / vuay¹	gwaːy⁴ / vuːy¹	---	--- / vuay⊦	vwǎːy
洗	wash (clothes)	CHIː	*kʰɯːp	---	---	kʰɯːp⁷ / ---	--- / kʰop⁷	---	---	---	---	---	---
洗	wash (head)	*səːk	*səːk	tak⁷ / tθak²	toːʔ⁷ / fɔʔ⁴	toːk⁷ / soːk⁷	toːʔ⁷ / soːk⁷	toːʔ⁷ / tsʰɔʔ⁸	toːʔ⁷ / tsʰɔʔ⁷	---	tsʰaː·⁵	---	---
洗澡	bathe	*ʔaːp	*ʔaːp	ʔaːp[⁹]	ʔaːp⁷	ʔaːp⁷ / ʔaːp⁷	ʔaːp⁷ / ʔaːp⁷	ʔaːp⁷ / ʔaːp⁸	ʔaːp⁷ / ʔap⁷	---	ʔɯp⁹	--- / aːp⊦	---
喜鵲	magpie	*səc	*səc	tat[⁹]	tat⁷	tac⁷	--- / sat⁷	tat⁷ / tsʰat⁸	tat⁷ / ---	---	[nɔːk⁹]	---	---
		CHIː	*C-ɲaːmʔ	---	---	ɲaːm³ / ---	tuːt⁸ / ɲaːm³	--- / ɲaːm³	tuːt⁸ / tsut⁸	---	luət⁸	---	---
		CHIː	*rjuːt	---	---	---	---	---	---	---	---	---	---
細	thin	*ʔuːt	*ʔuːt	ʔuːt[⁹]	ʔuːt⁷ / ʔuʔ⁴	ʔuːt⁷ / ʔuk⁷	ʔuːt⁷ / ʔuk⁸	ʔuːt⁷ / ʔuk⁸	ʔuːt⁷ / ʔut⁷	---	[ɲəːp⁸]	---	---
XIA													
呷	sip	*[c/ɕ]up	*[c/ɕ]up	tsʰɯp⁷ / tsʰ[i]p²	tsʰɯp⁷ / seʔ⁴	tsʰɯp⁷	tsʰɯp⁷ / tsʰop⁷	tsʰɯp⁷ / tut⁸	tsʰɯp⁷ / tut⁷	---	[tsem⁴]	---	---
		Runː	*rjuːt										
蝦	shrimp	*Curaːŋ	*Curaːŋ	reːŋ¹ / vɛŋ⁴	reːŋ¹ / vɛŋʔ⁴	pɯːm² / geːŋ⁴	feːŋ⁴ / pɯm²	feːŋ⁴ / fiaŋ¹	feːŋ⁴ / fiaŋ¹	---	[ʔɔː·⁵]	---	---
		CHIː	*mbɯːmɦ										
瞎	blind	*p-laːw	*p-laːw	laːw¹ / ɓaːw⁴	laːw¹ / pjawʔ⁴	plaːw¹ / paːw⁴	plaːw¹ / plaːw¹	paːw⁴ / plaːw¹	plaːw¹ / plaːw¹	---	[kʰⁱiw¹]	làːw / plaw⊦	plaːw

下	descend	*ʈuːʔ / *ʈʃʰuːʔ	--- / hay³	--- / ---	tsʰaw³ / tsʰaw³	--- / tsʰaw³	tsʰaw[1] / ---	--- / ---	--- / ---	--- / ---
下	descend	*C-luːy	luːy¹ / ---	luːy¹ / ---	luːy¹ / ---	--- / luːy¹	--- / ---	--- / ---	lúoy / ---	--- / ---
下	descend	CHI: *ɽjew	--- / ---	--- / lawʔ⁴	--- / ---	taw⁴ / ---	tʰaw⁴ / taw¹	taⁿw⁴ / tawⁿ[1]	--- / tɐwⁿ	tǎw / ---
下巴	chin	*C-ɣaːŋ	haːŋ¹ / hɛŋ¹	heːŋ¹ / hɛŋ¹	heːŋ¹ / heːŋ¹	heːŋ¹ / hiaŋ¹	heːⁿŋ¹ / hiaⁿŋ¹	[tsʰɔːŋ¹]	hàŋ / ---	---
下飯	go with (food)	*ʔuːɲ	ʔuːn¹ / ʔʉən¹	ʔuːn¹ / ʔun¹	ʔ[we]ɲ¹ / ʔ[o]ɲ¹	ʔuːn¹ / ʔun¹	ʔuːⁿn¹ / ʔun¹	[ɲin⁴]	--- / ---
下面	bottom	*peyʔ / *pʰeyʔ	pʰay³ / ---	pʰ[e]y³ / ---	pʰay³ / pʰey³	--- / pʰay³	--- / ---	---	fǎy / ---
	*[weew] / *ʈʃʰweew	tsʰaw¹ / faw¹	tsʰaw¹ / faw¹	fow¹ / faw¹	tsʰaw¹ / faw¹	tsⁿaw¹ / faw¹	taːⁿw¹	ʃǎw / ---
下去	go down	*C-luːy / Qi: *hluːy	luːy¹ / ---	luːy¹ / ---	luːy¹ / luːy¹	luːy¹ / ---	ɬuːⁿy¹ / ---	---	lúoy / ---
下去	go down	CHI: *ɽjew	--- / lawʔ⁴	--- / ---	taw⁴ / ---	--- / tawⁿ¹	taⁿw⁴ / tawⁿ¹	taːⁿw¹	--- / ---
夏	summer	*C-ɲaːn	ɲaːn¹ / ---	ɲaːn¹ / ---	ɲaːn¹ / ɲaːŋ	ɲaːⁿn¹ / ɲaːⁿŋ	ɲaⁿːn¹ / ɲuanⁿ⁴	[puⁿ⁴ɲemⁿ⁴]	--- / ---
	*hnaːɦ / *siːt CHI:	naː² / ---	taː² / ---	taː² / ---	tiːt⁷ / ---	tsⁿiːt⁸ / tsʰⁿiːt⁷	ɲeⁿnu / [tsⁿljtⁿ⁷]	--- / ---

XIAN

	Gloss	Recon A	Recon B	1	2	3	4	5	6	7	8
先	first	*[k/x]u:nɦ	*kʰu:nɦ	kʰu:n² / kʰuan⁵	kʰu:n² / kʰun²	kʰu:n² / ---	kʰu:n⁵ / kʰuŋ²	kʰu:n⁵ / kʰuŋ²	kʰu:n⁵ / kʰun⁵	---	kʰu:ŋN / ---
先	first	*C-ɣu:nɦ	*ɦu:nɦ	ɦu:n² / ---	ɦu:n² / ---	ɦu:n² / ---	--- / ---	--- / ---	--- / ---	---	--- / ---
鹹	salty	*Cuɣa:nʔ	*Cuɣa:nʔ	ɦa:n³ / ŋɔn³	ɦa:n³ / ŋwan³	ɦwa:n³ / ŋa:ŋ³	gwa:n³ / ŋa:ŋ³	va:n³ / ---	hwa:n³ / ---	[taŋ²]	ɦàn / vàn
衔	carry in mouth	*C-ŋa:n	*C-ŋa:n	ŋa:n¹ / ---	ŋa:n¹ / ŋan¹	ŋa:n¹ / ŋa:ŋ¹	ŋa:n¹ / ŋa:ŋ¹	ŋa:n⁴ / ŋa:ŋ¹	ŋa:n¹ / ŋuan⁴	ŋuen¹	ŋán
蜆	corbicula	*[c/ɕ]i:	*tɕʰi:	tsʰey¹ / ---	tsʰey¹ / ---	tsʰey¹ / ---	tsʰey¹ / tsʰey¹	tsʰey¹ / tsʰey¹	tsʰey¹ / tsʰey¹	tsʰay¹	---
	GHI:		*ɓənɦ	(ɓan²) / ---	ɓan² / ---	ɓan² / ---	ɓan⁵ / (ɓan²)	ɓan⁵ / ---	--- / ---	[pow⁴]	---
陷井	pitfall	*C-lu:ŋ	*C-lu:ŋ	lu:ŋ¹ / ---	lu:ŋ¹ / ---	lu:ŋ¹ / ---	lu:ŋ¹ / ---	--- / ---	lu:ŋ¹ / ---	---	---
陷井	pitfall	Qi: *fe:ŋʔ / NECHI: *tɕʰu:ŋʔ		--- / ---	--- / ---	--- / tsʰuŋ³	fe:ŋ³ / tsʰuŋ³	fe:ŋ³ / tsʰuŋ³	fe:ŋ³ / ---	tʰuəŋ⁴	---
陷落	subside	*pʰu:ŋ / Qi: *ljut / NECHI: *hlom		pʰu:ŋ¹ / ---	pʰu:ŋ¹ / ---	pʰu:ŋ¹ / ɬom¹	ɬut⁸ / ɬom¹	ɬut⁸ / ɬom¹	ɬut⁸ / ---	[tsuk⁸]	---

XIANG

字	gloss	src	proto	1	2	3	4	5	6	7	8	9
羨慕	envy	CHI:	*ŋja:k	(ze:k^{ˀ})	lɛʔ^4	re:ʔ^7 / te:ʔ^7	tɯ:^{2}	te:ʔ^8	---	---	---	---
		*C-ŋa:yɦ	*C-ŋa:yɦ	ŋa:y^2 / [ɲ]ay^5	ŋ[e]y^2 / ŋay^2	ŋa:y^2 / ŋa:y^2	ŋa:y^2 / ŋa:y^2	ŋ[a]y^2 / ŋ[a]y^2	ŋa:y^5	ŋ[a]y^5	ŋa:y^1 tow^1	---
相同	same	GHI:	*duŋ	---	duŋ^1	dɔŋ^1	dɔŋ^1	duŋ^1	duŋ^1	---	---	---
		*tə:ŋʔ	*tə:ŋʔ	---	---	---	---	dɔŋ^1	duŋ^1	---	tʰàŋ	---
相信	believe	*[c/ɕ]im	*tɕʰim	tsʰim^1	---	tsʰim^1	tsʰim^1	tsʰim^1	tsʰim^1	---	---	---
		Run:	*tɕɯ:ŋɦ	---	---	---	---	tsɯŋ^2	tɯŋ^5	---	tʃœɲV	---
香	fragrant; incense		*tu:nɦ	tʰu:n^2	tʰu:n^2 / tʰun^2	tʰu:n^2 / tʰun^2	tʰu:n^5 / tʰuŋ^2	tʰu:n^5 / tʰun^2	tʰu:n^5 / tʰun^5	[hɔ:ŋ]	tʰúon	---
香菇	mushroom	*C-dit	*dit	dit[9]	dit^7	dec^7	---	dec^7	det^7	---	dit	---
		Qi:	*tʃʰəŋʔ	---	tsʰin^3	tsʰeɲ^3	tsʰen^3 / tsʰen^3	tsʰàŋ^3	tsʰàŋ^1	tsʰàŋ^1	---	---
		GHI:	*tɕʰinʔ									
鑲	inlay	*p-lɔm	*p-lom	(lum^1)	lum^1	plom^1	plom^1 / plom^1	--- / plom^1	plum^1 / plom^1	[luen^2]	---	---
響	sound	*C-rə:ŋ	*ɦrə:ŋ	raŋ^1	ro:ŋ^1	ro:ŋ^1	ro:ŋ^1	ro:ŋ^4 / ro:ŋ^4	lɔ:ŋ^4 / ruaŋ^4	lɔ:ŋ^4 / ruaŋ^4	hu:^{1}	---

Chinese	Gloss	Source	Reconstruction									
向著	toward		*C-jok	tsok⁷	tsuk⁷	tsok⁷	tsok⁷ / tsok⁷	– / tsok⁸	– / tɔk⁷	–	–	–
項鍊	necklace	GHI:	*hŋi:w	tin¹	ki:w¹	ki:w¹	ki:w⁴ / kiw¹	kʰiw⁴	ki:w⁴	kew⁴	–	–
項圈	necklet		*kim	kʰim¹	kʰim¹	kʰim¹	kʰim¹	kʰim¹ / kʰem¹	–	[tɯəy²]	–	–
項圈	necklet	CHI:	*ŋgən	–	–	–	kan⁴ / kaŋ¹	kʰan⁴	kan⁴ / kan⁴	–	–	–
		CHI:	*kʰi:nʔ	–	–	–	kʰi:n³	kʰi:n³	kʰi:n³ / kʰin³	–	–	–
象	resemble	GHI:	*dɯŋ	dɯŋ¹	dɯŋ¹	dɔŋ¹	dɔŋ¹	dɔŋ¹ / dɔŋ¹	– / dɯŋ¹	dɑ̃ŋ¹	–	–
XIAO												
削	peel		*li:t	dʑi:t⁷	ɬi:t⁷	ɬi:t⁷	ɬi:t⁷	ɬi:t⁷	ɬi:t⁷	–	tʰa:w	tliɛ́t
削	peel	Qi: / NCHI:	*pʰa:t / *pʰi:nʔ	– / pʰen³	– / pʰen³	pʰen³	pʰa:t⁷ / pʰen³	pʰa:t⁷ / pʰen³	pʰa:t⁷ / pʰen³	[pʰə:k⁹]	pʰen⁷	–
削	peel		*C-ɣu:t	hu:t⁷	hu:t⁷	hu:t⁷ / hut[8]	hu:t⁷ / hut⁸	– / hut⁷	hut⁷	–	hṵ́ot	–
削	peel	*[k/x]uɲ		kʰun¹	kʰun¹	kʰun¹ / kʰon¹	kʰun¹	kʰun¹	kʰuɲ¹	–	–	–
削	peel	*C-lɯɲ / NECHI:	*C-lə:nɦ	lɯn²	lɯn²	lɯn²	– / lo:[n]²	– / luaŋ²	–	[lu:t⁷]	–	–

汉字	English	Recon 1	Recon 2									
消除	eliminate	*fut	*fut	pʰutʔ⁷ / ---	fut⁷ / ---	fut⁷ / ---	fut⁷ / ---	fut⁷ / fol[t]⁷	fut⁷ / fɘt⁷	pʰok⁷	--- / ---	---
小	small	GHl:	*ʔimɦ	tik[9] / ---	ʔin² / lɛʔ⁴	ʔeŋ²	--- / ʔin²	---	---	---	tík	---
小	small	CHl:	*ndok	---	---	---	tok⁸ / tɔk⁷	tʰoʔ⁸ / tɔk⁸	tok⁸ / tok⁸	tɘːk⁸	--- / tɔk˩	tɒk
小姑子	husband's sister	*ruːŋ	*ruːŋ	ruːŋ¹	guːŋ¹	guːŋ¹	guːŋ⁴	huaŋ⁴	huːŋ⁴	---	---	---
		*ju:	*hju:	zow¹	zow¹	zow¹	zow⁴	zow⁴ / zow¹	zow¹ / zow⁴	[fiː⁴]	---	---
小孩	child	*hlɯːk / Qi:	*hlɯːk / *dʑiʔ	dʑɯːʔ⁷ / ---	ɬɯːʔ⁷ / ɬuk⁷	ɬɯːk⁷ / ɬuk⁷	dʑi³ / ɬuk⁷	ɬuaʔ⁷ / ɬuk⁸	dʑi³ / ɬɯʔ⁷	ɬiɘk⁸	dɯː / ɬɯk˩	---
小米	millet	*C-lik	*C-lik	lik⁷	lik⁷	lik⁷	liːʔ⁷ / lik⁷	liːʔ⁸	lik⁷	[lat⁷]	l[é]k / laːꜛ	---
小腿	calf	*faːŋʔ	*faːŋʔ	pʰaːŋ³ / fɛŋ³	feːŋ³ / fɛŋ³	feːŋ³ / feːŋ³	feːŋ³ / feːŋ³	feːŋ³ / fiaŋ³	feːŋ³ / tʰiaŋ³	pɯa¹	---	---
小姨子	wife's younger sister	*Cɯrinʔ	*rjinʔ	zin³	zin³	rɘŋ³	ten⁶ / (ren³)	tʰen⁶ / tsen³	tin⁶ / tsen⁶	tsin⁴	zǐn / tʃen˥	---
		*ruːŋ	*ruːŋ	ruːŋ¹	guːŋ¹	guːŋ¹	guːŋ⁴	huaŋ⁴	hu[a]ŋ⁴	hu[a]ŋ⁴	---	---
		GHl:	*hjewʔ	---	zaw³	zaw³	zoː⁶ / zoː³	zoː⁶ / zoː³	zow¹ / zoː⁶	[miː⁴]	---	---

		Proto A	Proto B									
笑	laugh	*Cɯra:w	*rja:w	za:w^1 / za:w^4	za:w^1 / laʔ^4	ra:w^1 / ta:w^1	ta:w^4 / ta:w^1	tʰa:w^4 / tsa:w^1	ta:w^4 / tsa:w^4	tsu:^{4}	zá:w / tʃawˀ	tǎ:w
XIE												
斜靠	lean over	*Cuɲa:	*Cuɲa:	ɲa:^{1} / ---	ɲa:^{1} / ---	ŋwa:^{1} / ---	ŋwa:^{1} / ŋa:^{1}	ŋua^4 / ---	--- / ---	[ʔua^5]	--- / ---	---
鞋子	shoes	*C-gɘ:mʔ	*C-gɘ:mʔ	kam^3 / ɓɔn^4	ko:m^3 / kon^2	ko:m^3 / ---	ko:m^3 / ---	--- / kuam^3	(lɘm^2) / ---	[lɘm^5]	kàm / kuamˀ	---
寫	write, draw	GHɪ: / NECHɪ:	*tʰa:yʔ / *wa:yʔ	--- / ---	tʰa:y^3 / ---	tʰa:y^3 / ---	tʰa:y^3 / va:y^3	tʰa:y^3 / va:y^3	tʰa:y^3 / ---	---	--- / ---	tʰá:y
洩氣	discouraged	*fɪwɦ	*fɪwɦ	(piw^2) / ---	fiw^2 / ---	fiw^2 / fiw^2	fiw^5 / few^1	fiw[3] / few^2	--- / fi:w^5	---	--- / ---	---
XIN												
心	heart	GHɪ:	Cufɛ:k	(ho:ʔ^7) / ---	ho:ʔ^7 / ---	hwo:k^7 / ---	go:ʔ^7 / ŋo:k^7	vɔ:ʔ^7 / ŋoʔ^7	hɔ:ʔ^7 / ---	---	--- / ---	---
心臟	heart (physical)	GHɪ:	*hla:wʔ	--- / ---	ɬa:w^3 / ---	ɬa:w^3 / ---	ɬa:w^3 / ɬa:w^3	ɬa:w^3 / ɬa:w^3	ɬa:w^3 / ɬa:w^3	tsʰ1a:w^1	--- / ɬawˀ	---
新	new	*ma:n / CHɪ:	*hma:n / *C-nɘwʔ	ma:n^1 / ɓɔn^4	pa:n^1 / panʔ^4	pa:n^1 / pa:ŋ^4	no:^{3} / pa:ŋ^1	no:^{6} / no:^{3}	nɔ:^{3} / no:^{6}	[ɬaw^4]	mán / no:ˀ	nɔ́:
囟門	top of head	*C-ʋɯnɦ / NECHɪ:	*ʋɯnɦ / *wu:	vɯn^2 / ---	vɯn^2 / vɛnʔ^4	vɯn^2 / vow^4	ɬuun^2 / vow^1	vɯn^2 / vow^1	vɯn[2] / vow^4	[na:^{5}]	--- / ---	---

XING

		Proto	1	2	3	4	5	6	7	8
星星	star	*C-ɽaːw	raːw¹ / laːw⁴	raːw¹ / laʔ⁴	raːw¹ / laːw⁴	raːw⁴ / raːw¹	laːw⁴ / raːw¹	laːw⁴ / raːw⁴	[tsap⁷tsin⁵]	draː˩w / ɬaw˩
腥	smelly	*C-ɣaːy NCHI:	haːy¹ / ɲɔ(y)¹	haːy / ɲoːy¹	haːy¹ / —	haːy / ɲoːy¹	haːy¹ / ɲuay¹	haːy¹ / —	huəy⁴	—
		*Ciɦəːy *[k/x]aːw	kʰaːw¹ / —	kʰaːw¹ / —	kʰaːw¹ / —	kʰaːw¹ / kʰaːw¹	kʰaːw¹ / (kʰaːw⁴)	kʰaːw¹ / —	hu˩	—
醒	awaken	*hlɯːn CHI:	dɯːn¹ / pʰɔy¹	ɬɯːn¹ / —	ɬɯːn¹ / —	ɬɯːn¹ / ɬuŋ¹	ɬɯːn¹ / ɬuŋ¹	pʰuy¹ / ɬən[3]	[tsʰeːt⁹]	—
XIONG											
凶兆	ill omen	*wiːn	viːn¹ / —	viːn¹ / —	hwiːn¹ / —	viːn⁴ / viŋ¹	viːn⁴ / viŋ¹	viːn¹ / viŋ⁴	viːn¹	—
胸膛	chest	*fənʔ	[p]en³ / ɓon¹	fan³ / —	fan³ / faŋ³	— / faŋ³	fan³ / tʰan³	fan³ / tʰan³	pan¹tsay⁴	[p]ên faŋ]
熊	bear	*C-mɯy	muy¹ / mɔy¹	muy¹ / —	muy¹ / muy¹	muy⁴ / mɔy¹	muy¹ / mow⁴	muy⁴	muy⁴	— / moy˩
XIU											
休息	rest	GHI: *tʃʰɯːk	zɯːʔ⁷ / hɯək²	tsʰɯːʔ⁷ / hɛʔ⁴	tsʰɯːk⁷ / —	tsʰɯːk⁷ / tsʰuk⁷	tsəɯ¹ / kʰaw²	tsəɯ¹ / kʰaw⁵	[ʔaːw]	zǔː
		Qi: *tɕɯː Run: *kʰəwɦ								
修理	fix	*C-ɽiːmɦ *ɓiːn CNEHI:	riːm² / lim⁵	riːm² / —	riːm² / lim²	riːm² / ɓiŋ²	liːm² / ɓiŋ⁵	— / ɓiŋ²	—	—

字	Gloss	Recon. 1	Recon. 2	1	2	3	4	5	6	7	8
袖子	sleeve	*[k/x]i:n	*kʰi:n	kʰi:n¹	kʰi:n¹	kʰi:n¹	kʰi:n¹	kʰi:n¹	kʰi:n¹	[tɯ:n¹]	xǐen
				kʰi:n¹	kʰi:¹	---	kʰiŋ¹	kʰiŋ¹	kʰi:n¹		kʰi:ŋ┤
		*C-v[ɛ]:ŋʔ	*v[e]:ŋʔ	ve:ŋ³	ve:ŋ³	ve:ŋ³	fe:ŋ⁶	ve:ŋ⁶	ve:ŋ³	vo:⁴·	vɛŋ
				veŋ⁴	ven³	---	ve:ŋ³	vianŋ³	vianŋ⁶		---
XU											
蓄水	retain water	*C-luŋ	*C-luŋ	luŋ²	luŋ²	lo:ŋ¹	lo:ŋ¹	luŋ²	lo:ŋ¹	[ŋat⁷]	---
		CHI:	*C-lə:ŋ	---	---	---	lo:ŋ¹	luaŋ¹	loŋ²		---
XUAN											
旋轉	turn	*ŋa:yʔ	*hɲa:yʔ	ŋa:y³	ka:y³	ka:y¹	ka:y⁶	---	---	[van¹]	ŋày
				---	kay³	ka:y³	ka:y³	kuay³	---		---
選擇	choose	GHI:	*hləɲ	---	tsʰin³	ɬaŋ¹	ɬan¹	ɬan¹	ɬan¹	tsɔn⁴	---
				---	---	ɬan¹	ɬan¹	ɬan¹	ɬan¹		---
癬	ringworm	ECHI:	*C-le:mɦ	---	le:m²	le:m²	le:m⁵	le:m²	le:m⁵	le:m⁵	---
		NECHI:	*ku:ŋʔ	---	---	---	kuŋ²	kuŋ²	kuŋ⁵		---
XUE											
血	blood	*la:c	*hla:c	dfa:t⁷	ɬa:c⁷	ɬa:t⁷	ɬa:t⁷	ɬa:t⁷	ɬa:t⁷	ɬɵtˈ⁸	dạt
				tθɔc²	laʔ⁴	ɬo:t⁷	ɬo:t⁷	ɬa:t⁸	ɬuat⁷	tlạt	ɬuatˈ
XUN											
燻肉	smoke meat	*[ʈ/c]u:ɦ	*ʈ[ʃ/ɕ]u:ɦ	tsʰow²	---	tsʰaw²	---	vɔ:n¹	hɔ:n¹	ha:ŋ¹	---
		Qi:	*Cuɦə:n	---	---	---	tsʰaw²	tsʰaw²	tsʰaw⁵		---

漢字	gloss	reconstruction										
尋找	search	*C-g[ɛ]:k NWCHI: NECHI:	*k[e]:k *rʊt *tʰaː:wɦ	ke:ʔ⁷ / lʊt⁴	ke:ʔ⁷ / lɛʔ⁴	ke:k / ---	ke:ʔ⁷ / tʰa:w²	ke:ʔ⁷ / tʰa:w²	ke:ʔ⁷ / tʰa:w²	ke:ʔ⁷ / tʰa:w⁵	[liəw²]	--- / ---	--- / ---
YA												
壓	press	*t[tʃ/ɕ]ʰə:t NWCHI:	*tɕʰə:n	tsʰat⁷ / tsʰan¹	tsʰo:t⁷ / sɔnʔ⁴	tsʰo:t⁷ / ---	tsʰo:t⁷ / tsʰo:t⁷	--- / tsʰoʔ⁸	--- / ---	--- / ---	[kəm⁵]	--- / ---	--- / ---
鴨	duck	CHI:	*ɓit	--- / ---	--- / ---	ɓet⁷ / ---	ɓet⁷ / ---	ɓet⁷ / ɓet⁸	ɓ[e]t⁷ / ɓe[p]⁷	ɓet⁷	εp / pet˥	---
牙齒	tooth	*Cí·vən	*fjən	pʰen¹ / sen¹	fan¹ / fen¹	fan¹ / sen¹	fan¹ / sen¹	fan¹ / faŋ¹	fan¹ / fʰan¹	tsʰaŋ¹	fén / fa:ŋ˥	---
芽	bud	*ʈa: NWCHI:	*ʈʰa: *rɛ:ŋ	tsʰa:¹ / laŋ⁴	tsʰa:¹ / lɔnʔ⁴	tsʰa:¹ / ---	tsʰa:¹ / tsʰa:¹	tsʰa:¹ / tsʰa:¹	tsʰa:¹ / tsʰa:¹	[tɔk⁷]	ʃa: / ---	---
啞	mute	*C-ŋɔm	*C-ŋɔm	ŋom¹ / ŋam¹	ŋom¹ / ---	ŋom¹ / ŋom¹	ŋom¹ / ŋom¹	ŋom⁴ / ŋom¹	ŋum¹ / [mʲ]om⁴	ŋɔ:m¹	--- / ŋom˥	---
YAN												
烟	smoke (tobacco)	*[j/Ci]lɯ:k CHI: NCHI:	*[hj/lj]ɯ:k *hja: *C-ŋwɛ:n	zɯ:ʔ⁷ / ŋuan¹	zɯ:ʔ⁷ / ŋɔn¹	za:¹ / ŋɔ:n¹	za:⁴ / ---	za:⁴ / ---	za:¹ / za:⁴	tso:¹	zɯ / ---	---
烟子	thick smoke	*C-dɨ:k	*C-dɨ:k	dɨ:ʔ⁷ / ---	dɨ:ʔ⁷ / ---	dɨ:k / ---	dɨ:k / dɨt⁷	dʲaʔ⁷ / dɨʔ⁸	dʲiak⁷ / dɨʔ⁷	ti:²	--- / ---	---
淹	flood	*C-ʋəc	*ʋəc	v[e]t⁷ / viat²	vat⁷ / vaʔ⁴	vac / vat⁷	[vat⁸] / vat⁷	vat⁸ / vat⁸	vat⁷ / vat⁸	[muan⁴]	--- / ---	---

漢字	gloss										
羼	castrate	*C-ɖɯ:n	*ɖɯ:n	ɖɯ:n^1 / ɖɯn^1	ɖɯ:n^1 / ---	ɖɯ:n^1 / ɖɯŋ^1	ɖɯ:n^1 / ɖɯŋ^1	ɖɯ:n^1 / dɘn^1	ɬɯŋ^4	dɯɣn / ---	--- / ---
腌	pickle	GHI: / Run:	*C-mæ:ŋ / *C-moɲɦ	(mo:ŋ^1) / ---	mo:ŋ^1 / ---	mo:ŋ^1 / ---	mo:ŋ^1 / mo:ŋ^1	--- / moŋ^2	mo:ŋ^5	mo:ŋ^1 / moɲ^2	--- / ---
沿著	along	*C-ni:nʔ / NWCHI:	*C-ni:nʔ / *rwu:	ni:n^3 / vow^4	ni:n^3 / ɲɛwʔ^4	ni:n^3 / nin^3	ni:n^3 / nin^3	ni:n^3 / nin^3	----	--- / ni[ŋ]^6	--- / ---
鹽	salt	*C-ɲa:wʔ	*C-ɲa:wʔ	ɲa:w^3 / ɲa:w^3	ɲa:w^3 / ɲa:^{3}	ɲa:w^3 / ɲa:w^3	ɲa:w^3 / ɲa:w^6	na:w^6 / ɲa:w^3	nɔ:w^4	ɲàw / ɲaw˩	--- / ---
猿	ape	*Cuɾi:	*Cuɾi:	(gey^1) / ---	(rey^1) / ---	vey^1 / ---	fey^4 / ɣey^1	fey^4 / fey^1	[viən^{4}ʋuat^9]	--- / ---	--- / ---
眼睛	eye	*ɬa:	*tʃʰa:	tsʰa:^{1} / hɔ:^{1}	tsʰa:^{1} / ha:^{1}	tsʰa:^{1} / tsʰa:^{1}	tsʰa:^{1} / tsʰa:^{1}	tsʰa:^{1} / tsʰa:^{1}	tow^1	ʃá: / tʃʰa:˧	--- / ---
眼淚	tears	*C-nəmʔ	*C-nəmʔ	nom^3 / nam^3	nam^3 / nan^3	nom^3 / ---	nam^3 / nam^3	nam^3 / nam^6	na:m^1	nòm / nam˩	--- / ---
		*ɬa:	*tʃʰa:	tsʰa:^{1} / hɔ:^{1}	tsʰa:^{1} / ha:^{1}	tsʰa:^{1} / tsʰa:^{1}	tsʰa:^{1} / tsʰa:^{1}	tsʰa:^{1} / tsʰa:^{1}	tow^1	ʃá: / tʃʰa:˧	--- / ---
YANG											
秧	seedling	*Ciʋən	*Ciʋən	pʰen^1 / fɔɲ^1	fan^1 / fan^1	fan^1 / faŋ^1	fan^1 / faŋ^1	fan^1 / ʔuŋ^1	tsʰan^1	fén / ---	--- / ---
羊	sheep	*ja:ŋ	*hja:ŋ	za:ŋ^1 / zɛ:ŋ^1	ze:ŋ^1 / zɛŋʔ^4	ze:ŋ^1 / ---	ze:ŋ^4 / ze:ŋ^1	ze:ŋ^1 / ziaŋ^4	tsuɯ:ʔ^7	zaŋ / ʒiaŋ˥	--- / ---

Char	Gloss	Recon.	1	2	3	4	5	6	7	8	9
仰	face upward	*C-la: / *C-la:	la:¹	la:¹	la:¹	la:¹	la:⁴	la:¹	[tsa:m⁴]	la:	—
			—	la:¹	—	la:¹	la:¹	la:[1]		—	—
仰望	look up at	CHI: *ŋgeuʔ	tʰa:w²	ɓəuʂ³	kauʂ⁶	kauʂ³	kauʂ⁶	k[ə]uʂ⁶	ŋəy⁴	—	—
			—	—	—	—	—	—		—	—
癢	itch	*kɔm	(kʰum¹) kʰom¹	kʰ[ɯ]m¹ kʰom¹	kʰom¹ kʰom¹	kʰom¹ kʰom¹	kʰom¹ kʰom¹	kʰum¹ kʰom¹	kʰam¹	(xum) kʰom˦	—

YAO

Char	Gloss	Recon.	1	2	3	4	5	6	7	8	9
腰	waist	Meifu: *Ciɣəw / *Ciɦəw *ɦəw	haw¹	haw¹	hjaw¹ haw¹	zaw¹ haw¹	zaw¹ haw¹	hjaw¹ haw¹	[ɬam²]	—	—
		NWCHI: *Ciɣa:ɦ / *Ciɦa:ɦ *tɕʰum	ha:² tsʰən³	ha:² tsʰən³	hja:² ɲa:²	za:⁵ ɲa:²	za:⁵ ɲa:²	hja:⁵ ɲa:²	zow⁴	ɲa:˩	—
妖怪	monster	GHI: *hwɛːt / CHI: *tʃʰeːy	luŋ¹	vo:t⁷	vo:t⁸	vo:t⁸	vo:t⁷	vɔ:t⁷	vuat⁹	—	—
			—	—	—	—	—	tsʰuay¹		—	—
		GHI: *ʔɯːŋ	kʰiw¹	ʔɯːŋ¹	ʔɯːŋ¹	ʔɯːŋ¹	ʔɯːŋ¹	—	[ʔuey¹]	—	—
			—	—	ʔɯŋ¹	ʔuŋ¹	—	—		—	—
搖	shake	*ɲoŋɦ / *hɲoŋɦ	ɲoŋ²	ɲuɲ²	ɲoŋ²	ɲoŋ²	ɲoŋ⁵	n[u]ŋ²	ɲeuɲ⁴	ɲóɲ	—
			—	—	ɲoŋ²	ɲoŋ²	ɲoŋ²	n[u]ŋ⁵ ɲoŋ²		—	—
搖籃	cradle	*ʔu: / *ʔu:	ʔow¹	ʔow¹	ʔow¹	ʔow¹	ʔow¹	(ʔuy¹)	ʔə:y¹	—	—
			—	ʔɛw¹	—	ʔow⁴	ʔow⁴	ʔow⁴		—	—
咬	bite	GHI: *hɲa:ɲʔ	tʰan³	ka:n³	ka:ɲ³	ka:n⁶	ka:n⁶	kʰa:n⁶	da:n¹	tʰən	kán
			—	—	kan³	kan³	kan³	kan³		—	

Char	Gloss	Proto A	Proto B									
習	ladle	*C-dok / NCHI: / Run:	*C-dok / *kʰəw? / *ʔweːk	ɗok⁷ / kʰaw³	ɗuk⁷ / kɔː³	ɗok⁷ / k[ow]³	dok⁷ / d[o]k⁷	(vɔʔ) / vɔʔ⁷	--- / vɔʔ⁷	ɗɔːk⁹	---	---
習	ladle	CHI:	*ɓəːk	--- / ɓak²	--- / ɓɔʔ⁴	---	ɓɔːʔ⁷ / ɓɔk⁷	ɓɔːʔ⁷ / ɓɔʔ⁸	ɓɔːʔ⁷ / ---	[hiːw¹]	---	---
藥	medicine	jaː	*hjaː	zaː¹ / zɔː¹	zaː¹ / zaʔ⁴	zaː¹ / zaː⁴	zaː⁴ / zaː¹	zaː⁴ / zaː¹	zaː¹ / zaː[2]	tsoː¹	zaː:	---
要	want	*C-dɯː	*dɯː	dɕəɯ¹ / tsow¹	dɕəɯ¹ / dɕɛː¹	dɕəɯ¹ / dɕəɯ¹	dɕəɯ¹ / dɕəɯ¹	dɕəɯ¹ / dɕəɯ¹	--- / dɕəɯ¹	lɔː⁵	---	---
鷂鷹	sparrow hawk	*rinɦ	*rinɦ	(gin²)	gin²	gen² / gen²	gen² / xen²	hen² / xen²	pʰat⁷ / kʰen⁵	[pʰat⁷]	tɕʰeɪ	---
YE												
椰子	coconut	*Ciʔunɦ / NECHI	*Ciʔunɦ / *jeːŋɦ	ʔun² / ---	ʔun² / ʔjɛn²	ʔjun² / zeːɲ²	--- / zeːɲ²	zun⁵ / ziaɲ²	ʔjun⁵ / ---	[pɔː⁵ tsʰuək⁷]	ún / ʒiaɲ˧	zun
也	also	*C-ŋeŋ	*C-ŋeŋ	ŋan¹ / ---	ŋan¹ / ---	ŋa[n]¹ / ŋan¹	ŋan¹ / ŋan¹	--- / ---	--- / ---	---	--- / ---	---
野雞	pheasant	*[k/x]ey	*kʰey	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	kʰay¹ / kʰay¹	--- / kʰay¹	kʰay¹	xáy	---
		*suːn	*suːn	tuːn¹ / θuen¹θ	tuːn¹ / fun¹	tuːn¹ / suɲ⁴	tuːn¹ / suɲ¹	tuːn¹ / tsʰuɲ¹	--- / tsʰun¹	tsʰuen tʂ	tɕúon	---

漢字	English													
野貓	wildcat	*C-mi:wɦ / GHl:	*C-mi:wɦ	mi:w² / miw⁵	mi:w² / mi:²	mi:w² / miw²	mi:w⁵ / miw²	miw² / miw[1]	mi:w⁵ / miw²	[ɲa:w⁵]			¦	¦
野薯	wild potato	*Cuɲa: / NWCHl:	*Cuɲa: / *hwɲəːy	roŋ¹ / tθuen¹	tu:n¹ / fun¹	tu:n¹ / suŋ¹	tu:n¹ / suŋ¹	tu:n¹ / tsʰuŋ¹	--- / tsʰun¹	tsʰuen¹		¦	¦	¦
				ɲa:¹ / hɔ[y]	ɲa:¹ / ɲɔy⁴	ɲwa:¹ / ---	ɲwa:¹ / ɲa:¹	ɲua⁴ / ɲa:¹	ɲwa:¹ / ɲa:⁴	ɲow¹				
野薯	wild potato	*C-mu:ŋ / Run:	*C-mu:ŋ / *C-mən	mu:ŋ¹ / ---	mu:ŋ¹ / ---	mu:ŋ¹ / ---	mu:ŋ¹ / muŋ¹	muaŋ⁴ / maŋ¹	mu:ŋ¹ / man⁴	mɔ:n¹tsʰuen¹			¦	¦
野性	the wild	*Cili:w	*lji:w	zi:w¹ / ---	zi:w[3] / ---	zi:w¹ / ---	ɬi:w⁴ / ziw¹	ɬiw[2] / ziw¹	ɬi:w⁴ / tsiw⁴	tsi:w⁴			¦	¦
野豬	wild boar	*C-ləc	*C-ləc	lat⁷ / liat²	lat⁷ / ---	lac⁷ / lat⁷	lat⁷ / lat⁷	lat⁸ / lat⁸	lat⁷ / lat⁸	[pəy⁴tsʰuen¹]	lɤt / latɹ		¦	¦
葉子	leaf	*C-ɓuɪ	*ɓuː	ɓeu¹ / ɓow¹	ɓeu¹ / ɓɜw¹	ɓeu¹ / ɓeŋ¹	ɓeu¹ / ɓeŋ¹	ɓeŋ¹ / ɓeŋ¹	ɓeŋ¹ / ɓeŋ¹	pi:¹	ɓeŋ / [ɹhed]		¦	¦
夜盲	night blind	*rɔm / Qi:	*rom / *muːŋʔ	rom¹ / ---	(rom¹) / ---	rom¹ / ---	pɯ:ŋ⁶ / rom¹	pʰɯ:ŋ⁶ / ---	pɯ:ŋ⁶ / ---	pɯ:¹			¦	¦
		CHl:	*tʃʰa:	--- / hɔ:¹	--- / ---	tsʰa:¹ / ---	tsʰa:¹ / tsʰa:¹	tsʰa:¹ / ---	tsʰa:¹ / tsʰa:¹	tow¹			¦	¦
		CHl:	*kʰəy	--- / kʰay¹	--- / ---	--- / ---	kʰay¹ / ---	kʰay¹ / ---	kʰay¹ / ---	kʰay¹			¦	¦

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YI

Chinese	gloss	GHI / CHI	reconstruction								
腋	armpit	GHI: CHI:	*kʰa: *tɕʰuːŋʔ	taw² tsʰoŋ³	kʰa:¹ ---	kʰa:¹ ---	kʰa:¹ ---	kʰa:¹ ---	tsʰuaŋ³ kʰa:¹	--- tsʰuŋ³	[taw¹]
一	one		*C-ŋiʔ *C-ŋi:ʔ	ŋey³ ---	ŋay³ ---	ŋay³ ŋay³	ŋay³ ŋay³	ŋay⁶ ŋay³	--- ŋay³	[tsɛːy⁴]
一	one		tɕʰuː? [c/ɕ]ɯːʔ	--- ---	kɯ² ---	?ɯ³ tsuɯ³	?ɯ⁵ tsuɯ²	kɯ² tsuɯ²	kɯ² tsuɯ²	kɯ²	ʌhheʃ tʃʰhue kɯ ɯ́
一起	together		*C-bɯːɦ *C-bɯːɦ	ɓeɯ² ---	ɓaɯ² ---	ɓaɯ² ---	ɓaɯ⁵ ---	--- ---	ɓaɯ⁵ ---	[pa:k⁹]
一十	a ten		*hmun *hmun	mun¹ ---	pun¹ ---	pun¹ poŋ¹	pun⁴ poŋ¹	pʰun⁴ (poŋ⁴)	pun⁴ pən⁽²⁾	lem pun⁴ poŋˀ
醫冶	heal		*ja: *hja:	za:¹ ---	za:¹ ---	za:¹ za:⁴	za:⁴ za:¹	za:⁴ za:¹	za:¹ za:⁽²⁾	--- za: ʒa:ˀ
依靠	lean on	GHI:	*C-məːŋɦ	(mo:ŋ²) ɦcɯ³	mo:ŋ² ---	mo:ŋ² ---	mo:ŋ² ---	--- ---	--- ---	[ʔua²kʰaw¹]
姨父	mother's elder sister's husband		*tɕʰey³ *[c/ɕ]ey^C	tsʰey³ ---	tsʰay³ ---	tsʰay³ ---	tsʰay³ tsʰay³	--- tsʰ[ɯ]y³	tsʰay³ ---	tsʰa:y¹
姨父	mother's elder sister's husband		*fɯ: *fɯ:	pʰəɯ¹ ---	feɯ¹ ---	feɯ¹ ɦeɯ	feɯ¹ (feɯ⁴)	feɯ¹ fʰeɪ¹	feɯ¹ fʰeɪ¹	pa:¹

	Gloss	Proto a	Proto b	C1	C2	C3	C4	C5	C6	C7	C8	C9
姨母	father's younger sister	*ŋi:n	*hŋi:n	ŋi:n¹ / ---	(ŋi:n¹) / ---	ki:n¹ / ---	ki:n⁴ / kiŋ¹	kʰi:n⁴ / (kiŋ⁴)	ki:n⁴ / ---	ŋiən²	--- / ---	---
姨母	mother's elder sister	*mi:	*hmi:	m[i:] / ---	pey¹ / ---	pey¹ / ---	pey⁴ / ---	pʰey⁴ / (pey⁴)	pey⁴ / pey⁴	[fi:⁴]	--- / ---	---
已經	already	*C-ba:yʔ / *NECHI:	*ɓa:yʔ / *ɓə:yʔ	ɓa:y³ / ---	ɓa:y³ / ---	ɓa:y³ / ɓo:y³	ɓa:y³ / ɓo:y³	ɓa:y³ / ɓuay³	ɓa:y³ / ɓu:y³	---	bà:y / puay]	---
溢	overflow	*C-ba: ɦ / Run:	*ɓa: ɦ / *va:ɦ	ɓa:² / ɓɔ:⁵	ɓa:² / ɓa:²	ɓa:² / ɓa:²	ɓa:⁵ / ɓa:²	ɓa:⁵ / va:²	ɓa:⁵ / va:²	pɔ:¹	bǎ: / ---	---
YIN												
陰	cloudy	*C-ŋu:m / CHI: / NCHI:	*C-ŋu:m / *hŋom? / *C-ŋom?	ŋɯ:m¹ / ---	ŋɯ:m¹ / ---	kom³ / ŋom³	kom⁶ / ŋom³	--- / ŋom³	kum⁶ / kom⁶	kum⁴	--- / ŋom]	---
銀	silver	*ŋen	*hŋen	ŋen¹ / kon⁴	kan¹ / kan?⁴	kan¹ / kaŋ⁴	kan⁴ / kaŋ¹	kʰan⁴ / kaŋ¹	kan⁴ / kaŋ⁴	kuen⁴	ŋén / kaŋ⊣	kǎn
銀元	silver coin	*ŋen	*hŋen	ŋen¹ / kon⁴	kan¹ / ---	kan¹ / ---	kan⁴ / kaŋ¹	kʰan⁴ / kaŋ¹	kan⁴ / kaŋ⁴	kuen⁴	--- / ---	---
		*[k/x]a:w¹	*kʰa:w¹	kʰa:w¹ / kʰa:w¹	kʰa:w¹ / ---	kʰa:w¹ / ---	kʰa:w¹ / ---	--- / kʰa:w¹	--- / kʰa:w¹	---	---	---
引	direct	*C-ɣun / ECHI:	*C-ɦun / *ruyʔ	hun¹ / ---	hun¹ / huɛn¹	guy³ / ---	guy⁶ / hon¹	--- / ---	huy⁶ / ---	luey²	--- / ---	---
引火	ignite	*C-ɟip / CHI:	*tɕip / *C-ŋa:nʔ	tsip⁷ / ---	tsip⁷ / ---	tsip⁷ / ---	ŋa:n³ / ---	ŋa:n⁶ / ---	ŋa:n³ / ŋuan⁶	[ɲin²]	--- / ---	---

		Reconstruction										
引誘	tempt	*C-lɔk CHI:	*C-lok *C-luːk	lok⁷ ---	(lok⁷) ---	luːk⁷ luk⁷	luː?⁷ luk⁷	--- luk⁸	--- ---	--- ---	--- ---	--- ---
YING												
鸚鵡	parrot (green)	*C-dɛːw	*C-dɛːwɦ	dɛːw² ---	dɛːw² ---	dɛːw² dɛːw²	dɛːw⁵ dɛːw²	dɛːw⁵ diaw²	dɛːw⁵ diːw⁵	--- ---	--- ---
鸚鵡	parrot (black)	*C-ɟuːŋɦ	*C-tɕuːŋɦ	tsuːŋ² ---	tsuːŋ² ---	tsuːŋ² ---	tsuːŋ⁵ tsuŋ²	tsuaŋ⁵ tsuŋ²	tsuːŋ⁵ tuŋ⁵	tsuaŋ⁵ 	--- ---
鷹	eagle	*C-ŋaːw	*C-ŋaːw	ŋaːw¹ ---	ŋaːw¹ ---	--- ---	ŋaːw¹ ŋ[a]w¹	ŋaːw⁴ ŋaːw¹	ŋaːw¹ ŋaːw⁴	[vey²] 	--- ŋaw˥
螢火蟲	firefly	*C-guːc	*ku:c	--- kuat⁵	--- ku?⁵	k[u]c⁷ ---	kuːt⁷ kut⁷	--- kut⁷	kut⁷ 	--- 	---
		*C-lip	*lip	lip⁷ ---	lip⁷ ---	lip[⁹] ---	lip⁷ lip⁷	--- ---	--- ---	lip⁷ lip⁷	[tsap⁹]
		GHI: CHI:	*C-ləŋ? *C-laːy	(laŋ³) ---	laŋ³ ---	laŋ³ ---	--- ---	--- ---	--- ---	laːy⁷ l[a]y⁴	[tsin⁵]
影子	shadow	*[C-ʋ/w]uː Qi: NCHI:	*[ʋ/hw]uː *jəw? *Ciɦɛːw?	vɤɯ² ---	vɤɯ² ɲaw³	hjaw³ ɲaːw³	zoː³ ɲaːw³	zoː³ ŋaw³	z[o]:³ ŋaw⁶	[tɯa˥] 	vɤɕɯ ---
便	hard	*[c/ɕ]əːn?	*tɕʰəːn?	tsʰan³ tsʰan³	tsʰoːn³ sɔn³	tsʰoːn³ tsʰoːɲ³	tsʰoːn³ tsʰoːɲ³	tsʰɔːn³ tsʰuaŋ³	tsʰɔːn³ tsʰuːn³	[ləːw⁴] 	ʃɐn / sɔ̃n faw˥

YOU

汉字	English	Proto 1	Proto 2									
游泳	swim	*p-li:	*p-li:	ley^1 / lɔy^4	ley^1 / ---	pley^1 / pey^4	pley^1 / pley^1	pey^1 / pley^1	pley^1 / pley^1	[lɔn^1]	léy / ---	
有	have	*tɕu:ɦ	*C-ɟu:ɦ	--- / ---	tsaw^2 / ---	--- / tsaw^2	tsaw^2 / tsaw^2	--- / ---	--- / ---	---	--- / ---	
有	have	*du:k / *ɗə:k	*C-du:k / Run:	du:ʔ^7 / dók^2	du:ʔ^7 / (dɔʔ^4)	du:ʔ^7 / dók^7	--- / ---	dua:ʔ^7 / dɔʔ^8	du:ʔ^7 / dɔʔ^8[8]	tɔk^9	dʉ: / ---	dʉok
又	again	*C-lomʔ / *C-ləmʔ	*C-ləmʔ / NECHI:	lom^3 / ---	lom^3 / ---	lom^3 / lem^3	lom^3 / ---	--- / lam^3	--- / lam^3	---	--- / ---	
右	right	*pʰəyʔ / *fe:ŋ	*pəyʔ / Run:	pʰay^3 / pʰ[u]y^3	pʰ[e]y^3 / pʰay^3	pʰay^3 / ---	pʰay^3 / pʰay^3	pʰay^3 / fiaŋ^1	pʰa[:]y^3 / fiaŋ^1	pʰa:y^5	fãy / ---	
		*ndinɦ	CHI:	(tsen^2) / tsen^5	(tsen^3) / ---	teɲ^2 / ---	ten^2 / ten^2	--- / ten^2	--- / ten^2	[pet^{10}]	nĩn / tenˇ	
柚子	pomelo	*ɓom	*C-ɓɔm	ɓom^1 / ---	ɓ[e]m^1 / ---	ɓ[e]m^1 / ---	ɓom^1 / ɓom^1	--- / ɓom^1	ɓum^1 / ɓom^1	ɓʉeŋ^5	--- / pomˈ	

YU

汉字	English	Proto 1	Proto 2									
瘀血	bruise	*t[ʃ/ɕ]ʰəmʔ	GHI:	tʰok^7 / ---	tsʰ[o]m^3 / ---	tsʰ[o]m^3 / tsʰom^3	tsʰ[o]m^3 / ---	tsʰam^3 / ---	tsʰam^3 / tsʰam^3	[ʔja:m^1]	--- / ---	
		*hla:c	GHI:	ɗum^3 / tθɔt^2	ɬa:t^7 / laʔ^4	ɬa:c / ---	ɬa:t^7 / ɬo:t^7	ɬa:t^7 / ɬa:t^8	ɬa:t^7 / ɬuat^7	ɬʉət^8	--- / ---	
魚	fish	*hla:	*la:	ɗá:^{1} / ---	ɬa:^{1} / laʔ^1	ɬa:^{1} / ɬa:^{1}	ɬa:^{1} / ---	ɬa:^{1} / ɬa:^{1}	ɬa:^{1} / ɬa:^{1}	ɬow^4	dá: / ɬa:ˈ	tlá:

魚籠	fish basket	*C-li:k	*C-li:k	li:?⁷	li:?⁷	li:k⁷	lia?⁷	lia?⁸	liak⁷	[ɓa:w¹]	---	---
				liek²	li?⁴	li?⁷	lik⁷	lit⁸	li?⁸		---	---
魚鰭	fins	*hwik	*wik	(vi:?⁷)	vi[t]⁷	hwik⁷	vi:?⁸	vi:?⁸	vi[:t]⁷	[pʰɿ:⁵]	vit	vit
				---	---	vet⁷	vet⁷	vet⁸	vet⁸		---	---
雨	rain	*fun	GHɪ:	(pun¹)	fun¹	fun¹	fun¹	fun¹	fun¹	pɔŋ¹	(pun)	---
				fɛn¹	fɛn¹	foŋ¹	foŋ¹	foŋ¹	tʰən¹		foŋ˧	foŋ˧
語言	language	*tʰun	*tun	tʰun¹	tʰun¹	tʰun¹	tʰun¹	tʰun¹	tʰun¹	[dat⁹]	tʰún	---
				tsʰən¹	tʰɛn¹	tʰoŋ¹	tʰoŋ¹	tʰoŋ¹	tʰən¹		---	---
玉米	corn	*fe:ŋʔ	Qi:	(ʔo:y³)	ʔo:y³	---	fe:ŋ³	fe:ŋ³	fe:ŋ³	---	(ɔy)	---
			CHɪ:	---	---	---	---	---	---		---	---
		*tɕa:yʔ		---	---	---	tsa:y³	---	tsa:y³	[muay¹]	---	---
				---	---	---	---	tsa:y³	tuay³		---	---
芋頭	taro	*ra:k	*ra:k	ra:?⁷	ge:?⁷	ge:k⁷	ge:?⁸	he:?⁸	he:?⁸	kɯ:⁵	---	---
				---	---	ge:?⁷	xuɯ:²	xe?⁸	---		---	---
YUAN												
圓	round	*Cuɦom	*Cuɦɔm	hom¹	(hom¹)	hwom¹	gom¹	---	hum¹	[la:w¹]	luon	pluon
		*ʔwom	NCHɪ:	---	---	kom¹	yom¹	[z]om¹	vom¹		ʒom˧	---
遠	far	*C-ləy	*C-ley	lay¹	lay¹	lay¹	lay¹	lay⁴	lay¹	lay¹	lay	---
				lay¹	lay¹	lay¹	lay¹	lay¹	lay⁴		lay˧	---

願意	willing	*C-d[ɛ]:ŋ	*d[e]:ŋ	de:ŋ¹ —	de:ŋ¹ —	de:ŋ¹ de:ŋ¹	de:ŋ¹ d̥iaŋ]	de:ŋ¹ —	de:ŋ¹ —	— —	jɐ́n ɲa:ŋ]	¦ ¦
	GHl:	Cuɦɛ:k		(ho·ʔ⁷) —	ho:ʔ⁷ —	go:ʔ⁷ ŋo:k⁷	hwo:k⁷ —	vɔ:ʔ⁷ —	hɔ:ʔ⁷ —	hɔ:ʔ⁷ —	dàw	¦
YUE												
月	month	*C-ɲa:n	*C-ɲa:n	ɲa:n¹ ɲɔn¹	ɲa:n¹ njan¹	ɲa:n¹ ɲe:n¹	ɲa:n¹ ɲa:ŋ¹	na:n⁴ ɲa:ŋ¹	ɲa:n¹ ɲuan⁴	nuən¹	jɐ́n ɲa:ŋ]	¦ ¦
月初	beginning of month	*Cuɾəwʔ	*Cuɾəwʔ	raw³ —	gaw³ —	gwow³ —	go·⁶ ɣo·³	ho·⁶ vo·³	hɔ·⁶ vo·³	nuən¹	dàw	¦ ¦
		*C-ɲa:n	*C-ɲa:n	ɲa:n¹ —	ɲa:n¹ —	ɲa:n¹ —	ɲa:n¹ ɲa:ŋ¹	na:n⁴ ɲa:ŋ¹	ɲa:n¹ ɲuan⁴	—	jɐ́n	¦
月亮	moon	*C-ɲa:n	*C-ɲa:n	ɲa:n¹ ɲɔn¹	ɲa:n¹ njan¹	ɲa:n¹ ɲe:n¹	ɲa:n¹ ɲa:ŋ¹	na:n⁴ ɲa:ŋ¹	ɲa:n¹ ɲuan⁴	nuən¹	jɐ́n ɲa:ŋ]	¦ ¦
岳父	father-in-law	*pʰa:ʔ	*pa:ʔ	pʰa:³ —	pʰa:³ —	pʰa:³ pʰa:³	pʰa:³ pʰa:³	pʰa:³ —	pʰa:³ —	—	¦ ¦	¦
		*ɦɐn	*ɦ:ɐn	naŋ¹ —	to:ŋ¹ —	to:ŋ¹ to:ŋ¹	to:ŋ¹ to:ŋ¹	tʰɔ:ŋ¹ tuaŋ¹	to:ŋ¹ tuaŋ¹	[tsʰa:y]	tuaŋ]	¦
岳母	mother-in-law	*hmi:ʔ	*mi:ʔ	mey³ —	(mey³) —	pay³ —	p[i:]⁶ pay³	pʰay⁶ pay³	p[i:]⁶ —	—	¦ ¦	¦
		*ɦnɐn	*n:ɐn	naŋ¹ —	to:ŋ¹ —	to:ŋ¹ to:ŋ¹	to:ŋ¹ to:ŋ¹	tʰɔ:ŋ⁴ tuaŋ¹	to:ŋ⁴ tuaŋ¹	[njɛn²]	¦	¦

	Branch	PH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
YUN											
雲 cloud	CHl:	*deːk	deˑk^{7}	zeˑʔ^{7}	deːk^{7} / deˑʔ^{7}	deːʔ^{7}	deʔ^{7}	diaʔ^{7}	---	teʔ˧	d̪ek
	GHl:	*faːʔ	---	---	faː^{3}	faː^{3}	faː^{3}	fʰaː^{3}	---	(pàː) / faː˩	faː
孕穗 rice plant with seed	*C-miːnʔ	*C-miːnʔ	miːn^{3}	miːn^{3}	miːn^{3} / (min^{3})	miːn^{3} / miŋ^{3}	miːn^{6} / min^{6}	--- / min^{6}	pow^{1} / miːn^{1}	---	---
ZA											
扎 tie tightly	*siːɦ / Qi / NWCHl:	*siːɦ / *fɔːt / *C-ŋəːnʔ	tey^{2} / ŋan^{3}	--- / ŋɔn^{3}	tay^{2} / say^{2}	fɔːt^{7} / say^{2}	fɔːt^{7} / tsʰay^{2}	fɔːt^{7} / ---	[lə:w^{4}]		
ZAI											
宰 slaughter	*C-miːk / CHl:	*[C-]miːk / *ɦəwʔ	miːʔ^{7} / ---	miːʔ^{7}[8] / haw^{3}	miːk[8] / miʔ^{7}	miːk[8] / mik^{7}	haw^{3} / haw^{3}	haw^{3} / haw^{3}	[tsɛ:^{2}]		
ZAN											
咱們 we (incl)	*ruː	*ruː	r[u:]^{1} / ha:ˑ[5]	gaw^{1} / ŋawʔ^{4}	ga:^{1} / gaw^{4}	gaw^{4} / xaw^{1}	haw^{4} / x[ə:]˩	how^{4} / kʰ[oʔ]^{7}	[tey^{1}]	d[u:]˩ / x[ɔ:]˥	---
贊揚 praise	*wəy	*hwəy	vay^{1} / vay^{1}	vay^{1} / vayʔ^{4}	hway^{1} / vay^{4}	vay^{4} / vay^{1}	vay^{4} / vay^{1}	vay^{1} / vay^{4}	[tsəŋ^{4}]		
ZAO											
鑿子 awl	*C-ɓənɦ	*ɓənɦ	ɓen^{2} / ɓ[u]an^{5}	ɓan^{2} / ɓaɲ^{2}	ɓan^{2} / ɓaɲ^{2}	ɓan^{5} / ɓaɲ^{2}	ɓan^{5} / ɓaɲ^{2}	--- / ɓaɲ^{2}	[tsʰiˑw^{5}]	--- / paŋV	---

早 early	*C-ga:wʔ	*ka:wʔ	ka:w^3 / ka:w^3	ka:w^3 / kaw^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	[puɐt^8]	kà:w / ---
早晨 morning	GHI:	*ka:wʔ	pa:^{3} / ---	ka:w^3 / kaw^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	ka:w^3 / ka:w^3	[ziaw^4]	--- / ---
灶 stove	*C-dɔm / NCHI:	*dɔm / *wa:nʔ	dɔm^1 / ---	(dɔm^1) / ---	dɔm^1 / va:ŋ^3	dɔm^1 / va:ŋ^3	dɔm^1 / va:ŋ^3	dɔm^1 / vuan^6	[hɔm^4]	--- / vaŋ꜔
	*ci:n	*tɕi:n	tsʰi:n^1 / ---	tsʰi:n^1 / ---	tsʰi:n^1 / tsʰiŋ^1	tsʰi:n^1 / tsʰin^1	--- / (tsʰiŋ^4)	tsʰi:n^1 / tsʰin^1	tsʰi:n^1	--- / ---
	*su:ʔ	*suʔ	tow^3 / tθay^3	taw^3 / faw^3	taw^3 / saw^3	taw^3 / saw^3	taw^3 / tsʰaw^3	taw^3 / tsʰaw^3	tsʰa:w^1	--- / ---
ZEI										
賊 thief	*C-buy	*buy	ɓuy^1 / ɓɔy^1	ɓuy^1 / ɓɔy^1	ɓuy^1 / ɓuy^1	ɓuy^1 / ɓuy^1	ɓuy^1 / ɓuy^1	ɓuy^1 / ɓow^1	fuy^4	bú:y / poy꜔
ZEN										
怎樣 how	GHI:	*dɯŋ	ʔuŋ^2 / ---	dɯŋ^1 / ---	dɔŋ^1 / ---	dɔŋ^1 / ---	dɯŋ^1 / dɔŋ^1	dɯŋ^1 / dɯŋ^1	leŋ^5	--- / toŋ꜔
	*C-ra:	*ra:	ra:^{1} / ---	ra:^{1} / ---	ra:[3] / ---	ra:[2] / ---	la:[1] / ---	la:^{4} / ra:[6]	la:y^4	--- / ---
ZENG										
曾祖父 pat. grt grndpa	*put	*pʰut	pʰut^7 / ---	pʰut^7 / ---	pʰut^7 / ---	pʰut^7 / pʰok^7	pʰut^7 / pʰok^7	pʰut^7 / pʰet^7	[pe:w^{4}tuen^4]	pʰut / pʰok꜔

漢字	Gloss	Source	Recon.										
曾祖母	pat. grt grndma	*C-ɟut	*Cɟut	tsɯt⁷ / ---	tsɯt⁷ / tsɛk⁴	tsɯt⁷ / ---	tsɯt⁷ / tsək⁷	tsɯt⁷ / tsuk⁷	tsɯt⁷ / tət⁷	[tsə²ʔuan⁴] / ---	--- / tʃœk˩	¦¦¦	¦¦¦
增加	increase	GHl:	*C-ma:	--- / ---	maˑ¹ / maˑ¹	maˑ¹ / maˑ¹	maˑ¹ / maˑ¹	--- / ---	--- / ma:[1]	--- / ---		¦¦¦	¦¦¦
ZHA													
渣滓	sediment	GHl:	*da:k	--- / tsɛk⁴	dɛ:ʔ⁷ / ---	dɛ:k⁷ / ---	de:ʔ⁷ / dʑɯ:²	de:ʔ⁷ / dɛʔ⁸	de:ʔ⁷ / dʑaʔ⁷	tɯ:⁵ / ---		¦¦¦	¦¦¦
搾	handspan	*Cuɣup	*Cuɲup	huup⁷ / ŋup²	huup⁷ / ŋɛʔ⁴	hwuup⁷ / ŋap⁷	huup⁷ / ŋop⁸	vup⁷ / ŋop⁸	huup⁷ / [mʲop⁸]	hɔ:p⁸ /		¦¦¦	¦¦¦
眨眼	wink	GHl: Run:	*C-lip *C-ɲi:p	rop⁷ / lep⁴	lip⁷ / ---	(li:pᵖ) / ---	(li:pᵖ) / lep⁷	--- / ɲip⁷	--- / ɲip⁷	liap⁷ /		¦¦¦	¦¦¦
蚱蜢	grasshopper	*mi:ʔ	*hmi:ʔ	mey³ / ---	pey³ / ---	puu⁽¹⁾ / ---	ʔuu³ / puu³	--- / ---	--- / ---	ʔet⁷la:w³ /		¦¦¦	¦¦¦
		*C-git CHl:	*kit *nduɯ:k	kit⁷ / ---	kit⁷ / ---	kec⁷ / ---	tɯ:ʔ⁸ / ---	tʰuaʔ⁸ / (tuk⁷)	tɯ:ʔ⁸ / tɯ:ʔ⁸	[luy⁵] /	tœk˩ /	¦¦¦	¦¦¦
ZHAI													
摘	to strip	*C-ru:	*ru:	row¹ / ---	row¹ / ---	row¹ / ---	row⁴ / row¹	low⁴ / row¹	(law⁵) / ---	lu:⁴ /		¦¦¦	¦¦¦
摘	to strip	GHl: NWCHl: Run:	*C-lu:ʔ *ŋgɛ:k *rɯ	--- / kɛk²	law³ / kɛʔ⁴	law³ / ---	--- / ---	--- / rɯ⁴	--- / rɯ⁴	--- /		¦¦¦	¦¦¦
窄	narrow	*C-bi:p	*bi:p	ɓi:pᵖ⁽⁹⁾ / ---	ɓi:p⁷ / ---	ɓi:p⁷ / ɓip⁷	ɓi:p⁷ / ɓip⁷	ɓi:p⁷ / ɓip⁸	ɓi:p⁷ / ɓip⁷	[vi:n⁵] /	pi:p˩ /	¦¦¦	¦¦¦

ZHAN

| 粘 stick | *kʰaːt GHI: | man¹ / --- | kʰaːt⁷ / kʰaʔ²⁴ | kʰaːt⁷ / kʰaːʔ⁷ | kʰaːt⁷ / kʰaːk | kʰaːt⁷ / kʰaʔ⁸ | kʰaːt⁷ / kʰuat⁷ | [kʰan⁵] | mɐ́n / --- |

| 站 stand | *tɕuːn *C-ɟuːn | tsuːn¹ / --- | tsuːn¹ / tsun¹ | tsuːn¹ / tsuŋ¹ | tsuːn¹ / tsuŋ¹ | tsuːn¹ / tsuŋ¹ | tsuːn¹ / tun¹ | tsʰuːn¹ | tʃũon / tʃuːŋ˥ |

ZHANG

| 張 clsfr | *ʋɐnʔ *C-ʋɐnʔ | ʋɐn³ / vɐn⁴ | vɐn³ / --- | vɐn³ / vɐŋ³ | fɐn⁶ / vɐŋ³ | vɐn⁶ / vɐŋ³ | vɐn³ / vɐn⁶ | viɐn⁴ | vɐn / vaŋ˩ |

| 長大 grow up | *C-luŋ *C-luŋ | luŋ¹ / loŋ¹ | luŋ¹ / loŋ¹ | loŋ¹ / luŋ¹ | loŋ¹ / loŋ¹ | luŋ⁴ / luŋ¹ | luŋ¹ / luŋ⁴ | loː¹ | lũŋ / --- |

ZHAO

| 招待 service | *daːyɦ *C-daːyɦ / *tʃʰuːʔ Run: | daːy² / --- | daːy² / --- | daːy² / --- | --- / --- | daːy⁵ / tsʰauɰ³ | daːy⁵ / tsʰauɰ³ | daːy⁵ | --- / --- |

| 著火 catch fire | *tʰəŋ *təŋ | tʰoŋ¹ / --- | tʰaŋ¹ / tʰaŋ¹ | tʰaŋ¹ / tʰaŋ¹ | tʰaŋ¹ / tʰaŋ¹ | tʰaŋ¹ / tʰaŋ¹ | --- / tʰ[a]ŋ¹ | [nuɐn⁴] | --- / --- |

| 照料 take care of | *ʔuːŋɦ *ʔuːŋɦ | ʔuːŋ² / --- | ʔuːŋ² / --- | ʔuːŋ² / --- | ʔuːŋ⁵ / ʔuŋ² | --- / ʔuŋ² | --- / --- | [luːy²] | --- / --- |

ZHE

| 蜇 sting(er) | *[t/c]əːŋʔ *tɕʰəːŋʔ / *C-ɲey Run: | tsʰaŋ³ / --- | tsʰoːŋ[2] / --- | tsʰoːŋ³ / tsʰoːŋ³ | tsʰoːŋ³ / tsʰoːŋ³ | tsʰɔːŋ³ / ɲay¹ | tsʰɔːŋ³ / ɲay⁴ | [daːn⁴] | --- / --- |

| 遮羞布 underwear | *fiːɲɦ *fiːɲɦ | (piːn²) / --- | fiːn² / --- | fiːn² / --- | fiːn⁵ / fiŋ² | fiːn⁵ / fiŋ² | fiːn⁵ / fʰin⁵ | piɐn¹ | --- / --- |

中文	gloss	(recon A)	(recon B)	D1	D2	D3	D4	D5	D6	D7	D8	D9
遮蓋	cover	*fɔ:ŋɦ	*fɔ:ŋɦ	pʰaŋ² / ---	fo:ŋ² / ---	fo:ŋ² / fo:ŋ²	fo:ŋ⁵ / fo:ŋ²	fo:ŋ⁵ / ---	fɔ:ŋ⁵ / ---	[tiəm⁵]	—	—
遮蓋	cover	NCHI:	*mbi:ŋɦ	--- / ---	--- / pin²	--- / pin²	--- / pin²	--- / pin²	--- / pin²	---	—	—
折樹枝	bend (branch)	GHI:	*C-ŋu:t	ʔut⁸ / ---	ŋu:t⁷ / ---	ŋu:t⁷ / ---	ŋu:t⁷ / ---	ŋu:t⁸ / ŋut⁸	ŋu:t⁷ / ---	[pua⁵]	ut	—
折樹枝	break (branch)	*[c/ɕ]ə:k	*tɕʰə:k	tsʰak⁷ / ---	tsʰo:ʔ⁷ / sɔʔ⁴	tsʰo:k⁷ / ---	tsʰo:ʔ⁷ / tsʰo:k⁷	--- / tsʰit⁸	tsʰɔ:ʔ⁷ / tsʰiʔ⁷	---	ʃək	—
折疊	fold	*C-mu:n	*C-mu:n	mu:n¹ / muən¹	mu:n¹ / ---	mu:n¹ / ---	mu:n¹ / (mun¹)	mu:n⁴ / mun¹	mu:n¹ / mun⁴	ma:n¹	—	—
這	this	*C-ni:ɦ	*C-ni:ɦ	ney² / nəy³	ney² / nəy³	ney² / ney²	ney⁵ / ney²	ney² / n[e:]²	ney⁵ / n[i:⁵]	nɛy⁵	néy / n[ɛ:]ˀ	—
這樣	this way	*C-duŋ	*duŋ	ʔuŋ² / ---	duŋ¹ / ---	dɔŋ¹ / ---	dɔŋ¹ / ---	duŋ¹ / dɔŋ¹	duŋ¹ / duŋ¹	[leŋ⁵]	—	—
		*C-ni:ɦ	*C-ni:ɦ	ney² / ---	ney² / ---	ney² / ---	ney⁵ / ney²	ney⁵ / n[en³]	ney⁵ / n[i:⁵]	nɛ˙⁵	—	—
鷓鴣	partridge	*ta:nʔ	*tʰa:nʔ	tʰa:n³ / tʰɔn³	tʰa:n³ / tʰan³	tʰa:n³ / tʰa:ŋ³	tʰa:n³ / tʰa:ŋ³	tʰa:n⁴ / tʰa:ŋ³	tʰa:n³ / tʰuan³	da:n⁵	tʰàn	—
ZHEN												
針	needle	*ŋuc	*hŋuc	ŋut⁷ / kət⁴	kut⁷ / kɛʔ⁴	kuc⁷ / kət⁷	kut⁸ / kot⁷	kʰut⁸ / kot⁸	kut⁸ / kət⁸	kuət⁸	ŋʊ́t / kotꜜ	—

Character	Gloss	Recon 1	Recon 2	1	2	3	4	5	6	7	8	9
真	true	*C-dət	*dət	(dɑt^7) / ---	--- / ---	dɑt^7 / ---	dɑt^7 / dak^7	dɑt^7 / dak^7	dɑt^7 / dɑt^7	[pa:t^9]	┆ / ┆	┆
砧板	chopping block	CHI:	*t'imɦ	--- / ---	--- / ---	t'im^2 / ---	--- / t'em^2	--- / (t'em^5)	--- / t'em^5	[ta:ŋ^1]	┆ / ┆	┆
樹	pour out	*C-ɟo:ɦ	*tɕo:ɦ	tsɔ:^{2} / ---	tsɔ:^{2} / tsɔ:^{2}	tsɔ:^{2} / tsɔ:^{2}	tsɔ:^{5} / tsɔ:^{2}	tsɔ:^{5} / tsɔ:^{2}	tsɔ:^{5} / to:^{5}	[tɕɔm^2]	┆ / ┆	┆
枕	rest head	*Cuɲa:n	*Cuɲa:n	ŋa:n^1 / ---	ŋa:n^1 / ---	[ŋ]a:n^1 / ŋa:n^1	ŋwa:n^1 / ŋa:n^1	ŋuan^4 / ŋa:n^1	[ŋ]a:n^1 / [m]uan^4	ŋuən^1	ŋán / ┆	┆
枕頭	pillow	*Cuɲa:n	*Cuɲa:n	ŋa:n^1 / ---	ŋa:n^1 / ---	[ŋ]a:n^1 / ŋa:n^1	ŋwa:n^1 / ŋa:n^1	ŋuan^4 / ŋa:n^1	[ŋ]a:n^1 / [m]uan^4	ŋuən^1	ŋán / ŋaŋ꜀	┆
		*Curəwʔ	*Curəwʔ	raw^3 / vaw^3	gaw^3 / ŋɔ:^{3}	gwow^3 / go:^{3}	go:^{6} / yo:^{3}	ho:^{6} / vo:^{3}	hɔ:^{6} / vo:^{3}	ki:w^1	dàw / vo:꜈	┆

ZHENG

Character	Gloss	Recon 1	Recon 2	1	2	3	4	5	6	7	8	9
爭奪	compete for	*C-ɲa:w	*C-ɲa:w	ɲa:w^1 / ---	ɲa:w^1 / ---	ɲa:w^1 / ɲa:w^1	ɲa:w^1 / ɲa:w^1	na:w^4 / ɲa:w^1	ɲa:w^1 / ɲa:w^4	[kiəp^7]	┆ / ┆	┆
睜眼	open eyes	GHI:	*C-lǝŋʔ	(laŋ^3) / ---	laŋ^3 / ---	laŋ^3 / laŋ^3	laŋ^3 / laŋ^3	laŋ^6 / ---	laŋ^3 / l[a]ŋ^6	le:ŋ^1	┆ / ┆	┆
蒸	steam	*Ciʔunɦ	*Ciʔunɦ	ʔun^2 / ʔən^5	ʔun^2 / ---	ʔjun^2 / ʔoŋ^2	zun^5 / ʔoŋ^2	--- / zoŋ^2	--- / zən^5	tsun^1	┆ / ┆	┆
		Meifu:	*ʔunɦ									

中文	Gloss	Reconstruction(s)	Reflexes
正面	front	GHl: *rə:m ; *C-dəŋ, *dəŋ	(*rə:m) go:m¹, go:m⁴, go:m⁴, xo:m¹, ---, xuam¹, ho:m⁴, kʰuam¹, [hay²] ; (*dəŋ) doŋ¹, tseːŋ¹, ---, dfan¹, dfaŋ¹, dfaŋ¹, dfaŋ¹, dfaŋ¹, dfaŋ¹, dfoŋ¹, [muua⁵], dóŋ
正午	high noon	*ʈa:, *tʃʰaː ; *NCHl, *mbəyʔ	(*tʃʰaː) tsʰaː¹[2], tsʰaː¹, tsʰaː¹, tsʰaː¹, tsʰaː¹, tsʰaː¹ ; (*mbəyʔ) pʰ[e:]², pay³, pay³, ---
		*ŋwen, *hŋwən	van¹, vanʔ⁴, hwan¹, vaŋ¹, van⁴, van¹, van⁴, vaŋ¹, van¹, [duen⁵], ven¹
		GHl:, *dəɲh	d[e]ŋ[2], dfaŋ², dfaŋ², dfaŋ⁵, dfaŋ⁵, d[e]ŋ[2], (dfaŋ²)
ZHI			
支	pen clsfr	*puːnʔ, *pʰuːnʔ	(*puːnʔ) pʰuːn³, pʰuːn³, pʰuːn³, pʰuːn³, ---, pʰuːn³, ɓuən¹ ; (*pʰuːnʔ) pʰuŋ³, pʰuŋ³, pʰuŋ³, pʰun³, [pʰuːŋ]
隻 (雞)	chicken clsfr	*C-ləŋ, *C-ləŋ	laŋ¹, laŋ¹, laŋ¹, laŋ¹, laŋ⁴, laŋ¹, toŋ¹, loŋ¹, loŋ⁴, laɲ⌐, lóŋ
隻	livestock clsfr	*mən, *hmən	pan¹, pan⁴, pan⁴, pʰan⁴, pan⁴, pan⁴, puən⁴, men¹ ; paŋ¹, paɲ¹, paɲ¹, paɲ¹, pan¹, mên
芝麻	sesame	*ŋmɯː / Qi: ; *hŋuː, *ɲɟɯːn	keuɥ¹, kɛʔ⁴, keuɥ¹, keuɥ⁴, keuɥ⁴, keuɥ¹, tsʰɯːn⁴, tsɯːn⁴, heuɥ[2], kow⁴, [tiaw⁴], ŋəɲ
枝	branch	*[k/x]a:, *kʰa:	kʰaː¹, kʰaː¹, kʰaː¹, kʰaː¹, kʰaː¹, kʰaː¹, kʰaː¹, kʰow¹

漢字	gloss	源	proto	C1	C2	C3	C4	C5	C6	C7	C8	C9
知道	know	Meifu:	*[k/x]uːŋ	kʰuːŋ¹ / kʰoŋ¹	kʰuːŋ¹ / kʰueʔ⁴	kʰuːŋ¹ / kʰoŋ¹	kʰuːŋ¹ / kʰoŋ¹	kʰuan¹ / ---	kʰuːŋ¹ / ---	[min⁴]	xuoŋ	---
			*kʰuŋ								---	---
		CHI:	*Curɯ:	rɯɯ¹ / ---	ŋeɯ¹ / ---	gweŋ⁴ / heɯ	gweɯ¹ / heɣ	pʰaɯ⁶ / paɯ³	--- / paɯ⁶	[ɗuey⁵]	--- / paː1l	pʰẽd
			*hmɯ:ʔ									
織	weave (fabric)	CHI:	*tʃʰwuːk	tsʰuːʔ⁷ / fuɯek²	tsʰuːʔ⁷ / fu⁴	fuːk⁷ / fuʔ⁷	fuː⁷ / fuk⁷	tsʰuaʔ⁷ / fuk⁸	tsʰuːʔ⁷ / fʰuʔ⁷	taːk⁹ / ts'uːːʔ⁷	---	---
織	weave (net)	Meifu:	*[k/x]uːt	kʰuːt⁷ / kʰu[a]t²	kʰuːt⁷ / ---	kʰuːt⁷ / kʰuʔ⁷	kʰuːt⁷ / kʰuk⁷	kʰuːt⁷ / kʰuk⁸	kʰuːt⁷ / kʰut⁷	[tsʰaː¹]	---	---
織布機	loom		*tey	tsʰay¹ / ---	tsʰay¹ / ---	tsʰay¹ / tsʰay¹	tsʰay¹ / tsʰay¹	tsʰay¹ / ---	tsʰay¹ / ---	tsʰay¹	---	---
			*tʃʰey	tsʰuːʔ⁷ / fuɯek²	tsʰuːʔ⁷ / ---	fuː⁷ / fuk⁷	fuːk⁷ / fuʔ⁷	tsʰuaʔ⁷ / ---	tsʰuːːʔ⁷ / ---	taːk⁹	---	---
			*tʃʰwuːk									
指	point	Meifu:	*sɯːʔ	heɹ³ / ---	heɹ³ / ---	heɹ³ / hes	heɹ³ / hes	--- / heⁱsɹ³	--- / ---	tsey¹	tẽɯ	---
			*sɯː								---	
指甲	fingernail		*C-liːp	liːp⁷ / lip²	liːp⁷ / li⁴	liːp⁷ / lip⁷	liːp⁷ / lip⁷	liːp⁸ / lip⁸	liːp⁷ / lip⁸	lep⁷	lĩep	---
			*C-liːp								liːp˥	
蜘蛛	spider	ECHI:	*tʃʰdep	dĩp⁷ / ---	ɗap⁷ / ---	tap⁷ / ---	tap⁷ / ---	tsʰap⁷ / ---	tap⁷ / ---	tam¹	dĩp	---
		ECHI:	*des								---	
		ECHI:	*tʃʰiː	daːy² / ---	dey² / ---	tsʰey⁵ / ---	tsʰey⁵ / ---	tsʰey⁵ / ---	taːy⁵ / ---	taːy⁵	[laːy	---
		ECHI:	*saːyɦ								---	

漢字	gloss	Reconstruction	Attested forms
蜘蛛	spider	ECHI: *kʰom? / NECHI: *kʰəw	kʰ[a]m^3 kʰom^3 kʰom^3 --- --- --- ; kʰaw^1 kʰaw^1 kʰaw^1
直	straight	CHI: *kʰuːŋ	kʰuːŋ^1 kʰu[ː]ŋ^1 kʰuːŋ^1 ; kʰuŋ^1 kʰuŋ^1 kʰuŋ^1 ; xuoŋ
侄	nephew	*C-muːc / ECHI: *kɯŋɦ	kɯŋ^5 kɯŋ^5 kɯŋ^5 mu:c^7 mu:t^7 mu:t[9] ; mut^7
		GHI: *ɬɯːk	ɬiek^8 ɬuɐ?^{7} ɬuk^7 ɬuk^7 ɬuk^7 ; ɬuk^8 ɬuːk^7 han^1 tθuɐk^2
		*fɯː	pa:^{1} həɯ^1 fəɯ^1 fəɯ^1 fəɯ^1 ; pʰəɯ^1 həɯ^1 həɯ^1 fəɯ^1
只	only	*C-ɲeːŋ	ɲ[o]ŋ^2 ɲoːŋ^2 ɲoːŋ^2 ɲoːŋ^2 ɲoːŋ^2
紙	paper	*[c/ɕ]iaʔ / *tɕʰiaʔ	tsʰia^3 tsʰia^3 tsʰia^3 tsʰia^3 tsʰia^3 tsʰiˌ^3 tsʰiˌ^3 ; ʃẽa tʃʰiˌ
雉	pheasant	GHI: *faː	fa:^{1} fa:^{1} fa:^{1} fa:^{1} fa:^{1} fow^1
ZHONG			
中間	middle	*tɔm / Run: *tɕɯː ; *tʰom / *tɕɯː	tʰ[ɯ]m^1 tsʰom^1 tʰom^1 tʰon^1 tʰom^1 tʰom^1 tʰom^1 tʰom^1 tʰom^1 (tsuɴ^1) (ʰnesi^4) tʰum^1 hɲ^1 ; tʰõm tʃʰeʃ
腫	swell	*ʔun	ʔun^1 ʔen^1 ʔun^1 ʔen^1 ʔun^1 ʔoŋ^1 ʔun^1 ʔoŋ^1 ʔun^1 ʔoŋ^1 ʔun^4 ʔeʃ fun^4 ; ún

			GHI:								
種	a kind of		*C-muːɦ	(maw²) / ---	maw² / ---	maw² / ---	mow² / maw²	maw⁵ / maw²	mo² / maw²	moː⁵ / maw²	--- ┊ ┊
種	seed	*Civən	*fjən	pʰen¹ / fon¹	fan¹ / fan¹	fan¹ / fan¹	fan¹ / faŋ¹	fan¹ / faŋ¹	fan¹ / faŋ¹	fan¹ / fan¹	tsʰan¹ / fén ┊
種	to plant	*Cura:	*Cura:	raː¹ / voː⁴	(raː¹) / (vaʔ⁴)	gwaː¹ / koː¹	gwaː⁴ / ɣaː¹	(vaː⁴) / vaː¹	hwaː⁴ / vaː¹	kuːː¹ / draː ┊
重	heavy	*[k/x]un	*kʰun	kʰun¹ / kʰon¹	kʰun¹ / kʰɛn¹	kʰun¹ / kʰəŋ¹	kʰun¹ / kʰəŋ¹	kʰun¹ / kʰəŋ¹	kʰun¹ / kʰən¹	kʰɔːn¹ / xuín kʰœŋ˦ ┊
ZHOU											
粥	gruel	*ta:ɦ	*tʰa:ɦ	tʰaː² / tsʰɔː⁵	tʰaː² / ---	tʰaː·² / ---	tʰaː⁵ / tʰaː²	tʰaː⁵ / tʰaː²	tʰaː⁵ / tʰaː⁵	tʰow¹ ┊
		*C-nəmʔ	*C-nəmʔ	nom³ / nam³	nam³ / ---	nom³ / ---	nam³ / nam³	nam⁶ / nam³	nam³ / nam⁶	naːm¹ ┊
妯娌	brother's wife	*tə:ŋʔ	*tʰə:ŋʔ	tʰaŋ³ / ---	tʰoː³ / ---	tʰoːŋ³ / ---	tʰoːŋ³ / tʰoːŋ³	tʰɔːŋ³ / tʰoːŋ³	tʰɔːŋ³ / tʰuaŋ³	--- ┊
肘	elbow	*C-du:ŋ	*du:ŋ	duːŋ¹ / ---	duːŋ¹ / ---	duːŋ¹ / ---	duːŋ¹ / duŋ¹	duaŋ¹ / duŋ¹	duːŋ¹ / duŋ¹	[ʔuː¹] ┊
肘	elbow	*Ciɣu:ŋɦ	*Ciɦu:ŋɦ	huːŋ² / ɲ[a]ŋ⁵	huːŋ² / ---	hjuːŋ² / ---	zuːŋ⁵ / ɲuŋ²	zuaŋ⁵ / ɲuŋ²	zuːŋ⁵ / ɲuŋ²	tsʰua⁵ ┊
咒罵	curse	*C-ɣi:nʔ	*ɦi:nʔ	hiːn³ / ---	hiːn³ / ---	hiːn³ / ---	hiːn³ / hiŋ³	haː·⁶ / h[en]³	haː·⁶ / ---	haː·⁴ ┊

	Gloss	Proto A	Proto B	D1	D2	D3	D4	D5	D6	D7	D8
皺紋	wrinkle	*C-ɲit	*C-ɲit	ɲit[9] / ɲet²	ɲit⁷ / ɲɛʔ⁴	ɲec⁷ / ɲet⁷	net⁸ / ɲet⁸	ɲet⁷ / ɲet⁸	ɲet⁷	--- / ---	---
ZHU											
豬	pig	*hməw	*məw	maw¹ / ---	paw¹ / pawʔ⁴	pow¹ / paw⁴	pʰaw⁴ / ---	pow⁴ / paw⁴	[pəy⁴]	máw / ---	pǎw
豬油	lard	GHI:	*fɯ:ŋ	--- / ---	fɯ:ŋ¹ / ---	fɯ:ŋ¹ / ---	--- / fɯŋ¹	fɯ:ŋ¹ / fɯŋ¹	---	--- / ---	---
竹排	bamboo raft	*C-bəy	*bəy	ɓay[3] / ---	ɓay¹ / ---	ɓay¹ / ---	ɓay¹ / ɓay¹	(ɓa:y⁴) / ɓay¹	[tɯa¹]	--- / ---	---
竹笋	bamboo shoot	*C-nɯ:ŋ	*C-nɯ:ŋ	nɯ:ŋ¹ / nɯməŋ¹	nɯ:ŋ¹ / nəŋ¹	nɯ:ŋ¹ / nɯŋ¹	nɯaŋ⁴ / nɯŋ¹	nɯ:ŋ⁴ / nɯŋ⁴	na:ŋ¹	nuˤɤŋ / nɯŋ˨	---
竹子	bamboo (thin)	*C-la:w	*C-la:w	la:w¹ / ---	la:w¹ / ---	la:w¹ / la:w¹	la:w⁴ / la:w¹	la:w¹ / ---	[tɐm¹ɓa¹]	--- / ---	---
竹子	bamboo (big)	*C-rɛ:nɦ	*rɛ:nɦ	ran² / la:n⁵	ro:n² / lɔn²	ro:n² / lo:n²	lo:n² / ruanɲ²	lo:n² / ru:n²	----	dɐn / ɮuaŋ˩	lɔn
竹子	bamboo (big)	*C-ɗom	*ɗom	ɗom¹ / ts[e]m¹	ɗom¹ / ---	ɗom¹ / ɗom¹	ɗom¹ / ɗom¹	ɗum¹ / ɗom¹	tɐm¹ɗum⁵	--- / ---	---
竹子	bamboo (big and long)	*p-lɯ:yɦ	*p-lɯ:yɦ	lɯ:y² / ---	--- / ---	plɯ:y⁵ / (pɯy²)	pu:y⁵ / ---	plɯ:y⁵ / plɯ:y⁵	tɐm¹luey⁵	--- / ---	---
主人	master	*C-va:ŋ	*va:ŋ	va:ŋ⁴ / vɛŋ⁴	ve:ŋ¹ / vɛŋʔ⁴	ve:ŋ¹ / ve:ŋ⁴	fe:ŋ⁴ / ve:ŋ¹	ve:ŋ⁴ / viaŋ⁴	vɯ:⁴	--- / vianˤ	---

漢字	gloss	重建	重建									
煮	to boil	*C-rə:ŋɦ	*rə:ŋɦ	raŋ² / ---	ro:ŋ² / lɔŋ²	ro:ŋ² / lo:ŋ²	ro:ŋ² / ro:ŋ²	lɔ:ŋ² / ruaŋ²	lo:ŋ² / ruaŋ²	--- / ---	dǎŋ / ---	lɔŋ / ---
煮	to boil (potatoes)	*C-bu:ʔ	*C-bu:ʔ	6ow³ / ---	6aw³ / 6aw³	6ow³ / 6aw³	6aw³ / 6aw³	6aw³ / 6aw³	6ow³ / 6aw³	---	--- / ---	---
住	live at	*Cirɯ:k	*rjɯ:k	zɯ:ʔ⁷ / ---	zɯ:ʔ⁷ / tsun¹	to:ŋ³ / ---	tɯ:ʔ⁸ / tɯk⁷	tʰuaʔ⁸ / tsoŋ³	tɯ:ʔ⁸ / toŋ³	[liaw¹]	zǔ: / ---	---
柱子	pillar	*Cuŋəwɦ / CHI:	*Cuŋəwɦ / *ŋgə:n	ŋaw² / ---	ŋaw² / ---	ŋwow² / ---	ko:n⁴ / ŋo:²	kʰɔ:n⁴ / ŋo:²	kɔ:n⁴ / ku:n⁴	kɯan⁴	ŋʌ̌w / ---	---
蛀	cavity	*təmʔ	*tʰəmʔ	tʰom³ / ---	tʰam³ / ---	tʰam³ / tʰam³	tʰam³ / tʰam³	tʰam³ / tʰam³	tʰam³ / tʰam³	[tsi:w⁴]	--- / ---	---
蛀蟲	moth	*Cuɣu:	*Cuɣu:	how¹ / ---	how¹ / ---	hwow¹ / ---	gwow¹ / ŋow¹	--- / ŋow¹	--- / ŋow⁴	haw⁴	--- / ---	---
ZHUAN												
轉	turn	*Ciʔəy / Run:	*Ciʔəy / *ʔjət		ʔay¹ / ʔjay¹	ʔjay¹ / kay³	jay¹ / zay¹	zay¹ / zat⁸	ʔjay¹ / zat⁷	[han²]	--- / ---	---
ZHUANG												
裝飾	decorate	*C-bi:nɦ	*bi:nɦ	6i:n² / ---	6i:n² / ---	6i:n² / 6iŋ²	6i:n⁵ / 6iŋ²	6i:n⁵ / 6in²	6i:n⁵ / 6in⁵	6iən⁵	--- / ---	---
ZHUI												
追捏	chase	*C-lu:yʔ / GHI:	*C-lu:yʔ / *Cuɦə:n	lu:y³ / ---	ho:n¹ / ---	hwo:n¹ / ---	lu:y³ / ---	lu:y⁶ / ---	lu:y³ / ---	[pʰe:k⁹]	luoy / ---	---

ZHUN

準備	prepare	*rep	*rep	--- / ---	gap⁷ / ---	gop⁷ / ---	--- / ---	hap⁸ / ---	hap⁸ / ---	---	--- / ---	---

ZHUO

捉	catch	GHl: *mə:k	*hmə:k	mak⁷ / ɓa:k⁴	po:k⁷ / pɔʔ⁴	po:ʔ⁸ / po:k⁷	po:ʔ⁸ / po:k⁷	pʰɔ:ʔ⁸ / pɔʔ⁸	pɔ:ʔ⁸ / pɔʔ⁸	[ha:m¹]	mᵊk / po:ʔ]	---
濁	turbid	GHl:	*C-nuum	nu:ŋ / ---	nuum¹ / nɔn³	nuum¹ / ---	nuum¹ / ---	--- / ---	--- / ---	---	núoŋ / ---	---
濁	turbid	*C-gunɦ	*kunɦ	--- / ---	--- / ---	--- / ---	kun⁵ / kɔŋ²	kun⁵ / kɔŋ²	--- / ken⁵	[huet⁸]	--- / ---	---

ZI

自己	self	GHl:	*pʰa:ʔ	tsʰ1¹ / ---	pʰa:³ / ---	pʰa:³ / ---	--- / pʰa:³	--- / pʰa:³	--- / pʰa:³	[na¹]	--- / ---	---
		GHl:	*tɕuɯ:ʔ	ka:³ / tsɔ:⁴	tsauɰ³ / ---	tsauɰ³ / ---	tsauɰ⁶ / tsʰeɯ³	tsʰauɰ⁶ / tsauɰ³	tsauɰ⁶ / tsauɰ⁶	[lɔ:⁵]	--- / ---	---

ZONG

鬃毛	mane	GHl:	*C-ɲi:nɦ	ŋu:n² / ---	ŋi:n² / ---	ŋi:n² / ---	ŋi:n⁵ / ---	--- / ŋin²	--- / ---	[hɔ:ŋ⁴ ŋay¹]	ŋúon / ---	---
鬃毛	mane	CHl:	*C-ŋa:k	--- / ---	--- / ---	--- / ---	ɲe:ʔ⁷ / ŋuɯ:²	ɲe:ʔ⁸ / ɲeʔ⁷	ɲe:ʔ⁷ / ɲiaʔ⁷	---	--- / ---	---
粽子	rice dumpling	*ɲi:t	*hɲi:t	--- / tsit⁴	--- / tsiʔ⁴	tsi:t⁷ / ---	tsi:t⁸ / tsit⁷	tsʰ1:t⁸ / tsit⁸	tsi:t⁸ / tsit⁸	---	--- / ---	---

ZOU

走	go	*fi:	*fi:	(pey¹) / ---	fey¹ / fey¹	fey¹ / fey¹	fey¹ / fey¹	fey¹ / f꜒ey¹	fey¹ / f꜒ey¹	pay¹ / ---	fey⅃ / ---
走	go	*C-ɟa:mɦ	*tɕa:mɦ	tsa:m² / ---	tsa:m² / ---	tsa:m² / ---	--- / ---	--- / ---	--- / ---	--- / ---	tʃám / ---

ZU

祖父	grandfather	*pu:ʔ	*pʰu:ʔ	pʰow³ / ---	pʰaw³ / ---	pʰaw³ / pʰaw³	pʰaw³ / pʰaw³	pʰow³ / pʰaw³	pʰaw³ / pʰaw³	(pʰə̀:w⁶) pə:w⁴ / ---	pʰâw / pʰəw⅃
祖母	grandmother	*C-ɟɯ:ʔ	*tɕɯ:ʔ	tseeɯ³ / ---	tsauɯ³ / ---	tsauɯ³ / tseeɯ³	tsauɯ³ / tsauɯ³	tsauɯ³ / tauɯ³	tseɵɯ³ / tauɯ³	tse.² / ---	tʃə̂ɯ / tsa:l⅃
祖宗	ancestor	*put	*pʰut	pʰut⁷ / ---	pʰut⁷ / ---	pʰut⁷ / pʰok⁷	pʰut⁷ / pʰok⁷	pʰut⁷ / ---	pʰut⁷ / ---	--- / ---	pʰʊt / ---
		*pu:ʔ	*pʰu:ʔ	--- / ---	pʰaw³ / ---	pʰaw³ / pʰaw³	pʰaw³ / pʰaw³	pʰow³ / ---	pʰaw³ / pʰaw³	(pʰə̀:w⁶) pə:w⁴tuən⁴ / ---	pʰâw / ---
詛咒	curse	*tən	*tʰən	tʰan¹ / ---	tʰan¹ / ---	tʰan¹ / tʰaɲ	tʰan¹ / ---	tʰan¹ / ---	tʰan¹ / ---	[ɲam⁵] / ---	--- / ---

ZUAN

鑽	to drill	*wes	*wes	taw¹ / ---	taw¹ / ---	taw¹ / saw¹	taw¹ / tsʰaw¹	taw¹ / tsʰaw¹	taw¹ / ---	[hɔk⁸] / ---	--- / ---
鑽子	drill	*wes	*wes	taw¹ / ---	taw¹ / ---	taw¹ / ---	--- / kut⁸	taw¹ / kut⁸	taw¹ / ---	--- / ---	--- / ---
		*ɳgu:t	Run:				kut⁸				

ZUI

嘴巴	mouth	*məmʔ NCHI:	*hmɑmʔ *mbomʔ	mom³ ɓo[ŋ]⁴	pam³ p[uen]³	pom³ pom³	pam⁶ pom³	pʰam⁶ p[o]m³	pam⁶ pom⁶	muɑŋ⁴	mòm p[o]m˥	pæm
嘴唇	lips (upper)	*sunʔ	*sunʔ	tun³ tθen⁵	tun³ ---	tun³ soŋ³	tun³ soŋ³	tun³ tsʰoŋ³	ttun³ ---	naː⁻tsʰuŋ¹	tùn tʃʰoŋ˥	---
嘴唇	lips (lower)	CHI:	*t[ʃ/ɕ]eːy	--- ---	--- ---	tsʰoːy¹ ---	tsʰaːy¹ tsʰoːy¹	--- ---	--- tsʰuːy¹	---	--- ---	---
罪	crime	*C-maːʔ	*C-maːʔ	maː³ ---	maː³ ---	maː³ ---	maː³ maː³	maː⁶ maː³	maː³ maː⁶	[tuy⁵]	màː ---	---
醉	drunk	*muy	*hmuy	muy¹ ɓoy⁴	puy¹ poyʔ⁴	puy¹ puy¹	puy⁴ puy¹	pʰuy⁴ poy¹	puy⁴ pow⁴	puey⁴	múːy	pùy

ZUO

昨天	yesterday	*pənʔ	*pʰənʔ	pʰen³ pʰan³	pʰan³ pʰan³	pʰan³ pʰaŋ³	pʰan³ pʰaŋ³	pʰan³ pʰaŋ³	pʰan³ pʰan³	pʰɔːn¹	dàw pʰaːŋ˥	---
左	left	*pəyʔ Run:	*pʰəyʔ *feːŋ	pʰay³ pʰuy³	pʰ[e]y³ pʰay³	pʰay³ pʰay³	pʰay³ pʰay³	pʰay³ fiaŋ¹	pʰa[ː]y³ fiaŋ¹ hay²		fǎy ---	---
		*wiːŋ NCHI:	*hwiːŋ *ʔwey	viːŋ¹ (zaŋ¹)	viːŋ¹ ʔway¹	hwiːŋ¹ kway¹	viaŋ⁴ viŋ¹	--- viŋ¹	--- viŋ⁴	---	vǐeŋ viːŋɬ	---
		Qi:	*ɹwaːw	--- ---	--- ---	--- ---	faːw⁴ ---	--- ---	faːw⁴ ---	[huey⁴]	--- ---	---
坐	sit	GHI:	*tɕoŋʔ	(tsuŋ³) tsom⁵	tsuŋ³ tsaŋ³	tsoŋ³ tsuaŋ³	tsoŋ³ tsoŋ³	tsoŋ³ tsoŋ³[1]	tsɔŋ³ tɔŋ³	tɕeistʃ	(tʃùŋ) tʃɔŋ˥	---

做	do	*C-ʋuːk	*ʋuːk	vuːʔ[9]	vuːʔ[7]	vuːk[7]	vok[8]	voʔ[8]	voʔ[7]	[leŋ[1]]	vu̠ː	vo̠k
		Qi:	*ʋuk	vok[4]	(voʔ[4])	vuʔ[7]	vuk[7]	ley[2]	ley[2]		---	
		Run:	*C-liːɦ									

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