# Language contact and the directionality of internal drift: the development of tones and registers in Chamic*

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Abstract

The Chamic languages of Vietnam have undergone phonological restructuring in the last 2000 years. In contact with the Mon-Khmer languages, all have developed final stress with consequent phonotactic restructuring. Since then, some languages have remained essentially unchanged (Roglai, Rade, and Jarai), but others have undergone radical restructuring: in contact with register languages, Western Cham has become a register language; in contact with the phonology of Bahnar, Haroi has become a restructured register language; in contact with the tonal Vietnamese, Phan Rang Cham has become incipiently tonal; and, in contact with the fully tonal languages of Hainan, Tsat has become fully tonal. The internal paths of change are relatively clear, due to their shallow time depth combined with the richness of the comparative data. However, despite the existence of phonetically plausible internal paths of development, the available evidence makes it clear that external contact set the changes in motion and determined their directionality.

Not long after their forebears left the mainland for Formosa, the Austronesians made a 6000 year journey — out into the islands, around the Pacific, and finally back to the mainland. The Chamic languages represent the tail end of this 6000 year journey, with the forerunners of the modern Chamic speakers arriving in Vietnam around 2000 years ago. Their historically recent arrival in Vietnam is directly reflected in the linguistic data: proto-Chamic (PC) is a tightly-knit, relatively easily-reconstructed subgroup with an obviously short time depth.

About 2000 years ago, when the seafaring Austronesian-speaking forerunners of the modern Chamic speakers arrived on the mainland of Southeast Asia, they spoke an essentially disyllabic, nontonal, nonregistral language. The language these seafarers spoke was to become Chamic, the parent of the languages spoken in the Champa federation.

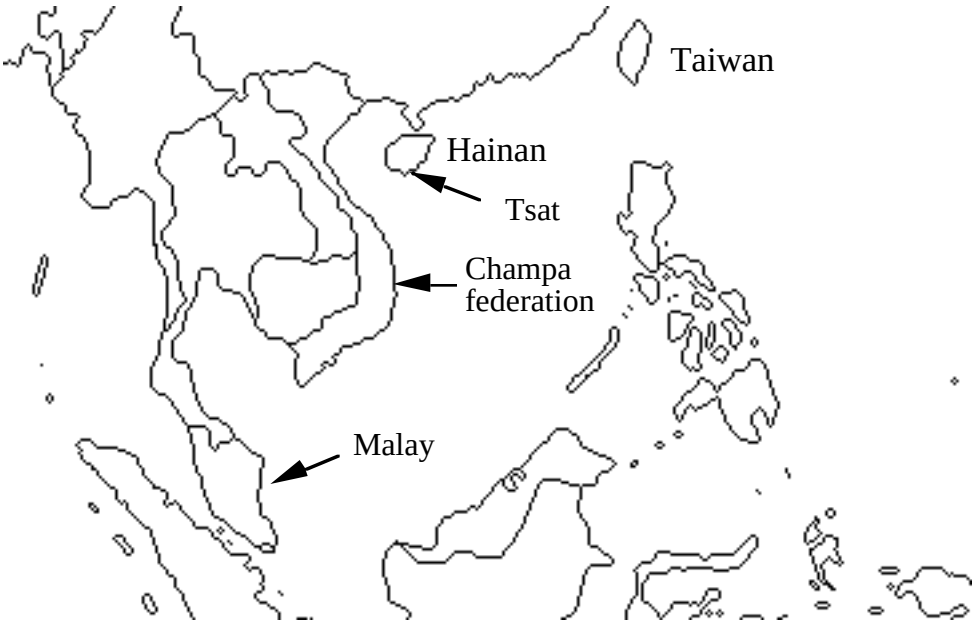


Figure 1: The Champa federation

The evidence indicates that PC was atonal and disyllabic. However, from PC, a wide range of phonologically distinct systems has developed. Today, among the descendants of PC, Western Cham is a register language (Friberg and Kvoeu, 1977; Edmondson and Gregerson, 1993), Haroi is a restructured register language (Lee, 1974, 1977b; Burnham 1976; Thurgood, in press), Phan Rang Cham is a quasi-registral, incipiently tonal language (Thurgood, 1992; Han, Edmondson, and Gregerson, 1992), and Tsat of Hainan is fully tonal (Haudricourt, 1984; Benedict, 1984; Ni 1990ab; Thurgood 1992, 1993). In short, despite the essentially identical starting point provided by PC, each of these languages has taken a different path of internal restructuring — under the influence of contact with typologically different languages.

While the focus of this paper is on both certain facts and on the historical problems inherent in trying to account for them, the data itself is also directly relevant to many current issues in phonological theory, including especially the treatment of laryngeal features in feature geometry, the prosodic characteristics of laryngeal features, and the phonetic implementation of laryngeal features. The phonological relevance of this data, however, will be left to those with the relevant expertise.

## 1 Early Mon-Khmer influence on PC.

The Austronesian seafarers who arrived on the mainland spoke a language that contained four basic vowels: *-a, *-i, *-u, *-e (=[-ə]) and three final diphthongs: *-ay, *-uy, and *-aw. The languages lacked consonant clusters and the consonants themselves were largely unmarked, that is, unlike modern Chamic languages, there were no implosives, no breathy voiced consonants, and no preglottalized (or ejective) consonants. The morphemes were basically disyllabic, more specifically, CVCV(C).

Under the influence of the Mon-Khmer (MK) languages along the coast of southeastern Vietnam, pre-Chamic quickly developed into a PC with final stress, resulting in disyllabic roots consisting of an unstressed initial syllable followed by a stressed main syllable. The stress pattern is reflected in the vowel inventories reconstructable for the PC disyllables: In the unstressed PC pretonic syllable, the four-way vowel distinction of proto-Austronesian (PAn) has been reduced to a three-way distinction, while in the stressed syllable PC has some 18 or so distinct vowels, not counting length contrasts. As for the consonantal inventory, PC has added numerous clusters along with the likes of *ɓ- and *ɖ-.

The intimacy of MK contact with PC is evident both in the large number of borrowings into PC and in its phonological effects on PC. Headley (1976), in his examination of Lee's (1966) reconstruction of PC, conservatively notes that among Lee's 700 or so lexical reconstructions, at least some 72 or about 10% are MK borrowings. The fact that most of these reconstruct to the PC stage is of some significance, for it places the borrowings some time around the arrival of the first Austronesian speakers, roughly 2,000 years ago, a date given support by the oldest inscription in a Cham language, found at the site of modern-day Tra-kiêu near the old Cham capital of Indrapura (=Amaravati), which Coedès (1968:48) dates as from the middle of the fourth century AD.

Aside from the borrowings, the most obvious effect of this contact is the adaptation of the Austronesian disyllables to the MK model. In MK morphemes are either monosyllabic or what Matisoff (1973) picturesquely termed sesquisyllabic, i.e., a syllable and a half, a structure more precisely characterized by Donegan (1993:5) as iambic, that is, 'words in which a light (open) syllable precedes a heavy (closed or long-vowelled) second syllable.' Both Matisoff (1973) and Donegan (1993) note in passing that words in proto-Austroasiatic, of which MK is one of the two major branches, were either monosyllabic or iambic. And, more directly of interest here, this characterization fits the MK languages of Vietnam perfectly; for example, Chrau (Thomas 1971) is iambic, Mnong Rolom is monosyllabic, Vietnamese monosyllabic, and so on.

After the break-up of PC, some languages, such as Roglai, Rade, and Jarai have remained largely unchanged. However, under the influence of contact with radically different phonological systems, other Chamic languages have changed significantly along two continua. First, in several languages, the earlier disyllabic forms have in varying degrees moved in the direction of monosyllabicity. Second, in some languages, there has been the development of register, that is, of phonation distinctions on vowels. In some of these cases, these register systems have remained; in another language, with the loss of the phonation component, a restructured register system has emerged; and, in still others, tonal systems have evolved.

## 2 The movement toward monosyllabicity.

The historical continuum from disyllabicity to monosyllabicity is transparent. The internal path for the change was set into motion by the introduction of final stress into PC under MK influence, producing iambic words consisting of an unstressed syllable followed by a stressed syllable. This stress placement sets up the linguistic preconditions for subsequent changes; the changes themselves appear to have been triggered by language contact.

The Chamic languages have subsequently shown a steady erosion of the pretonic syllable, beginning with the reduction of vowel distinctions. Even in PC, the pretonic syllable had only four possible vowel distinctions. The descendant languages have reduced these at least somewhat. In some languages, for example, in Chru and Rade (see Table 3), the pretonic syllable shows no vocalic contrasts — only a schwa remains.

Next, in a number of cases, the reduced vowel of the pretonic syllable was dropped entirely, reducing the iambic forms to monosyllables. If the initial of the main syllable was *h (see Table 1), the initials of the pretonic syllables and the main syllables coalesced into initial clusters. A natural consequence of this is that such clusters only occur in main syllables, never in pretonic syllables.

Note that these C + h combinations are retained as actual clusters, rather than as aspirated stops! (Gérard Diffloth, personal communication). Chru presents morphological evidence that these are clusters rather than a single phoneme. As Fuller (1977:78) points out, alternations such as phà ‘to plane’ and p-ən-hà ‘a plane’, with an infixed nominalizing -ən- occur. In all those instances where there is a clear etymology, it is always the case that such C + h clusters derive from the reduction of disyllables. It is also worth noting in passing that this is a point of convergence with MK languages, many of which have numerous parallels e.g. Khmer /khaat/ ‘lose’ and /komhaat/ ‘loss’.

| PAn | Malay | PC | Wr. Cham | Tsat | |
|---|---|---|---|---|---|
| *taqun | tahun | *thŭn | thun | thun$^{33}$ | ‘year’ |
| *puqun | pohon | *phŭn | phun | phun$^{33}$ | ‘plant’ |
| *paqit | pahit | *phĭʔ | --- | phiʔ$^{24}$ | ‘bitter’ |
| *paqat | pahat | *pha:t | phaʔ | phaʔ$^{24}$ | ‘chisel’ |

| | | | | | |
|---|---|---|---|---|---|
| *paqa | paha | *pha | phā | pha$^{33}$ | ‘leg, thigh’ |
| *daqiS | dahi | *dhə̃i | dhei | thai$^{33}$ | ‘forehead’ |

Table 1. From disyllables with medial *h to monosyllables.

PAn = proto-Austronesian, or at least with an AN (Austronesian) reconstruction which predates Chamic (Blust, p.c.); Malay, an Austronesian language closely related to Chamic but outside Chamic proper; PC = proto-Chamic, a modified version of Lee 1966; Wr. Cham = Written Cham, the written form of Phan Rang Cham, but part of a literary tradition that dates back 1500 years; Tsat, a standardized transcription based on the work of Ouyang and Zheng and of Ni, with various choices informed by the instrumental work in Maddieson and Pang (1991).

If the medial was *-l- or *-r- (see Table 2), the initials of the pretonic syllables and the initials of the main syllables coalesced into initial clusters in Jarai (not shown), Chru, and Tsat. In Tsat, the process has gone a step further, with the *-l- or *-r- having developed into a -i- glide.

| PAn | PC | Wr. Cham | Chru | Tsat | |
|---|---|---|---|---|---|
| *qabaRa | *bara | bara | bra | phia$^{11}$ | ‘shoulder’ |
| *daRaq | *darah | darah | drah | sia$^{55}$ | ‘blood’ |
| *bulan | *bula:n | bulan | bla:n | phian$^{11}$ | ‘moon’ |
| *bulu | *biləu | bulău | bləu | phiə$^{11}$ | ‘body hair’ |

Table 2. From disyllables with medial liquids to monosyllables.

If the main syllable began with any other consonant than *h- or a liquid, the whole pretonic syllable was lost (see Table 3). Presumably, the loss of the vowel of the pretonic syllable left a highly marked unacceptable cluster, leading to the loss not just of the vowel of the initial syllable but the initial consonant as well. As a consequence, in Rade, there has also been a reduction in the number of consonantal contrasts in the pretonic syllable. In Tsat, the initial consonant of the pretonic syllable is completely lost.

| PAn | PC | Wr. Cham | Chru | Rade | Tsat | |
|---|---|---|---|---|---|---|
| *baseq | *basah | basah | pəsah | məsah | sa$^{55}$ | ‘wet; damp’ |
| *qubi | *hubəi | hubei | həbəi | həbei | phai$^{11}$ | ‘taro; yam’ |
| *quzan | *huja:n | hujan | həjañ | həjan | sa:n$^{11}$ | ‘rain’ |
| *qumah | *huma | humā | həma | həma | ma$^{33}$ | ‘dry field’ |
| *lapaR | *lapa | lapa | ləpa | epa | pa$^{33}$ | ‘hungry’ |
| *lima | *lima | limə | ləma | ema | ma$^{33}$ | ‘five’ |

| | | | | | | |
|---|---|---|---|---|---|---|
| *m-uda | *muda | medā | məda | məda | tha[11] | ‘young; unripe’ |
| *mamaq | *mumãh | memeh | bəmah | məmah | ma[55] | ‘chew’ |
| *pajay | *paday | padai | pədai | mədie | tha:iʔ[42] | ‘rice (paddy)’ |
| *panaq | *panah | paneh | pənah | mənah | na[55] | ‘(shoot) bow’ |
| *taliS | *taləi | talei | tələi | klei | lai[33] | ‘rope; string’ |
| *taŋan | *taŋa:n | taŋin | təŋañ | kəŋan | ŋa:n[33] | ‘hand’ |

Table 3. From other disyllables to monosyllables.

Some languages went further along the path to monosyllabicity than others. Some, such as Tsat, have reduced almost all disyllables to monosyllables. Others, such as Chru, have only reduced some forms, leaving others still disyllabic.

Diachronically, the two directional processes — from disyllabic to monosyllabic and from atonal to registral to tonal — obviously interacted and overlapped but are easier to visualize if discussed separately.

3 Western Cham register.

First, Western Cham developed a two-way register system, a system in which the vowels following one set of initials have one phonation type and the vowels following the other set have a different phonation type. Then, two distinct phonation types led to the development of two phonemically predictable but allophonically distinct sets of vowels (see Table 4). The diachronic origins of this system are set out in a relatively short footnote by Friberg and K. Hor (1977: 35-36, fn. 14), in a paper on register patterns in Western Cham. Historically, one set of vowels evolved following one set of initials, while the other evolved following the other set of initials (cf. Table 5). Even in modern Western Cham, the two sets of vowels are still partially predictable from the modern initials, although the original relationship has been obscured both by changes in the consonant system and by the spread, under certain conditions, of register from the pretonic first syllable to the stressed main syllable.

| First Register Vowels: | | | Second Register Vowels: | | |
|---|---|---|---|---|---|
| i | ə | u̯ | i | ɨ | u |
| e | ʌ | o | e$^{i}$ | ə̯ | o$^{u}$ |
| æ | a | ɔ | e̯ | a̯ | o̯ |

Table 4. Vowel register in Western Cham
[From Edmondson and Gregerson 1993:67]

Note: The two registers for the vowel /a/ are distinguishable, not by vowel quality, but by other features.

As is typical of register systems, the two registers of Western Cham are manifested as clusters of co-occurring features. As Edmondson and Gregerson

(1993:63-72) and Friberg and K. Hor (1977) point out, the first register vowels derive from the phonation type induced by proto-voiceless initials and tend to be tenser, with a lower vowel quality and a higher pitch, while the second register vowels derive from the phonation type induced by proto-voiced initials and tend to be laxer, with a high vowel quality and a lower pitch, cf. Table 5.

| | First Register | Second Register |
|---|---|---|
| original initials | proto-voiceless | proto-voiced |
| voice quality | tense, clear | lax, breathy |
| vowel quality | lower (open) | higher (closed) |
| pitch | higher pitch | lower pitch |

Table 5. Contrasts between first and second register in register languages [Henderson, 1952; Edmondson and Gregerson 1993:61-63]

Although Table 5 is a straightforward description of the complex of phonetic features that constitute the Khmer voice register distinction (Henderson, 1952), not Western Cham, it does not appear to differ significantly from Western Cham register, aside from the fact that Edmondson and Gregerson's instrumental description did not find systematic vowel quality differences between the registers.

The diachronic developments are straightforward (see Figure 2). The proto-voiced obstruents produced breathy phonation on the following vowels, while the remaining consonants, including the voiceless obstruents, produced an unmarked, modal or clear voiced phonation on the other vowels.

These phonation distinctions led to two phonetically distinct but phonemically noncontrastive vowel registers: the breathy phonation becoming the second register vowels and the modal voice becoming the first register vowels. When the conditioning proto-voiced and proto-voiceless obstruents merged in modern Western Cham, these vowel registers were phonemicized.

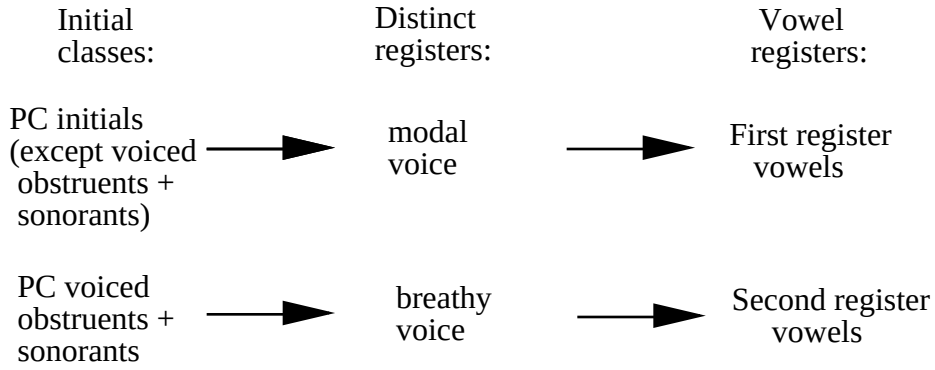


**Figure 2: The development of Western Cham register**

The representation in Figure 2 shows both voiced obstruents and sonorants leading to second register vowels. In contrast, in Haroi, Phan Rang Cham, and Tsat, the sonorants pattern not with the voiced obstruents but with the remaining consonants.

3.1 The PC voiced obstruents: the two layers

The history of register in Western Cham really begins with the introduction of the breathy second register. The modern second register represents two distinct historical layers: the first layer descends from forms with proto-voiced obstruent initials; a second layer descends from forms with the sonorant initials. Most likely very early in Chamic, if not in PC, the voiced obstruents *b-, *d, *g-, and *j- were already associated with a breathy voice quality. This breathy phonation became the nucleus of Western Cham second register. For examples of second register from forms with proto-voiced obstruent initials, see Table 6.

| PC | Western Cham | Phan Rang Cham | |
|---|---|---|---|
| *babah | ḅaḅah | paḅah | ‘mouth’ |
| *digəi | ṭaḳay | taḳĕy | ‘tooth’ |
| *dada | taṭa; ca̤ṭa | taṭa | ‘chest’ |
| *tujuh | taca̤uh | taca̤ŭh | ‘seven’ |
| *paday | paṭai | paṭay | ‘paddy rice’ |
| *boh | ḅorh -v | ḅoh | ‘clf. for fruit’ |
| *ʔabih | ḅih | aḅih | ‘all’ |
| *do:k | ṭoʔ | ṭoʔ | ‘sit; live; stay’ |
| *dlay | ḳlai | -ḳlay | ‘forest’ |
| *dəŋ | ṭəŋ | ṭăŋ | ‘stand; stop’ |
| *sidəm | ṭŏm | haṭăm | ‘ant’ |
| *huja:n | ca̤n | haca̤n; ca̤n | ‘rain’ |
| *jrãw | ca̤ru | ca̤ru | ‘medicine’ |

Table 6. PC voiced obstruents > Western Cham Second Register.

Note 1: The dot under the initials in Western Cham and in the Phan Rang Cham columns indicate second register vowels, etymologically derived from breathy voice, which was in turn derived from voiced obstruent initials.
Note 2: In this and the following tables, irregularities in forms are marked by -v for an irregular or at least unexpected vowel reflex, -i for an initial, -f for a final, -vR for vowel register, -l for length, and -t for a tone.

In Table 6 (and in the tables to follow), all Western Cham obstruents followed by a second register vowel are marked by a dot subscribed under the initial obstruent. By marking the presence of second register vowels in the same way, it

is easy to recognize its presence. However, second register is actually manifested on the vowels, not on the consonants. Thus synchronically second register is no longer still predictable from the modern consonants.

Note that almost all the PC voiced obstruent initials in Table 6 have second register vowels in Western Cham. In the forms for 'mouth', and 'tooth', the reflexes of both syllables have second register vowels because both syllables had PC proto-voiced obstruent initials (but cf. 'chest'). In the forms for 'seven' and 'paddy rice', only the vocalic reflex of the second syllable vowel is in the second register, because only the PC initial of the second syllable was a voiced obstruent. In such forms, since the initial of the first syllable was originally voiceless, the vowel reflex of the first syllable vowel is in the first register.

Then, within Western Cham, there was an unusual extension of the second register phonation to forms with sonorant initials. It is noteworthy that this extension is limited to Western Cham; it does not occur in Haroi, Phan Rang Cham, or Tsat.

| PC | Western Cham (Kvoeu-Hor) | |
|---|---|---|
| *ʔayup | yŭp | 'blow; whistle' |
| *ya:p | yaoʔ | 'count' |
| *wil | wĭl | 'round' |
| *wər | wăr | 'forget' |
| *rək | rəʔ | 'grass; weeds' |
| *ʔaŋin | ŋĭn | 'the wind' |
| *ʔuni | ni | 'this' |
| *ʔana:k | nɨʔ | 'child' |
| *ʔina | nɨ | 'mother; big' |
| *ñŭʔ | ñŭk | 'submerge' |
| *ñus | ñuh | 'blow nose' |
| *məŋ | məŋ | 'from' |
| *ʔama | mɨ | 'father' |
| *leʔ | lĕʔ | 'fall into' |
| *ʔula | la | 'snake' |
| *lac | laiʔ | 'say' |
| *lo:k | loʔ | 'peel, to' |
| *lumiaʔ | ramiɨʔ | 'put away' |
| *ləyuh | yuh | 'shake' |
| *laŋit | laŋiʔ | 'sky' |
| *manŭʔ | manŭʔ | 'fowl; chicken' |
| *lanăŋ | lanəŋ | 'earthworm' |
| *minăm | mañum | 'drink, to' |
| *luma:n | lamɨn | 'elephant' |

| | | |
|---|---|---|
| *mamah | mamɨh | ‘chew’ |
| *lamo | lamo | ‘cow; cattle’ |
| *lima | lamɨ | ‘five’ |

Table 7. Second register from sonorant initials.

As all monosyllables with sonorant initials are in the second register, it is not necessary to mark second register in any particular way. For examples, see Table 7. And, if both syllables of a disyllabic word begin with a sonorant, both syllables have second register reflexes.

3.2 Transparency and phonation spreading.

For disyllabic words, the distribution of registers is complicated by the fact that some main syllable initial consonants are transparent to the spreading of phonation types from the pretonic to the main syllable. In a remarkably insightful footnote, Friberg and Hor (1977:36) explicitly discuss the patterns of spreading from the presyllable to the main syllable.

The Western Cham spreading patterns are fairly simple: sonorants are transparent to spreading, while obstruents tend to block it. More specifically, all main-syllable initial sonorants are transparent to spreading. That is, if the pretonic syllable begins with a voiced obstruent, the main syllable follows the vowel splitting patterns associated with voiced obstruent phonation. This pattern of spreading is also found in Haroi, Phan Rang Cham, and Tsat.

In a similar way, if the pretonic begins with a voiceless stop, affricate, or fricative, the main syllable follows the vowel splitting patterns associated with voiceless obstruent phonation. This pattern of spreading is apparently restricted to Western Cham, at least within Chamic. For examples, see Table 8.

| PC | Western Cham | |
|---|---|---|
| *kayua | kayoa | ‘because’ |
| *kayəu | kayau | ‘tree; wood’ |
| *pina:ŋ | panɨŋ | ‘betel (areca palm); betel-nut’ |
| *tama | tamɨ | ‘enter’ |
| *kuməi | kamay | ‘female, woman’ |
| *tumuh | tamuh | ‘grow’ |
| *tano | tano | ‘male’ |
| *pila | pla | ‘to plant’ |
| *taləi | talay | ‘rope; string’ |
| *kulit | kliʔ | ‘skin’ |
| *tuleh | taleh | ‘untie’ |
| *karəm | karŏm | ‘hatch, to’ |

| | | |
|---|---|---|
| *sana | hana | ‘roast; parch’ |
| *siniŋ | sanəŋ | ‘think’ |
| | | |
| *hayuaʔ | yoaʔ | ‘harvest [rice]’ |
| *hurəi | hray | ‘day; sun’ |
| *huma | hamɨ | ‘dry field’ |
| *haləu | hlau | ‘pestle’ |

Table 8: Spreading of voiceless phonation through sonorants.

Medial obstruents are less permeable than sonorants to spreading. In Western Cham, Friberg and Kor note in a footnote that in disyllabic forms with main syllables with a voiceless fricative initial the register from a voiced obstruent spreads through both a main syllable initial *h and a main syllable initial *s.

| PC | Western Cham | |
|---|---|---|
| *bahrəu | p̣ahau | ‘new; just now’ |
| **buhay | p̣ahas -f | ‘otter’ |
| | | |
| *bisəi | pasay | ‘iron’ |
| *basah | pasah | ‘wet; damp’ |

Table 9: Spreading through medial *s & *h.

Note: With both ‘new’ and ‘otter’, the domain of second register is now the whole word, not just the initial syllable.

In Table 9, the subscribed dot under the initials of both ‘new’ and ‘otter’ indicates that the vowel in the pretonic and in the main syllable are in the second register. The double asterisk before the reconstruction of ‘otter’ indicates that the word is ultimately a borrowing into Chamic, but it was borrowed long before Western Cham register spreading occurred. As for the *s forms, we simply have to take the word of Friberg and Kor that the main syllable vowels are in the first register.

3.3 The history of Western Cham contact.

It appears that Western Cham has always been in contact with one register language or another. The Western Chams apparently migrated to the west from eastern Vietnam after the Cham Kingdom collapsed in the sixteenth century (Headley, 1991), splitting off from the Phan Rang Cham at that time. More than likely Western Cham had already developed at least an incipient if not a full register

system by the time, as Phan Rang Cham clearly also had a similar register system at one time.

Since the specific contact languages are not identified, the precise social mechanisms involved are not known. However, from the large number of MK loan words incorporated into Western Cham it seems apparent that bilingualism was one source and from other ethnographic reports there was also some language shifting involved, with various MK speakers shifting to Western Cham.

## 4.0 Haroi's restructured register

Haroi has what Huffman (1976) termed a restructured register system. In the case of Haroi, between PC and modern Haroi the following chain of events has occurred: (1) certain classes of initials led to distinctive phonation differences on the following vowels, that is, a register system; (2) the phonation differences on the vowels produced vowel distinctions, that is, led to a register system with vowel registers; and, (3) the phonation distinctions that originally conditioned the vowel splits disappeared, leaving behind a large number of now unconditioned vowel distinctions, that is, became a restructured register system. In short, this chain was how Haroi came to have so many vowels.

Thus, the most salient residue of Haroi's path of historical development is the unexpectedly large number of vowels. As Tegenfeldt and Goschnick (1977:1) note, unlike the typical nine- or ten-vowel systems of most Chamic languages, Haroi has some 20 vowels, 11 simple vowels (each occurring both long and short) and at least 9 diphthongs, a total that does not including some 10 rarely occurring nasalized vowels.

| | | front | | central | | back | |
|---|---|---|---|---|---|---|---|
| high: | closed | i | ia | ɨ | ɨa | u | ua |
| | open | ɪ | | | ɨi | ʊ | |
| mid | | e | ea | ə | | o | oa |
| | | ɛ | | | | ɔ | oi |
| low | | | | a | | | |

Table 10. Haroi vowels

Haroi words are either monosyllabic or disyllabic. All of the common vowel distinctions occur in monosyllables and in the stressed syllable of disyllables. There are no vowel contrasts in the presyllable.

Modern Haroi reflects a major realignment and splitting of the original PC vowel system. The major source for these multiple reflexes is register-induced vowel splitting. Under the influence of first register (induced by the proto-voiceless obstruents) certain monophthongs were lowered and certain diphthongs had their onsets lowered. And, under the influence of second register (induced by the proto-

voiced obstruents), certain monophthongs were raised and certain diphthongs had their onsets raised.[1]

4.1 Registers and the modern Haroi vowel splits

The two specific registers are associated with the overwhelming majority of the modern Haroi vowel splits: the first register, which consists of the allophonically-distinct conditioned set of vowels associated with the phonation type that evolved after the PC voiceless obstruents and the second register, which consists of the allophonically-distinct set of vowels associated with an apparently breathy phonation that evolved after the PC voiced obstruents. When these conditioning phonation differences were lost, allophonic vowel differences became phonemic. At this point, Haroi became a restructured register language (see Figure 3).

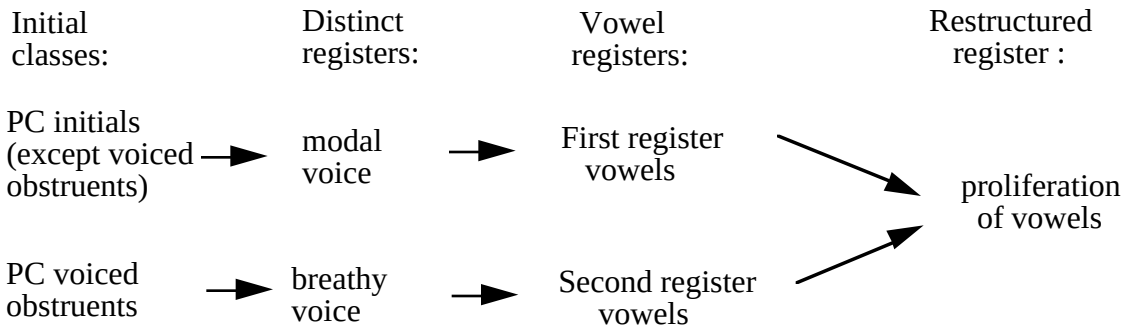


Figure 3: The development of Haroi restructured register

For monosyllabic words, the manner of articulation of the PC syllable-initial consonant correlates exceptionlessly with vowel splitting patterns. The first register has a vowel lowering effect, sometimes affecting the whole vowel and sometimes affecting only the onset. As Table 11 shows, for the high vowels *-u and *-i, voiceless obstruents correlate with vowel lowering. For examples, see Table 12. For the centering diphthongs, which have a high vowel onset, the voiceless obstruents correlate with the lowering of the onset. This occurs not just after voiceless obstruents, but after glottalized initials as well.[2]

In addition, with the centering diphthongs, the voiced obstruents are correlated, not with lowering, but with backing: *-ia- went to -ɨa-. For examples, see Table 12.

| Proto-Chamic | high vowels | centering diphthongs |
|---|---|---|

| | | |
|---|---|---|
| voiceless obstruents<br><br>voiced aspirated obstruents | lowered/ onset lowered | onset lowered |
| glottalized obstruents | unchanged | onset lowered |
| sonorants | unchanged | unchanged |
| voiced obstruents | unchanged | backed: *-ia- > -ɨa- |

Table 11. First register and vowel lowering.

| PC | Haroi | |
|---|---|---|
| *krih | krěh | ‘whittle’ |
| *pit | pe:iʔ | ‘sleep’ |
| *khi:n | khěn | ‘dare’ |
| *trun | trŏn | ‘descend’ |
| *thun | thŏn | ‘year’ |
| *thu | tho:u | ‘dry’ |
| *tuy | toi | ‘follow’ |
| *hia | hea | ‘cry; weep’ |
| *kuah | koăh | ‘shave, scrape’ |
| *ʔiãu | eau | ‘left (side)’ |
| *ɖua | ɖoa | ‘carry (wear) on head’ |
| *ɓiaʔ | ɓěaʔ | ‘little’ |
| *driau | trɨau | ‘exclaim; acclaim’ |
| *tubiăt | cəphɨaʔ | ‘go out; appear’ |

Table 12. First register and vowel lowering (examples).

Second register, the phonation induced by the voiced obstruents, caused various mid vowels and the low vowels to raise and, in some cases, to back (see Table 13). After voiced obstruents, the finals *-əi, *-ək, *-ər, and *-ən (a loan) raised, becoming -ɬi, -ɬʔ, -ʊl (and backed), and -ʊn (and backed), respectively. The finals *-əŋ and *-əh raised to *-ɬŋ and *-ɬh, respectively. The mid vowels *e and *o raised to -ɪ and -ʊ, respectively. Finally, the low vowel onsets were raised. For example, *-a, *-ău, *-aw, and *-ay became -ɬa, -ɬau, -ɬau, and -ɬai, respectively. For examples, see Table 14.

| Proto-Chamic | *-əi; *-ək<br>*-ər; *-ən | *-əŋ; *-əh | mid<br>*ɛ; *ɔ | low vowels |
|---|---|---|---|---|
| voiceless obstruents<br>voiced aspirated<br>glottalized obstruents<br>sonorants | backed:<br>*-ɔi; *-ɔk<br>*-ɔr; (*-ɔn) | unchanged | unchanged | unchanged |
| voiced obstruents | raised:<br>-ɬi; -ɬʔ;<br>and backed:<br>-ʊl; (-ʊn) | raised:<br>*-ɬŋ; *-ɬh | raised:<br>ɪ; ʊ | onset raised |

Table 13. Second register and vowel raising.

| PC | Haroi | |
|---|---|---|
| *bləi | plɬi | ‘buy’ |
| *brəi | prɬi | ‘give’ |
| *grək | krɬʔ | ‘vulture’ |
| *dər | thʊl | ‘bury’ |

| | | |
|---|---|---|
| *dləh | tlɬh | ‘descend’ |
| *gəŋ | khɬŋ | ‘pole; post’ |
| *dəŋ | thɬŋ | ‘stand’ |
| | | |
| *dleh | tlɬh | ‘tired’ |
| *do:k | thu:ʔ | ‘sit; live; stay’ |
| *boh | phuh | ‘fruit; egg’ |
| *joh | suh | ‘broken; spoilt’ |
| | | |
| *bras | prɨ:ah | ‘rice (paddy)’ |
| *gah | khɬah | ‘side, direction’ |
| *ba | phɨa | ‘bring, take, carry’ |
| *dlay | tlɬai | ‘forest; wild’ |
| *dlăŋ | tlɬaŋ | ‘look at; watch’ |
| *gəm | khɬam | ‘cover, to’ |
| *habəu | ʔaphɬau | ‘ashes’ |

Table 14. Second register and vowel raising (examples).

In all remaining contexts, except for some highly restricted vowel assimilation, the pre-Haroi vowels stayed in place.

4.2 Transparency and phonation spreading

For disyllabic words, the situation is parallel but complicated by the fact that some classes of main syllable initial consonants are transparent to the spreading of phonation types from the pretonic syllable. As a consequence, in such cases it is not the main syllable initial but the initial of the pretonic syllable that correlates with the main syllable vowel register.

The Haroi spreading patterns are remarkably straightforward: the main-syllable initial sonorants are transparent to spreading from all obstruents in the pretonic syllable except *s and *h. That is, as both Burnham (1976) and Lee (1977:89) noticed, if the pretonic syllable begins with a voiced obstruent, the main syllable follows the vowel splitting patterns associated with breathy phonation. See Table 15.

| PC | Haroi | |
|---|---|---|
| *biləu | pəlɬau | ‘body hair’ |
| *bahrəu | pərɬau | ‘new; just now’ |
| *durəi | cərɨi | ‘thorn’ |
| *bumo:ŋ -f | pəmuŋ | ‘banana blossom’ |
| *danaw | cənɨau ‘pond’ | ‘pond; lake’ |
| *gulac | kəlɨ:aiʔ | ‘return; go home’ |
| *gunam | kənɨam | ‘cloud’ |

| | | |
|---|---|---|
| *jala:n | cəlɬ:an | ‘road; path’ |
| *darah | cərɬah | ‘blood’ |
| *biya | pəyɬa | ‘crocodile’ |
| *bula:n | pəlɬ:an | ‘moon; month’ |
| *buŋa | pəŋɬa | ‘flower’ |
| *barah | pərɬah | ‘swell; swollen’ |
| *dalam | cəlɬ̆am | ‘deep; inside’ |
| *bara | prɬa | ‘shoulder’ |
| *dilah | cəlɬah | ‘tongue’ |

Table 15. Breathy phonation spreading through sonorants.

In a parallel way, if the pretonic syllable begins with a voiceless obstruent (other than *s or *h) and the main syllable begins with a sonorant, the main syllable follows the vowel splitting patterns associated with voiceless obstruent phonation. The examples in Table 16 show forms in which the phonation induced by the initial voiceless obstruent of the pretonic syllable has spread to the main syllable. As a consequence, the reflexes of PC high vowels *-i and *-u after sonorants are the reflexes expected after voiceless stops, not the reflexes expected after sonorants.

| PC | Haroi | |
|---|---|---|
| *kuñit | kəñe:iʔ | ‘yellow; tumeric’ |
| *kulit | kəle:iʔ | ‘skin’ |
| *tili | cəlei | ‘flat (of large rocks)’ |
| *kalih | kəlĕh | ‘miserly’ |
| *tumuh | cəmŏh | ‘grow’ |
| *kami | kəmei hăi | ‘we (ex.)’ |

Table 16. Voiceless obstruent phonation spreading through sonorants.

In contrast to the sonorants, it appears that all main-syllable initial obstruents block spreading.

For those tempted to attribute the vowel splits directly to the influence of PC initials rather than to the influence of an intervening phonation type, these patterns constitute strong evidence that it was the phonations correlated with the syllable-initial consonants, not the syllable-initial consonants themselves, that caused the vowel splitting. In phonetic terms, what must have spread from the pretonic syllable through the syllable-initial sonorant of the main syllable was a specific phonation type, not the manner of articulation of the pretonic syllable-initial consonant.[3]

4.3 The history of Haroi contact

Haroi shows evidence of a long period of intense contact with registral MK languages, particularly, as the literature notes, close contact with Bahnar speakers.

Tegenfeldt and Goschnick (1977:2), for instance, write that there are more Bahnar loanwords in Haroi than in either Rade or Jarai. In fact, the influence of Bahnar is so great that some writers have referred to the Haroi people as Bahnar Cham. In their discussion, Tegenfeldt and Goschnick (1977:1-2) went so far as to suggest a causal connection between contact and Haroi restructuring. They noted that the Haroi vowel system has a resemblance to the register system of Bahnar as well as general typological similarities with other MK register systems. Other evidence of intense contact comes from the peculiarities of the Austronesian loans in one of the Katu dialects, which indicate that Haroi has also had recent, intense contact with at least this MK dialect (Gérard Diffloth, personal communication).

An examination of North Bahnaric, the branch of Bahnaric in contact with Haroi, raises more questions than it answers. It is unclear whether North Bahnaric is registral or not, although it is clear that, even if it is not registral now, it most likely was at one time. For instance, West Bahnaric appears to have at least subphonemic register and two closely related languages, Alak and Tampuan, also seem to have register, but Thomas (1979:179) reports that North Bahnaric does not have register. In any case, the correspondences between North Bahnaric vowels and the vowels in other groups makes it obvious that the vowels of North Bahnaric have undergone a rather marked realignment of the type that reflects the earlier presence of a register system (cf. the discussion of vowel correspondences in Thomas 1979). In short, like Haroi, North Bahnaric has undergone register-induced vowel realignments. While it is clear that North Bahnaric and Haroi have notfollowed identical paths of development, both have realigned their vowel systems under the influence of register.

Haroi has a long history of intense contact with Bahnar speakers. And, while technically Bahnar does not seem to be a restructured register system in the sense of Huffman 1976, like Haroi, Bahnar has undergone the realigning of its vowel system under the influence of phonation distinctions. Further, the mechanism for this influence appears to be a combination of shift plus long-term bilingualism. At the earliest stage, it looks as if some speakers of Hrê, a Bahnaric Mon-Khmer language, shifted to using a Chamic language closely resembling Rade as their dominant language; however, following the shift, there has nonetheless been a long period of continuing bilingualism between the Haroi and the Bahnaric speakers. In short, it is this continued and intensive contact that has allowed Haroi to follow a similar path of development as has Bahnaric.

Haroi has not only converged with the registral systems of the neighboring MK languages but gone on to become a restructured register language, a path of change that suggests a long period of intense contact with its MK neighbors, including at least intense bilingualism and probably including some early language shift from Bahnar to Haroi.

## 5 The incipient tones of Phan Rang Cham.

On the path from PC to the modern language, Phan Rang Cham (Eastern Cham) has been influenced by several successive, typologically distinct waves of contact. The earliest wave, common to all Chamic languages, is the heavy MK influence, which left the Chamic languages with word-final stress and a morpheme structure for disyllables consisting essentially of an unstressed presyllable followed

by a stressed main syllable. After the breakup of PC, Phan Rang Cham was subjected to a long period of extended contact with registral MK languages. In the cases of closely-related Western Cham and Haroi, these registral contacts ultimately resulted in these languages developing their own register systems. For Phan Rang Cham, the early contacts with registral MK languages was replaced by later contact with a typologically distinct MK language, with the fully tonal Vietnamese. Under this Vietnamese influence, Phan Rang Cham has steadily become more and more tonal.

Excellent descriptions of modern Phan Rang Cham are available (Doris Blood, 1962; David Blood, 1967; and Fr. Gérard Moussay, 1971), including a valuable instrumental study (Han, Edmondson, and Gregerson, 1992). Phan Rang Cham has undergone complete restructuring since PC, and, if we take the preliminary description in Blood (1962) and Blood (1967) at face value, considerable change in just the last quarter of century since the Bloods described it in the 1960's. The Bloods' 1962/1968 description suggests at most a two-way tonal or a two-way registral distinction but, as Han, Edmondson, and Gregerson (1992) note, contemporary Phan Rang Cham is now a fully tonal language.

5.1 The evolution of Phan Rang Cham tones.

The conditions governing the development of tone on main syllables are straightforward, with Figure 4 illustrating what happened in monosyllables. The first stage was a two-way split conditioned by the main syllable initials: the proto-voiced obstruents ultimately resulted in a breathy voiced, low-pitched tone; the remaining initials, including voiced sonorants, ultimately resulted in a contrasting modal-voiced, high-pitched tone, in effect, the default tone. The second stage involves the further splitting of each of these tones, depending upon the presence or absence of a final glottal stop. It is, however, unclear how far this stage has progressed: although it is clear that Phan Rang Cham final glottal stops affect pitch, some question remains about whether this pitch difference is still allophonically predictable or already fully phonemic.

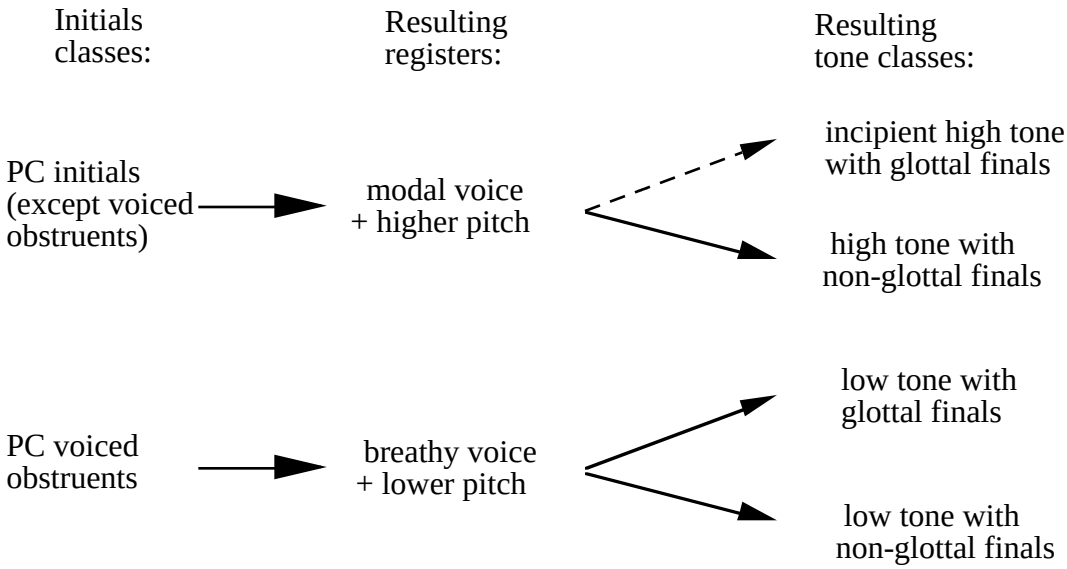


Figure 4. Phan Rang Cham tonogenesis in monosyllables.

Notice that it is only the voiced obstruents that resulted in tone lowering, not the sonorants. This restriction makes it clear that it was not voicing per se that led to low tone, but instead low tone evolved through a two-step process: first, the voiced obstruents led to breathy voice, and only then did the low tone emerge from this breathy voice. Further, as Han, Edmondson, and Gregerson point out (1992), after the voiced obstruents produced breathy phonation, they merged with the voiceless obstruents, leaving two types of vowels after modern Phan Rang Cham voiceless stops: one set with breathiness and one without. Interestingly in the Phan Rang Cham monosyllabic forms from proto-voiced obstruents, the breathiness is consistently present; in disyllabic forms, the breathiness occurs less consistently. In all these forms, the resulting pitch is low or low rising. As Table 17 shows, the low-toned Phan Rang Cham forms resulted from a voiced obstruent as the main syllable initial (low tone is marked with a grave accent). The contrasting high tone is, in effect, a default tone, consisting of the remaining forms which did not descend from the voiced obstruents.

| Malay | PC | Phan Rang Cham | |
|---|---|---|---|
| tebus | *təbus | təpùh | ‘ransom; rescue’ |
| --- | *ʔabih | ʔapìh | ‘all’ |
| --- | *bubah | pəpàh | ‘mouth’ |
| --- | *lagah | likàh | ‘tired’ |
| labuh | *labuh | lapùh | ‘fall down’ |
| duduk | *do:k | tòʔ | ‘sit; live; stay’ |

| | | | |
|---|---|---|---|
| padi | *paday | pətày | ‘rice (paddy)’ |
| dua | *dua | twà | ‘two’ |
| hiduŋ | *ʔidŭŋ | ʔatùŋ | ‘nose’ |
| kerbau | *kubaw | kəpàw | ‘water buffalo’ |
| abu | *habəu | həpàw | ‘ashes’ |
| ubi | *hubəi | həpày | ‘taro; yam’ |
| hujan | *huja:n | həcàn | ‘rain’ |
| dada | *dada | tətà | ‘chest’ |
| gigi | *digəi | təkày | ‘tooth’ |
| babi | *babuy | pəpùy | ‘wild pig’ |

Table 17. Low tone main syllables from proto-voiced obstruent onsets.

Phan Rang Cham = Eastern Cham, as found in the work of Doris and David Blood.

5.2 Transparency and phonation spreading.

In modern Phan Rang Cham disyllables, the initial syllable is atonal, while the main syllable is tonal. The development of disyllabic forms is somewhat more complicated than the development of monosyllabic forms. Some classes of main syllable initial consonants are transparent to the spreading of phonation types from the presyllable; some are not. As a consequence, in some cases it is the main syllable initial that ultimately determines the main syllable tone; in other cases, it is the initial of the presyllable. Nonetheless, the Phan Rang Cham spreading patterns are clear. The main-syllable initial sonorants are transparent to spreading from presyllable voiced obstruents. Apparently, the breathiness from the proto-voiced obstruents spread from the pretonic syllables to the main syllables. For examples, see Table 18.

| Malay | PC | Phan Rang Cham | |
|---|---|---|---|
| darah | *darah | təràh | ‘blood’ |
| --- | *dilah | təlàh | ‘tongue’ |
| dalam | *dalăm | təlèm | ‘deep’ |
| bulan | *bula:n | pəlàn | ‘moon; month’ |
| bulu | *biləu | pəlèw | ‘body hair’ |
| jalan | *jala:n | cəlàn | ‘road; path’ |

Table 18. Spreading through sonorants.

In contrast, the main-syllable initial obstruents are relatively resistant to spreading. Only the voiceless fricatives *s and *h allow spreading; the remaining

obstruents block spreading. Two sets of forms are found in Table 19. In the first set the grave accent marking a low tone on the Phan Rang Cham forms is evidence of spreading through a medial *h in 'new' and through a medial *s in 'iron'; just as clearly there is no low tone in 'wet', but this is mostly likely because of the final *-h.

| Malay | PC | Phan Rang Cham | |
|---|---|---|---|
| baharu | *bahrəu | pərə̀w | 'new' |
| besi | *bisəi | pəthày | 'iron' |
| basah | *basah | pəthàh | 'wet; damp' |
| jahat | *jaha:t | csà? | 'bad; wicked' |
| jahit | *jahit | csì? | 'sew' |
| dahi | *?adhə̃i | thày | 'forehead' |

Table 19. Spreading through medial *s and *h.

The second set of forms shows the reflexes of PC voiced aspirated initials. As the extra-Chamic forms from Malay, a language closely-related to Chamic but outside Chamic proper, make obvious, the PC voiced aspirated initials are reductions from older disyllabic forms. These forms also display low tone reflexes.

| Malay | PC | Phan Rang Cham | |
|---|---|---|---|
| batuk | *bitŭk | pətu? | 'cough' |
| dikit | *diki? | təki? | 'few; little' |
| batu | *batəu | petəw | 'stone' |

Table 20. Failure to spread through a voiceless main syllable onset.

As Table 20 shows, disyllabic forms with main syllable obstruent initials other than *s or *h behave just like monosyllables, that is, the initial of the main syllable determines the main syllable tone class.

5.3 The effect of final glottal stop.

Han, Edmondson, and Gregerson (1992:41-42) discuss the effect of final glottal stop on the Phan Rang tonal system. As they note, several scholars have noticed a pitch difference between forms that end in a glottal stop (< proto-voiceless stops: *-p, *-t, *-k, *-?) and forms that do not. Although Blood considered the distinction nonphonemic, he did note that the high-toned forms are especially high before final glottal stop and before -h. (1967:29). In his dictionary of Phan Rang Cham, Fr. Gérard Moussay has a four-way tonal contrast, in which his high-toned and low-toned forms are further divided into forms with final glottal stops and

forms without. Like Moussay, Hoang Thi Chau (1987) has a four-tone analysis, with glottal finals being distinguished from nonglottal finals. Han, Edmondson, and Gregerson (1992:41) distinguish only three tones: a single high tone, a glottal-final low tone and a nonglottal final low tone, with a distinction between glottal and nonglottal finals in the low toned forms but not in the high toned ones.

5.4 The history of Phan Rang Cham contact.

There are two obvious areas in which speculation on the nature of the contact and on the mechanisms of change might be fruitful. First, an examination of the phonetics of the tones of Vietnamese suggests that the transition from a Chamic-style register system to a Vietnamese-style tonal system involves more a shift in focus than a total restructuring. As Eugénie Henderson (1967:171) pointed out some time ago:

> It is important to recognize that pitch is frequently only one of the phonetic components of 'tone' as a phonological category. A phonological tone is in our area [South East Asia] very frequently a complex of other features besides pitch—such as intensity, duration, voice quality, final glottal constriction and so on.

If the phonetics of Vietnamese tones are examined carefully, it is clear that the six tones are complexes of various features besides pitch (Thompson 1984-5:16), which include phonetic distinctions important in the emergent Phan Rang Cham tones. More precisely, among the forms without final stops the low-pitched huyền tone described as "often accompanied by breathy voice quality" is in contrast with the mid or high-mid pitched ngang tone, while among the forms with final stops the low-dropping-pitched nặng tone which "ends in [a] stop or is cut off abruptly by [a] glottal stop" is in contrast with the high-rising-pitched sắc tone. That is, the Vietnamese tone system contains typological distinctions very much like those now emerging in Phan Rang Cham.

Second, the social mechanism involved is far more likely bilingualism than shift, as it is far, far more frequently the case that the Phan Rang Cham speakers are bilingual in Vietnamese than vice versa. And, when shifting occurs, it is Phan Rang Cham speakers shifting to Vietnamese, rather than vice versa.

The precise phonemic status of Phan Rang Cham pitch patterns is largely beside the point — the internal paths of historical development are clear. Equally clear are the successive layers of external contact, layers that appear to have preceded if not precipitated each of the stages of internal change. The PC contact with MK produced final stress, and, as a consequence, reduced pretonic syllables. The subsequent contact with registral MK languages produced a registral Phan Rang Cham. Then, increasingly intimate contact with the tonal Vietnamese has produced an increasingly tonal Phan Rang. The history of successive Phan Rang Cham phonological restructurings is the history of a language adjusting its internal paths of change to follow paths illuminated by language contact.

6 Tsat tones.

The Tsat language is spoken in the Moslem villages of Yanglan and Huixin near Sanya City on Hainan island by the Utsat people, a group that migrated from Vietnam to Hainan island, an island just off the southern coast of mainland China. The people call themselves Utsat, but they refer to the language as Tsat.[4]

Typologically, Tsat has changed radically, undergoing a shift from disyllabic and atonal to monosyllable and tonal. Because this shift has occurred in a relatively short period of time, the path of development is still fairly obvious, providing a relatively transparent case of the full evolution from completely nontonal to fully-tonal.

6.1 Evolution of the Tsat tones.

The Tsat tonal system is comparable in its complexity to that of its Chinese neighbors and more developed than the tonal system of Phan Rang Cham. The tonal developments have been discussed in a series of papers by various authors (Maddieson and Pang 1993, Benedict 1984, Haudricourt 1984, Ouyang and Zheng 1983, Zheng 1986, Ni 1988ab, 1990ab).

Benedict (1941) recognized the Chamic affiliations of Tsat more than fifty years ago, but the recognition of the presence of tone in Tsat is recent. Detailed synchronic work on the tonal system is even more recent (Ouyang and Zheng, 1983; Ni, 1988ab, 1990ab). Comparative work on Tsat has either been included with the synchronic work or it has quickly followed on its heels (cf. Benedict, 1984; Haudricourt, 1984; Zheng 1984; Ni, 1988ab, 1990ab).

The modern Tsat tones are predictable from the voicing differences in the earlier initials and finals. The 55 tone evolves from a final *-h; the relative chronology of this change with respect to the other changes is unclear, something indicated by the dotted line in Figure 5. Otherwise, the earliest stage involved a splitting of the lexicon into two groups — words with high-pitched, probably clear-voiced phonation and words with a low-pitched, breathy-voiced phonation (Figure 5).

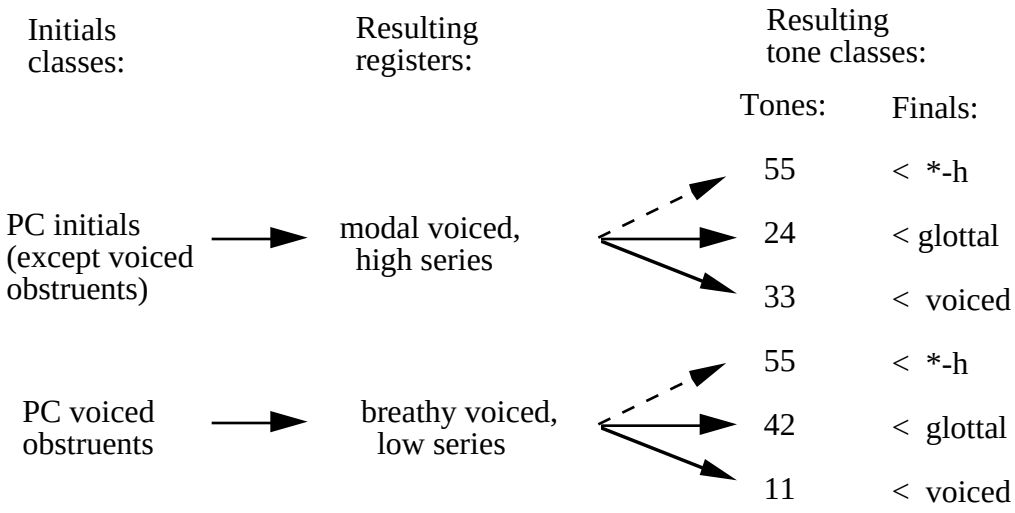


Figure 5. Tsat tonogenesis.

Tones are marked with Zhao [Chao] tone numbers. The numbers indicate relative pitch height, with 5 being high, 3 in the middle, and 1 low. The first number indicates where the tone begins; the second where the tone ends. Thus, for example, 55 is a high, level tone.

Next, both of these groups were split further by the final consonant. All words with a final glottal stop developed a contour tone — a mid-rising 24s (-s indicates a stopped tone) tone from the high-pitched series and a mid-falling 42s tone from the breathy-voiced low-pitched series. All words with a nasal or a vowel final developed a level tone — a mid-level 33 tone from the high-pitched series and a low-level 11 tone from the breathy-voiced low-pitched series. Several other subsets developed in special ways, but these developments are also transparent.

6.1.1 From final *-h & *-s: (> tone 55).

In Tsat there is a single reflex for PC forms with a final *-h or *-s, except for the rhyme *-as: tone 55 (see Table 21). The primary source of this tone is final *-h, from PAn *-q, which becomes -h throughout Chamic. A statistically less important source of the tone is PAn *-s, which merges with *-h becoming -h throughout Chamic.

| PAn | Malay | PC | Wr. Cham | Tsat | |
|---|---|---|---|---|---|
| *putus | pecah | *picah | pacah | tsa$^{55}$ | ‘broken; break’ |
| *puluq | puluh | *pluh | pluh | piu$^{55}$ | ‘ten’ |

| | | | | | |
|---|---|---|---|---|---|
| *taneq | tanah | *tanah | taneh | na$^{55}$ | ‘earth, soil’ |
| *panaq | panah | *panah | paneh | na$^{55}$ | ‘(shoot) bow’ |
| *ma-iRaq | merah | *mahirah | meriah | za$^{55}$ | ‘red’ |
| *belaq | belah | *blah | blah | phia$^{55}$ | ‘chop; split’ |
| *nanaq | nanah | *lanah | laneh | lə$^{11}$ na$^{55}$ | ‘pus’ |
| *buaq | buah | *boh | bauh | pho$^{55}$ | ‘fruit, clf.’ |

Table 21. Tone 55 from PC *-h (< PAn *-q).

6.1.2 From stopped finals.

All Chamic final stops (*-p, *-t, *-k, *-c, *-ʔ) were reduced to a glottal stop or glottal constriction in Tsat. Careful examination of tapes of Tsat makes it clear that, despite what might be suggested by the Ouyang and Zheng transcription and the Ni Dabai transcription, these forms still retain a final glottal stop.

These forms with final glottal stops have split into two tones: forms containing an originally voiced stop or affricate initial produced a falling 42s tone (Table 22). The importance of initial voicing was suggested by Benedict (1984); this precise solution for the 42s tone was pointed out by Eric Oey (p.c., 1992).

| PC | Wr. Cham | Tsat | |
|---|---|---|---|
| *brŭaʔ | pabrụ̄ʔ | phuaʔ$^{42s}$ | ‘work’ |
| *dadit | tadiʔ | thiʔ$^{42s}$ | ‘a fan’ |
| *do:k | dōk | thoʔ$^{42s}$ | ‘sit; live; stay’ |
| *hadip | hadiup | thiuʔ$^{42s}$ | ‘live, alive’ |

Table 22. Sources of tone 42s (stopped).

The remaining stopped syllables, that is, those without an originally voiced stop initial, produced a contrasting rising 24s tone (Table 23). As with the forms with the 42s tone, the final glottal stop is still retained in tone 24s forms.

| PAn | Malay | PC | Wr. Cham | Tsat | |
|---|---|---|---|---|---|
| *anak | anak | *ʔana:k | anəʔ | naʔ$^{24s}$ | ‘child’ |
| *sakit | sakit | *sakiʔ | hakiʔ | kiʔ$^{24s}$ | ‘sick, painful’ |
| *hiket | ikat | *ʔikăʔ | ikaʔ | kaʔ$^{24s}$ | ‘to tie’ |
| *laŋit | laŋit | *laŋi:ʔ | laŋiʔ | ŋiʔ$^{24s}$ | ‘sky’ |
| *Sepat | empat | *pa:ʔ | paʔ | paʔ$^{24s}$ | ‘four’ |
| *paqat | pahat | *pha:t | phaʔ | phaʔ$^{24s}$ | ‘chisel’ |
| *uRat | urat | *ʔurăt | uraʔ | zaʔ$^{24s}$ | ‘vein, tendon’ |

Table 23. Sources of tone 24s (stopped).

6.1.3 Nasal or vowel finals.

The basic division in nasal and vowel final forms is between a low-toned reflex with a 11 pitch and a mid-toned reflex with a 33 pitch. The 11 tone is the conditioned tone, with syllables containing a proto-voiced stop becoming 11. Cf. Table 24.

| Malay | PC | Tsat | |
|---|---|---|---|
| dua | *dua | thua$^{11}$ | ‘two’ |
| hiduŋ | *ʔidŭŋ | thuŋ$^{11}$ | ‘nose’ |
| kerbau | *kubaw | pha:u$^{11}$ | ‘water buffalo’ |
| abu | *habəu | phə$^{11}$ | ‘ashes’ |
| ubi | *hubəi | phai$^{11}$ | ‘taro; yam’ |
| hujan | *huja:n | sa:n$^{11}$ | ‘rain’ |
| dada | *dada | tha$^{11}$ | ‘chest’ |
| gigi | *digəi | xai$^{11}$ | ‘tooth’ |
| babi | *babuy | phui$^{11}$ | ‘wild pig’ |

Table 24. Sources of tone 11.

Phan Rang Cham = E(astern) Cham, as found in the work of Doris and David Blood.

The remaining forms constitute a residue class: All forms not containing a proto-voiced stop are found in the 33 tone, or in one of its apparently-conditioned variants.

| PAn | Malay | PC | Wr. Cham | Tsat | |
|---|---|---|---|---|---|
| *ulaR | ular | *ʔula | ulā | la$^{33}$ | ‘snake’ |
| *telen | telan | *lu:n | luan | luan$^{33}$ | ‘to swallow’ |
| *taqun | tahun | *thŭn | tathun | thun$^{33}$ | ‘year’ |
| *taŋan | taŋan | *taŋa:n | taŋin | ŋa:n$^{33}$ | ‘hand’ |
| *qumah | huma | *huma | humā | ma$^{33}$ | ‘dry field’ |
| *puqun | pohon | *phŭn | phun | phun$^{33}$ | ‘trunk; plant’ |
| *lima | lima | *lima | limə | ma$^{33}$ | ‘five’ |
| *kaSiw | kayu | *kayəu | kayau | zau$^{33}$ | ‘tree; wood’ |
| *Sapuy | api | *ʔapuy | apu̯ĕi | pui$^{33}$ | ‘fire’ |
| *enem | enam | *năm | nam | nanʔ$^{33}$ | ‘six’ |

Table 25. Sources of tone 33.

Although low tone is found in words which contained a proto-voiced stop (or affricate) either in the pretonic syllable or in the main syllable, it is not the voicing that caused these forms to have the low 11 tone, since voiced sonorant initials correlate with the 33 tone class, not with the 11 tone class. Rather it was breathiness associated with the voiced obstruents that resulted in the tone lowering.

6.2 Transparency and phonation spreading.

As occurs in the other languages already examined, there was spreading of the breathiness from a voiced obstruent in the pretonic syllable to the main syllable, thereby resulting in a lowered tone in the main syllable. In Tsat, the spreading of the effect of a voiced obstruent occurred through three classes of main-syllable initial consonants: sonorants, *s & *h, and voiceless stops.

| PAn | Malay | PC | Wr. Cham | Tsat | |
|---|---|---|---|---|---|
| --- | --- | *buŋăt | --- | ŋaʔ$^{42s}$ | ‘soul, spirit’ |
| *bulu | bulu | *biləu | bulău | phiə$^{11}$ | ‘hair, body’ |
| *qabaRa | bahu | *bara | bara | phia$^{11}$ | ‘shoulder’ |
| *beRas | beras | *bra:s | brah | phia$^{11}$ | ‘rice (paddy)’ |
| *buŋa | buŋa | *buŋa | buŋə | ŋa$^{11}$ | ‘flower’ |
| --- | --- | --- | *bisəi | sai$^{11}$ | ‘iron’ |
| *baqeRu | baharu | *bahrəu | barau | phiə$^{11}$ | ‘new’ |
| --- | batuk | *bitŭk | batuʔ | tuʔ$^{42s}$ | ‘cough’ |
| *dikit | dikit | *dikiʔ | dikiʔ | kiʔ$^{42s}$ | ‘few; little’ |
| *batu | batu | *batəu | batău | tau$^{11}$ | ‘stone’ |
| --- | --- | *bato | pato | to$^{11}$ | ‘teach’ |
| --- | --- | *bitəi | patay | u$^{11}$ tai$^{11}$ | ‘banana’ |
| *depa | depa | *dupa | dapā | pa$^{11}$ | ‘armspan’ |

Table 26. Spreading through the sonorants, *s & *h, and voiceless stops.

As is also the case with the other languages, the precise conditions of the spreading in Tsat are idiosyncratic to Tsat, suggesting that, despite the obvious typological similarities, at least some of this spreading happened independently in each language.

6.3 The history of Tsat contact.

Tsat seems to have been strongly influenced by Hainanese, the Southern Min dialect that functions as the local lingua franca, but the people have a strong communal identity and sense of language loyalty due at least partially to their being

set apart by their Islamic beliefs (Keng-Fong Pang, personal communication). Nonetheless, the lexicon is rampant with Chinese loans.

The modern Tsat speakers are surrounded by tonal languages. Many are partially if not fully bilingual in Hainanese, a fully-tonal Chinese dialect. Most likely the social mechanism involved in the development of tones in Tsat is precisely this bilingualism. The possibility of the mechanism being shift is fairly limited because the Tsat speakers form a rather tight Muslim community, making it difficult for outsiders to marry into it. In any case, if there were any language shift, it is far more likely that the Tsat speakers would be shifting to Hainanese rather than away from it.

In the early history of the Tsat speakers on Hainan, it is possible that language shift did play a part. One story about the migration of the Tsat suggests that it was overwhelmingly men that migrated to the island and that upon their arrival they took wives from among the Li women, who would have been speakers of a tonal language. However, another version of the story states that both the men and women arrived together.

Table 27 compares the tone systems of Tsat with the tone systems of the Tan-chou dialect (Ting 1980)—the most likely language for Tsat speakers to be bilingual in and with two of the Lí dialects (Hlai dialects; Ouyang and Zheng, 1980)—in case there was earlier contact between the Tsat and the Lí. Interestingly, what comparison shows is that contact with any one of the languages shown, or for that matter any one of another ten or so tonal languages of Hainan, would have provided the typological model needed for the restructuring of the Tsat phonological system.

As Table 27 shows, Tsat has three level tones—high-level (55), mid level (33), and low-level (11), a falling tone (42s), and a rising tone (24s). The Tan-chou dialect of what Ting (1980) calls a southern dialect of Chinese has three level tones (55, 22, 11) and a rising tone (35); it does however lack a falling tone and the rising tone does not end in a stop. Both the Lí dialects have three level tones, a rising tone, and a falling tone; in the Yuánmén dialect neither the rising tone, nor the falling tone end in a stop, but even in Tsat the final stops for the rising and falling were not always transcribed.

| | Austronesian: Chamic (Hainan) | Chinese: Southern dialect (Hainan) | Tai-Kadai: Lí (Hainan) | Tai-Kadai: Lí (Hainan) |
|---|---|---|---|---|
| | Tsat | Tan-chou | Yuánmén | Tōngshǐ |
| high level | 55 | 55 | 55s | 55 |

| | | | | |
|---|---|---|---|---|
| falling tone | 42s | --- | 42 | 43s |
| mid level | 33 | 22 | 44 | 33 |
| rising tone | 24s | 35 | 13 | 13s |
| low level | 11 | 11 | 11 | 11 |

Table 27. The tones of Tsat, Tan-chou, and two Lí languages.

The -s indicates that the tone occurs only in stopped syllables.

Bear in mind, an exact fit between tonal systems is hardly necessary; indeed, it would be surprising. After all, the Tsat did not borrow the system directly. Instead, contact-guided change influenced the internal paths of development within Tsat itself. This suggests that the interaction between the internal influences and the external factors may very well produce a system that differs both from the earlier Tsat system and from the system found in the contact language.

Nonetheless, in the midst of examining what we do not know, we should not lose track of what we do know: Tsat speakers have had extended contact with speakers of a tonal language of Hainan, and, while in contact with these speakers, Tsat developed a typologically very similar tonal system.

7 The internal paths of change.

Although undoubtedly our understanding of many of the details will improve, we know the basic path by which Haroi developed restructured register, Western Cham developed register, Phan Rang became incipiently tonal, and Tsat became fully tonal. The cross-linguistic comparison of the monosyllables illustrates these developments while highlighting the similarities and differences (see Table 28).

In examining these largely independent developments, one immediately sees that there are frequent cross-linguistic parallels in the developmental paths and that, despite the typologically distinct modern phonological systems, each of the distinct internal paths of development is phonetically plausible. Similarities in the paths are, of course, not unexpected. The four languages began from virtually the same starting point and, in part, the changes were guided by universal phonetic tendencies.

Just as striking is that, from this common starting point, came modern phonological systems that are radically different typologically. These typological differences have their roots in the complex phonetics of the vowel registers. Second register, for instance, is characterized by a bundle of features: primarily a laxness or breathiness, co-occurring with lower pitch and higher vowels, while the contrasting first register is characterized by modal phonation, co-occurring with

higher pitch and lower vowels. For reasons that cannot be fully explicated just by the examination of language internal developments, Western Cham has remained a register language since evolving this system, while in Phan Rang Cham and Tsat the pitch properties eventually rose to prominence, and in Haroi the vowel quality differences became prominent.

In all four languages, the initial stage was to develop a special register after the voiced obstruents, the so-called second register. And in all four languages, by default, the remaining forms became a contrasting register. From this point on, the developments in each language differ in detail but remain otherwise parallel.

The developments in Western Cham were the simplest. The two registers are manifested as a two-way register system: the voiced obstruent initials led to second register reflexes, while the remaining initials led to first register reflexes. The one development unique to Western Cham is the extension of second register to include the sonorant initial forms, an extension not fully explicable in terms of system internal developments within Western Cham since it is not voicing per se that appears to be the defining characteristic of second register but rather the breathy voice quality associated with the voiced obstruents, something obviously missing from the sonorants. Along with the realignment of the register of certain individual forms due to spreading, these developments produced the modern Western Cham system.

The Haroi developments initially parallel those in Western Cham. The voiced obstruents produced a presumably breathy-voiced second register, which has left a clearly identifiable class of vowel reflexes in the modern language. As in the other languages, the remaining forms originally fell into a single, contrasting default register. Here, however, Haroi added its own developmental twist: the voiceless obstruents further divided the default register, producing a set of first register vowels, which have left their own identifiable class of vowel reflexes in the modern language. Meanwhile, vowels after the sonorants, being outside these two developments, were left largely unaffected (except for some vowel harmony).

At this point Haroi was still a register system, typologically very much like Western Cham, although differing in details. Specifically, the vowel quality differences were still fully predictable from the co-occurring phonation differences. However, when the phonation differences were lost, some of the formerly predictable vowel quality differences remained, becoming phonemic, and making Haroi into a restructured register system.

Despite differences in language specific details, in spreading patterns, and despite Tsat's unique tone class from final *-s and *-h, Phan Rang Cham and Tsat followed typologically similar paths of development. In both, the voiced obstruent initials led to forms with second register reflexes, with the remaining forms becoming the contrasting register by default. In both languages, the pitch component of the vowel registers became salient, with the second register vowels developing low tone while the remaining forms became a contrasting default higher tone.

| | Western Cham | Haroi | Phan Rang Cham | Tsat |
|---|---|---|---|---|
| | register | restructured register | incipiently tonal | fully tonal |
| voiceless obstruents | first register (default) | vowel reflexes < first register (initial layer) | high tones (default) | 33; 24s tones (default) |
| glottalized obstruents | first register (default) | vowel reflexes < first register (second layer) | high tones (default) | 33; 24s tones (default) |
| sonorants | second register (second layer) | (unaffected) | high tones (default) | 33; 24s tones (default) |
| voiced obstruents | second register (initial layer) | vowel reflexes < second register | low tones | 11, 42s tones |

Table 28. The paths of development in monosyllables.

The reflexes of disyllables are further affected by the results of spreading. Whenever the initial of the presyllable was associated with a different register than the initial of the main syllable, there was the potential for the spreading of the phonation (not the tone) of the first syllable to the main syllable and these patterns of spreading are interesting in their own right. Although the language specific details differ, the patterns suggest that different consonant classes have different degrees of permeability with regard to spreading. The sonorants seem the most permeable, medial *s and *h come next, followed by the voiceless obstruents, with the voiced obstruents being the least permeable. There are also differences in what is likely to spread. As the top part of Table 29 shows, in all three languages with the potential for spreading, the voiced obstruent phonation does spread through the medial sonorants. It also spreads through medial *s & *h in the languages where the data is clear, but only in Tsat does it spread through the medial voiceless stops and affricates.

| | Western Cham | Haroi | Phan Rang Cham | Tsat |
|---|---|---|---|---|
| second register through: | | | | |
| • sonorants | yes | yes | yes | yes |
| • *s, *h | yes | not clear | yes | yes |
| • voiceless stops, affricates | no | no | no | yes |
| | | | | |
| voiceless stops & affricates through: | | | | |
| • sonorants | yes | yes | not applicable | not applicable |
| *s & *h through: | | | | |
| • sonorants | yes | no | not applicable | not applicable |

Table 29. The paths of spreading in disyllables.

The spread of first register is less pervasive, but this is at least in part because in both Phan Rang Cham and Tsat there is no potential for spreading — the reflexes after the voiceless obstruents and the sonorants are the same. However, in Haroi and Western Cham, where there is the potential for spreading, spreading does occur. Here, the voiceless stops and affricates appear to behave differently from the voiceless fricatives *s and *h: The sonorants appear permeable to the effects of first register stops and affricates in both languages, but the same sonorants are permeable to *s and *h only in Western Cham.[5]

8 The evidence for external contact.

Despite the presence of other types of evidence, the strongest and most compelling evidence for the influence of contact is circumstantial. The argument, in short, is that unless the role of outside contact is recognized in triggering and directing these changes, we are forced to attribute a remarkable string of convergences among contiguous phonological systems to chance. We would be forced to treat as fortuitous first that PC—an Austronesian language—acquired the combination of final stress, pretonic weakening, and possibly incipient register, when no other Austronesian language did, just at the time when it came into regular contact with MK; then, we would be forced to treat as chance the fact that incipient register in each of these four languages to subsequently came to resemble the register or tonal systems of its neighbors, just when it came into contact with them. No, the circumstantial evidence alone makes it clear that the languages that radically restructured their phonological systems did so while under the influence of languages whose phonological systems could be said to have provided — through that contact — the phonological prototype for the restructuring. Cf. Joseph (1983:179-212, but esp. 190-191) for a similar argument but with reference to the diachronic treatment of infinitival constructions in the Balkan Sprachbund.

The specific contacts and their phonological characteristics are known. In contact with MK with its iambic disyllables—unstressed presyllable and stressed main syllable, the largely disyllabic PC forms typically became iambic. Later, in contact with the MK register languages of western Vietnam and Cambodia, Western Cham developed a full register system. In contact with the tonal Vietnamese, Phan Rang Cham has become increasingly tonal just as Tsat, in contact with the fully tonal Hainanese, became fully tonal. And, although the details are more complicated, Haroi, long in contact with Bahnar, seems to have paralleled the developments in Bahnar: more specifically, when Bahnar had phonation differences on its vowels Haroi developed them too, and when Bahnar lost these differences, Haroi again followed suit.

The paths of internal change varied greatly from language to language, with the ultimate typological direction of the change being determined in large part by the models encountered through contact. Of course, the individual languages were still constrained by the availability of phonetically-plausible internal paths of development, but the mechanism for change was simple: Intimate contact with a phonological system in which a particular phonetic feature was salient increased the relative saliency of that phonetic feature in the register complex. This alone, one suspects, was sufficient to set the 'drift' toward a new phonological system into motion and to maintain the directionality of that drift.

In addition to variation in the internal paths of change, even with the limited evidence available, it is likely that there was some variation in the social mechanisms involved. With the early MK contact, most likely both some bilingualism and some language shift were involved. With the development of the early registers, there is little available hard data although register systems are pervasive in the area. The developments in Haroi from a modern perspective look to be from long-term bilingualism, although some earlier language shift remains a possibility. However, with the incipient tones of Phan Rang Cham, it is clear that the major mechanism was intense bilingualism as was also most probably the source of the development of the tones in Tsat.

As for future research, in a narrow sense, the most obvious direction for extending our understanding of the Chamic developments lies in a much more detailed investigation of the precise nature of the contact situations that led to the various changes. There are a number of questions thus far only answered superficially. For instance, just how much bilingualism was there? Precisely who had contact with whom and for how long?

More information on the social mechanisms involved e.g., language shift, long-term bilingualism, and so on would be valuable. To what degree did language shift play a part in the developments? That is, to what degree did speakers of one language shift to the other, introducing features of the original language (whether or not it was ultimately abandoned)? Is it possible to make reasonable guesses about the periods of time involved in these changes? It is imperative to note though that none of the gaps in the data prevents us from drawing one important conclusion: even with this admittedly circumstantial evidence, it is clear that the internal paths of change are a reflection of the external patterns of language contact.

## 9 Conclusions.

The Chamic data have a great deal to say about the interaction of internal and external factors in historical explanation. In each of the Chamic languages examined, the new phonological system has arisen in a series of phonetically plausible stages. Taken just one language at a time, each individual series of developments provides a misleadingly adequate appearing language-internal account of the restructurings. It is only when the correlations between the phonological structures in the contact languages and the outcomes of the Chamic restructurings are noticed that the inadequacy of any purely internal accounts becomes obvious.

There is a methodologically-motivated bias among historical linguists in favor of internal explanations. As Thomason and Kaufman (1988:57-64; 139ff) point out, for many historical linguists contact explanations are to be accepted only when fully and completely documented — otherwise, internal forces are to be presumed. An obviously related concern focuses on what constitutes proof of contact influenced change. Against this, Thomason and Kaufman reasonably argue that external explanations are like any explanation—they are to be preferred when the balance of the evidence, or else mere simplicity, favors them.

Certainly, in the case of Chamic, if the methodologically imposed requirements for proof of external influence include as a minimum a well-defended chronology of internal development and of external contact from PC onward, the proof is not immediately forthcoming and, may very well never be, and yet the purely internal explanation not only misses many crucial generalizations but it also fails to recognize how the changes were triggered and what supplied their directionality. In these languages, the evidence for a strong contact influence is largely circumstantial but nonetheless it provides the most convincing account of the facts. And, whether or not more detailed accounts of the nature and length of the contact are forthcoming, just on the basis of the circumstantial evidence assembled thus far, it can be concluded that external contact played a central role in triggering the changes and, while interacting with the internal developments, the external contacts determined which of several phonetically plausible internal paths the language took.

Several characteristics of the interaction between internal and external influences are important to note. Contact triggered the changes and provided their

directionality — the changes were not the chance outcome of a series of undirected responses to language internal pressures. In each case, which phonetic features of the earlier register system were to rise to prominence and which features were to recede into the background was determined by which features were salient in the phonological system of the contact language.

Notice that this did not result in identical systems in both languages, nor is there any reason that this should be expected. In Phan Rang Cham, for example, the Vietnamese contact has led to the pitch characteristics of the earlier register system being seen as salient, leading to the development of tone in Phan Rang Cham. It has not, however, led to identical tone systems — Phan Rang Cham has a three- or four way tonal distinction, while in Vietnamese it is a five- or six-way distinction. This should not be surprising. Indeed, it would be more surprisingly if contact should produce exactly the same system in the language being influenced — even in language classes precise imitation of the target language system is discouragingly rare.

As Thomason and Kaufman point out, there is a methodologically-motivated reluctance to entertain external motivations for changes that already have a natural internal explanation. However, the historical developments in Chamic demonstrate the role that external influences have played in providing directionality to natural paths of internal change. These changes are the products of both external and internal influences. None of this should be surprising. After all, if contact can induce unnatural changes, then it would be preposterous to maintain that it cannot induce natural changes. Indeed, a priori it has to be assumed that contact is more likely to induce natural than unnatural changes. Thus, the real issues in contact situations concern the nature of proof, not the pseudo-issue of whether or not contact can induce natural changes.

There is much left to be done before we have a proper understanding of the forces behind the radically restructuring of Chamic phonological systems. In addition, as the Chamic data illustrates, an understanding of the internal paths of change will not by itself explain what happened; it is also crucial to understand the nature and the degree of external contact that the language systems experienced during their formative stages. With the Chamic languages, we are fortunate that the data forces us to recognize necessity of both: Alone neither the internal nor the external will adequately explain our data.

In a broader sense, going beyond the narrow focus on Chamic languages, it is obvious that doing historical linguists in parts of the world in which multilingualism and language shift are so commonplace requires paying careful attention, not just to the internal, but also to the external influences on language change even in those cases where the internal paths of change alone are plausible — particularly since, as in Chamic, external rather than internal paths may be the primary determinant of the directionality of change.

References

Aymonier, Etienne François and Antoine Cabaton. 1906. Dictionnaire cam-français. PEFEO 7. Paris: Imprimerie National.

Benedict, Paul K. 1941. A Cham colony on the island of Hainan. Harvard Journal of Asiatic Studies 4:129-34.

Benedict, Paul K. 1984. Austro-Tai parallel: A tonal Cham colony on Hainan. Computational Analyses of Asian & African Languages 22:83-86.

Blood, David L. 1967. Phonological units in Cham. Anthropological Linguistics 9.8:15-32

Blood, Doris Walker. 1962. Reflexes of Proto-Malayo-Polynesian in Cham. Anthropological Linguistics 4.9:11-20.

Blood, Doris Walker and David Blood. 1977. Eastern Cham working dictionary. SIL. microfiche.

Blood, Doris Walker, David Blood, and Thien Sanh Canh. 1976. Eastern Cham vocabulary. SIL. microfiche.

Blust, Robert A. 1969. Some new proto-Austronesian trisyllables. *Oceanic Linguistics* 8:85-104.

Blust, Robert A. 1980. Austronesian etymologies. Oceanic Linguistics 19:1-2:1-181.

Blust, Robert A. 1983-4. Austronesian etymologies—II. Oceanic Linguistics XXII-XXIII.1 & 2: 29-150.

Blust, Robert A. 1986. Austronesian etymologies III. Oceanic Linguistics 5.1-2:1-123.

Blust, Robert A. 1989. Austronesian etymologies-IV. Oceanic Linguistics 28.2:111-180.

Burnham, E. C. 1976. The place of Haroi in the Chamic languages. MA thesis, University of Texas at Arlington.

Capell, A. 1949. Two tonal languages in New Guinea. Bulletin of the School of Oriental and African Studies 13:184-99.

Cobbey, Maxwell. 1980. A first case of historiography among the Roglai. In Notes from Indochina on ethnic minority cultures, edited by Marilyn Gregerson and Dorothy Thomas. SIL Summer of Anthropology, Dallas, Texas. Pp. 61-83.

Coedès, G. 1968. The Indianized states of Southeast Asia. Edited by Walter F. Vella. Translated by Susan Brown Cowing. Kuala Lumpur: University of Malaya Press.

Costello, Nancy and Judy Wallace. 1963. Katu-English-Vietnamese Dictionary. 87pp.

Costello, Nancy and Kitrunh. 1976. Katu ethnographic texts. 40pp.

Costello, Nancy and Judy Wallace. 1976. Katu linguistic articles. 10pp., 24pp., and 8pp.

Costello, Nancy et al. 1976. Katu notes and word lists. 72pp.

Chao, Yuan Ren. 1930. A system of tone letters. Le Maître Phonétique.

Denning, Keith. 1989. The diachronic development of phonological voice quality, with special reference to Dinka and the other Nilotic languages. Ph. D. dissertation, Stanford University.

Donegan, Patricia. 1993. Rhythm and vocalic drift in Munda and Mon-Khmer. Linguistics of the Tibeto-Burman Area 16:1-1-43.

Diffloth, Gérard. 1990. Vietnamese tonogenesis and new data on the registers of Thauvang. Sino-Tibetan Conference.

Edmondson, Jerold A. and Kenneth J. Gregerson. 1993. Western Cham as a register language. In Edmondson and Gregerson, pp. 61-74.

Edmondson, Jerold A. and Kenneth J. Gregerson. 1993. Tonality in Austronesian Languages. Edited by Jerry Edmondson and Ken Gregerson. Oceanic Linguistics Special Publication No. 24. Honolulu, Hawaii: University of Hawaii Press.

Edmondson, Jerold A. and Yang Quan. 1989. Phonological geometry in Kam-Sui: contours, edges, and dimorphism. To appear in Minzu Yuwen.

Friberg, Timothy and Hor Kvoeu. 1977. Register in Western Cham phonology. In Thomas, et al., pp. 17-38.

Fuller, Eugene. 1977. Chru phonemes. In Thomas, et al., pp. 77-86.

Goschnick, H. and Alice Tegenfeldt-Mundhenk. 1976. Haroi dictionary. SIL. Huntington Beach, Calif. 325pp. ms.

Goschnick, Hella. 1977. Haroi clauses. In Thomas, et al., pp. 105-124.

Hận, Phú Vãn, Jerold Edmondson, and Kenneth Gregerson. 1992. Eastern Cham as a tone language. Mon-Khmer Studies 20:31-43.

Haudricourt, A.-G. 1984. Tones of some languages in Hainan. Minzu Yuwen 4:17-25.

Headley, Robert K. 1976. Some sources of Chamic vocabulary. Austroasiatic Studies, Part I. Oceanic Linguistics Special Publication No. 13:453-476.

Headley, Robert K. 1991. The phonology of Kompong Thom Cham. *Austroasiatic Languages: Essays in honour of H. L. Shorto.* Edited by Jeremy H. C. S. Davidson. University of London, School of Oriental and African Studies: 105-121.

Henderson, Eugénie J. A. 1952. The main features of Cambodian pronunciation. BSOAS 14.1:149-74.

Henderson, Eugénie J. A. 1965. The topography of certain phonetic and morphological characteristics of South East Asian languages. Lingua 15:400-434.

Henderson, Eugénie J. A. 1967. Grammar and tone in South-East Asian languages. Wissenschaftliche Zeitschrift der Karl-Marx-Universitåt-Leipzig. Gesellschafts- und Sprachwissen-schaftliche Reihe. Part 1/2:171-178.

Hoang, Thi Chau. 1987. He thong thanh dieu tieng Cham va cach ki hieu [The system of tones in Cham and their symbolization]. In Ngon-Ngu [Language] 1-2:31-35. Institute of Linguistics, the Social Sciences Committee of Vietnam.

Huffman, Franklin E. 1976. The register problem in fifteen Mon-Khmer languages. Austroasiatic Studies, edited by Philip N. Jenner, Laurence C. Thompson, and Stanley Starosta. Special publication of Oceanic Linguistics no. 13. 2 volumes. Honolulu, Hawaii: University of Hawaii Press, I:575-90.

Joseph, Brian. 1983. The synchrony and diachrony of the Balkan infinitive; A study in areal, general, and historical linguistics. Cambridge University Press.

Jrang, Ja Kuang, Ja Wi, Ja Dai, Ja Ngai, and Eugene Fuller. 1977. Chru Vocabulary. Summer Institute of Linguistics. Manila.
Lee, Ernest Wilson. 1966. Proto-Chamic phonologic word and vocabulary. Ph.D. Indiana University. 67-3690.
Lee, Ernest Wilson. 1974. Southeast Asian areal features in Austronesian strata of the Chamic languages. Oceanic Linguistics XIII.1-2:643-668.
Lee, Ernest Wilson. 1977a. Introduction. In Thomas, et al., pp. vi-vii.
Lee, Ernest Wilson. 1977b. Devoicing, aspiration, and vowel split in Haroi: evidence for register (contrastive tongue-root position). In Thomas, et al., pp. 87-104.
Maddieson, Ian and Keng-Fong Pang. 1993. Tone in Utsat. In Edmondson and Gregerson, pp. 75-89.
Matisoff, James A. 1973. Tonogenesis in Southeast Asia. In Consonant Types & Tone. Edited by Larry M. Hyman. Southern California Occasional Papers in Linguistics No. 1. Los Angeles: USC. Pp. 71-96.
Moussay, Fr. Gérard. 1971. Dictionnaire Cam-Vietnamien-Français. Phan Rang: Centre Culturel Cam.
Ni Dabai. 1988a. The genealogical affiliation of the language of the Hui people in Sanya Hainan. Minzu Yuwen 2:18-25.
Ni Dabai. 1988b. The Kam-Tai of China and the Hui of Hainan. Bulletin of the Central Institute of Minorities 3:54-65.
Ni Dabai. 1990a. The origins of the tones of the Kam-Tai languages. ms.
Ni Dabai. 1990b. The Sanya (Utsat) language of Hainan island: a living specimen of a linguistic typological shift. ms.
Oey, Eric M. n.d. The linguistic position of the Chamic languages. ms..
Ouyang, Jueya and Zheng Yiqing. 1980. *A brief description of Li (Hainan).* Chinese Minority People's Language, Basic Description Series. Beijing.
Ouyang Jueya and Zheng Yiqing. 1983. The Huihui speech (Utsat) of the Hui nationality in Yaxian, Hainan. Minzu Yuwen 1:30-40.
Parkin, Robert. 1991. A Guide to Austroasiatic Speakers and Their Languages. Oceanic Linguistics Special Publication No. 23. Honolulu: University of Hawai'i Press.
Pittman, Richard S. 1959. Jarai as a member of the Malayo-Polynesian family of languages. Asian Culture 1.4:59-67.
Shorto, Harry L. 1977. Proto-Austronesian *taqən: An anomaly removed. *Bulletin of the School of Oriental and African Studies* 40:128-129. University of London.
Tegenfeldt-Mundhenk, Alice and Hella Goschnick. 1977. Haroi phonemes. In Thomas, et al., pp. 1-15.
Tharp, J. A. and Y-Bham Buoy-Ya. 1980. A Rhade-English dictionary with English-Rhade finderlist. Pacific Linguistics. Series C - No. 58.
Thomas, David D. 1971. Chrau grammar. Oceanic Linguistics. Special Publication No. 7. Honolulu: University of Hawaii Press.
Thomas, David D. 1979. The place of Alak, Tempuan, and West Bahnaric. Mon-Khmer Studies VIII:171-186.

Thomas, David D., Ernest Wilson Lee, and Dang Liem Nguyen. 1977. Papers in South East Asian Linguistics. No. 4. Chamic Studies. Canberra: Pacific Linguistics. Series A, No. 48.

Thomas, Dorothy M. 1963. Proto-Malayo-Polynesian reflexes in Rade, Jarai, and Chru. Studies in Linguistics 17:59-75.

Thomason, Sarah Grey and Terrence Kaufman. 1988. Language contact, creolization, and genetic linguistics. University of California Press: Berkeley.

Thompson, Laurence C. 1984-1985. A Vietnamese reference grammar. Edited by Stephan O'Harrow. Mon-Khmer Studies XIII-XIV.

Thurgood, Graham. 1980. Consonants, phonation types, and pitch height. Computational Analyses of Asian & African Languages 13:207-19.

Thurgood, Graham. 1992. From atonal to tonal in Utsat (a Chamic language of Hainan). Proceedings of the Eighteenth Annual Meeting of the Berkeley Linguistics Society. February 14-17, 1992. Special Session on the Typology of Tone Languages. Edited by Laura A. Buszard-Welcher, Jonathan Evans, David Peterson, Lionel Wee, and William Weigel. Pp. 145-156.

Thurgood, Graham. 1992b. The aberrancy of the Jiamao dialect of Hlai: speculation on its origins and history. Southeast Asian Linguistics Society I, Edited by Martha Ratliff and Eric Schiller. Tempe: Arizona State University Southeast Asian Studies Publication Program. Pp. 297-308.

Thurgood, Graham. 1993. Phan Rang Cham and Utsat: tonogenetic themes and variants. In Edmondson and Gregerson, pp. 91-106.

Thurgood, Graham. in press. Restructured register in Haroi: reconstructing its historical origins. To appear in Southeast Asian Linguistic Studies in Honour of Vichin Panupong, edited by Arthur S. Abramson, et al.

Ting Pang-hsin. 1980. The Tan-chou dialect of Hainan. Cahier de linguistique Asie Orientale 8:5-27.

Zheng Yiqing. 1986. A further discussion of the position of Huihui speech and its genetic relationship. Minzu Yuwen 6:37-43.

Notes:

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[1]Not all Haroi vowel changes are due to the effects of register on vowel quality. One minor Haroi vowel change pre-dates the later influence of register on vowels: PC *-əm and *-əu merged very early with *-ăm and *-ău, respectively. The changes, of course, were later subject to the registrally-induced vowel splitting that realigned the vowel system of Haroi.

[2]However, it would be premature to read too much significance, one way or the other, into the onset lowering correlated with the glottalized obstruents. Virtually all the Chamic glottalized consonants are ultimately borrowed from MK. Thus, one question about at least those forms that do not reconstruct back to PC is whether the vowels in question acquired the lowered onsets before or after they were borrowed.

[3]These are the dominant patterns in Haroi. However, as both Lee (1977) and Burnham (1976) noticed, there is a subset of what I would describe as sonorant-initial main syllables with original low vowels that unexpectedly occur with a raised onset. In the case of the one monosyllable and some of the disyllables, it appears the raised onset comes from the initial *y- of the main syllable. For the remaining disyllabic roots, the raised onset seems to correlated with the presence of the PC high vowel *-u or *-i in the pretonic syllable.

[4]For Utsat, Mark Durie (personal communication) has suggested an etymology, deriving it from an u- prefix widely used with ethnic groups plus the word Cham with the loss of the labial place of articulation in the final nasal.

[5]A caveat is in order. The cross-linguistic comparison of differences in spreading patterns may have more than one interpretation. For instance, only one small group of PC voiced obstruents fails to have Western Cham second register reflexes: this lack of spreading occurs only in PC disyllabic forms in which the first syllable began with a proto-voiced obstruent and the second syllable with a voiceless obstruent. Friberg and K. Hor (1977:36) noticed this gap in the patterning

and, in the same footnote, speculated that the originally voiced initial of the first syllable had devoiced before the onset of Western Cham register development.

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