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1. Introduction

Abbreviations: AA: Austroasiatic. VM: Viet-Muong (= Vietic). PVM: Proto-Viet-Muong (= Proto-Vietic). OC: Old Chinese. MC: Middle Chinese.

The problem of the origin of tones in Vietnamese was first discussed by the famous sinologist Henri Maspero (1912). He demonstrated, with the help of Sino-Vietnamese (the Vietnamese pronunciation of Chinese characters), that the six tones of Vietnamese could be analysed into two series: *ngang-sắc-hỏi* corresponding to ancient voiceless initials and *huyền-nặng-ngã* corresponding to ancient voiced initials.

A further contribution was made by André G. Haudricourt in his seminal article *De l'origine des tons en vietnamien* (1954). He showed masterly that the three tones of Ancient Vietnamese originated from ancient laryngeal finals. In short, *sắc-nặng* tones derived from an ancient final glottal stop and *hỏi-ngã* tones from an ancient final spirant, while, by contrast, *ngang-huyền* tones developed in final vowel context. Haudricourt's model was developed and extended by James A. Matisoff (1973) to account for much of the tonogenesis phenomena in Southeast Asia.

Gérard Diffloth (1989), contra Haudricourt, proposed to reconstruct an earlier Proto-AA creaky voice to account for Vietnamese *sắc-nặng* tones, contrasting with a Proto-AA clear voice. This theory solves several tonogenesis problems within the VM group; on the other hand, it raises many new problems within the AA family.

I this paper, I suggest that the Vietnamese tone contrast, *sắc-nặng* vs *ngang-huyền* and its cognates in other VM languages, reflects an earlier *tense* vs *lax* contrast that results from the influence of the Chinese language during the Han

times (206 B.C.—220 A.D.). In the end, this hypothesis reinforces Haudricourt's ideas.

This hypothesis leads us to divide PVM into an Early PVM, the stage just before the first Chinese influence, and a significantly different Late PVM, or traditional PVM.

2. The state of affairs in Proto-VM (henceforth **Late PVM**)

We can safely assert that all tone systems in modern VM languages derive from a fundamental three-way contrast of Proto-VM between **-Ø** (unmarked voiced ending rhyme), **-ˀ** (constricted voiced ending rhyme) and **-h** (laryngeal spirant ending rhyme). Checked syllabes in **-**C (voiceless ending rhyme) are apart.

-Ø	**-ˀ**	**-h**	**-C**
vowel semi-vowel nasal lateral	vowel semi-vowel nasal lateral	vowel	vowel

This implies that Proto-VM was a toneless language. The constriction **-ˀ** in vowel ending derives from a Proto AA final glottal stop **-ʔ**.

3. Tonogenesis in Viet-Muong

To put the case simply, tones in VM were generated by two major phenomena:

• Loss of laryngeal features in rhymes with **-ˀ** and **-h** in two phases. The first phase is the change of **-ˀ** into a pitch/contour melody, presumed rising and slightly constricted, that contrasts with **-Ø** in a two-tone system. The second phase is the loss of the laryngeal spirant **-h**, creating a third pitch/contour melody that contrasts with the two previous ones in a three-tone system.

• Devoicing of plosive initials (confusion of voiced into voiceless) associated with tone splitting.

The relative chronology of these two major phenomena for each language led to different types of tone systems (Ferlus 1998a).

• If the devoicing of plosive initials took place after the complete loss of the two laryngeal features **-ʔ** and **-h**, then the language developed a six-tone basic system as in northern VM languages (Vietnamese, Mường, Thổ).

• If the devoicing took place after the change of the laryngeal constriction **-ʔ**, while final spirant **-h** was still preserved, then the language developed a four-tone basic system as in southern VM languages (Maleng, Arem, Sách/Rục, Thavung).

I give examples of tone systems for written standard Vietnamese and Sách/Rục (Nguyễn Văn Lợi 1993; personal data).

Vietnamese: The tone system of Vietnamese can be presented as follows (in *quốc ngữ* spelling):

	voiced finals			voiceless finals
*voiceless initials	*ngang*	*sắc*	*hỏi*	*sắc*
*voiced initials	*huyền*	*nặng*	*ngã*	*nặng*

• Within syllables ending in vowels, all of the six tones can occur.

• Within syllables in nasal finals (*-m -n -nh/-ng*) and ancient lateral final (**-l** > Viêt *-i/-y*), only tones derived from **-Ø** (*ngang-huyền*) and **-ʔ** (*sắc-nặng*) can occur in genuine VM words. Tones corresponding to **-h** (*hỏi-ngã*) only exist in borrowings from Chinese, or in words of expressive origin (as was already noted by Maspero).

• Tones deriving from rhymes with final **-h** exist on syllables that are either vowel-final or with the ancient final fricative **-s** (> **-l^{h}** > Viêt *-i/-y*).

• The tones in syllables **-**C with final plosives (*-p -t -ch/-c*) are realized with the same contour as *sắc-nặng* tones, but they constitute a subsystem that contrasts, as a whole, with the subsystem in voiced final syllables.

• In some dialects the confusion of two tones (usually *nặng-ngã* but sometimes *hỏi-ngã*) reduced the number of tones from six to five.

***Sách/Rục**:* The Sách and Rục dialects show very tiny differences and are practically the same language. They form the Chứt subgroup spoken in Tuyên Hóa district, Quảng Bình province.

	voiced finals		voiceless finals	
*voiceless initials	**v**	**vˀ**	**vh**	**v**C
*voiced initials	**v̀**	**v̀ˀ**	**v̀h**	**v̀**C

Tones: *clear voice:* **v** [44] **vˀ** [45ʾ] **vh** / **v**C [45]
breathy voice: **v̀** [11] **v̀ˀ** [11ʾ] **v̀h** / **v̀**C [11]

A fifth tone [423] is found exclusively in borrowings from the Nguồn language.

Comparative vocabulary:

	Viet	Sách/Rục		Viet	Sách/Rục
three	*ba*	**pa**44	four	*bốn*	**poːn**45ʾ
zebu	*bò*	**pɔ̀**11	salty	*mặn*	**màn**11ʾ
fish	*cá*	**ka**45ʾ	grass	*cỏ*	**kɔh**45
mother	*mẹ*	**mɛ̀**11ʾ	middle	*giữa*	**ʈɛ̀ah**11
bird	*chim*	**iciːm**44	firewood	*củi*	**kuːlʰ**44
wear out	*mòn*	**mɛ̀ɔŋ**11	tongue	*lưỡi*	**lɛ̀alʰ**11

4. Haudricourt's theory

As was mentioned in the introduction, the origin of Vietnamese tones was clearly explained by André G. Haudricourt (1954). According to the author, *sắc-nặng* tones derive from an ancient final glottal stop, *hỏi-ngã* tones from an ancient final spirant while, by contrast, *ngang-huyền* tones developed within vowel-final contexts. He reconstructed Vietnamese tonogenesis in terms of three stages:

1. Ancient Vietnamese was a toneless language.

2. The final glottal stop **-ʔ** changed into a rising contour. The final spirant **-h** changed into a falling contour. The final -Ø remained at an even pitch. The result was a three-tone system made up of the ancestors of the three pairs, *ngang-huyền* (from -Ø), *sắc-nặng* (from **-ʔ**) and *hỏi-ngã* (from **-h**).

3. The confusion of voiced initial obstruents into voiceless split the three-tone system into two series. The result was a six-tone system.

The same type of explanation can be extended to all VM languages, including those that show a four-tones system with the final **-h** preserved, as well as so-called "register languages".

Chart: Vietnamese tonogenesis according to Haudricourt.

1 (no tone)	2 (3 tones)	3 (6 tones)	nowadays
pa	**pa-**	**pa˗**	*ba*
ba	**ba-**	**pa_**	*bà*
paʔ	**paˊ**	**paˊ**	*bá*
baʔ	**baˊ**	**pa.**	*bạ*
pah	**paˋ**	**paˋ**	*bả*
bah	**baˋ**	**pa˷**	*bã*

But this elegant presentation, while meaningful as an overview, cannot account for some points of VM and Vietnamese tonogenesis. In particular:

• When checking the origin of the three primary tones (through the comparison of Vietnamese with some Mon-Khmer languages), some discrepancies in correspondences come up. William A. Gage (1985) remarked that a final glottal stop **-ʔ** in Mon-Khmer languages can be related with Vietnamese words in *sắc-nặng* (expected correspondences) as well as with *ngang-huyền* (unexpected correspondences). Let us examine correspondences between Khmu, a genetically related neighbouring language, and Vietnamese:

Expected correspondences			Unexpected correspondences		
sɔʔ	*chó*	dog	**kmaʔ**	*mưa*	rain
kaʔ	*cá*	fish	**mpoʔ**	*bao*	to dream
ŋkoʔ	*gạo*	husked rice	**lmboʔ**	*bò*	zebu

It could be argued that an unknown phonetic change took place during the long separation between Khmu and Vietnamese (and VM in general) since the times of Proto-AA. But it will appear in the course of the article that far from being an

anomaly, these two-way correspondences are in fact a result of the first stage of Viet-Muong tonogenesis.

• The existence of *sắc-nặng* tones on rhymes with nasal/lateral endings presupposes an ancient glottalization, a phenomenon which is little represented in such rhymes within the Mon-Khmer family.

• The hypothesized changes of a final glottal stop into a rising contour, and a final spirant into a falling contour, is a pure speculation. It can be inferred from various observations that the two changes are not simultaneous: the final glottal stop shifted before the final spirant did. Within the VM subgrouping, Southern languages (Maleng, Arem, Sắch/Rục and Thavung) have a four-tone system with final **-h** preserved. As far as we know, no language that shifted **-h** before **-ʔ** has ever been observed. In general, at the first stage of laryngeal changes, the constriction derived from **-ʔ** seems to be more significant than the contour that evolves later toward a rising or a falling tone (depending on phonological coercion within the system at the moment of the change). At the second stage, the result of the change of final **-h** tends toward a new constriction instead of the previous glottal stop: a secondary constriction.

5. The hypothesis of a Proto-Austroasiatic creaky voice

Gérard Diffloth (1989) made the hypothesis that Proto-AA had a two-way contrast, *creaky voice* vs *clear voice*, that he reconstructed in Proto-Katuic, Proto-Pearic and Proto-Vietic (= Proto-Viet-Muong). I will examine briefly the cases of Vietnamese and Talan (Katuic) languages, and then analyse the theory.

Vietic: According to Diffloth, in Proto-Vietic there was no final glottal stop **-ʔ**. Vietnamese rhymes in voiced endings with present day *sắc-nặng* tones reflect the earlier creaky voice; those with *ngang-huyền* tones reflect the clear voice. Diffloth's reanalysis allows one to eliminate the problem of the correspondence between these two pairs of tones and final **-ʔ** in Khmu. It also provides a satisfactory answer to the existence of *sắc-nặng* tones with nasal/lateral finals.

Chart: Reflects of the earlier voice contrast *creaky* vs *clear* in Vietnamese.

Register	*clear **[v]**	*creaky **[v́]**		
Finals	voiced finals		stops	*spirant
*voiceless initials	*ngang*	*sắc*	*sắc*	*hỏi*
*voiced initials	*huyền*	*nặng*	*nặng*	*ngã*

Examples:

Proto-Vietic clear voice **[v]**:

vowel	semi-vowel	nasal	lateral (**-l** > *-i/-y*)
mưa "rain"	*tai* "ear"	*con* "son"	*cây* "tree"
bò "zebu"	*ruồi* "fly"	*rừng* "forest"	*về* "return"

Proto-Vietic creaky voice **[v́]**:

chó "dog"	*muối* "salt"	*bốn* "four"	*gối* "knee"
rựa "machete"	*khói* "smoke"	*nặng* "heavy"	*bụi* "dust"

Proto-Vietic final spirants **-h** and **-s** (> **-l^{h}** > *i/y*).

cỏ "grass"	*bảy* "seven"
gỗ "wood"	*mũi* "nose"

***Katuic**:* Within the Katuic group, only two languages, Talan and Ong, a closely related language, attest the phonetic features that led Diffloth to reconstruct a voice contrast (*creaky* vs *clear*) for Proto-Katuic. These features do not exist in any other language of the group.

Chart: Reflects of the early voice contrast *creaky* vs *clear* in Talan.

*Proto finals	**m n ɲ ŋ**	**p t c k**	**Ø w j r l s h**
*creaky voice *short vowels* *all vowels* *long vowels*	**m^{ʔ} n^{ʔ} ɲ^{ʔ} ŋ^{ʔ}** **'m 'n 'ɲ 'ŋ**	**m^{ʔ} n^{ʔ} j^{ʔ} ʔ**	**'Ø 'w 'j 'r 'l 's 'h**
*clear voice	**m n ɲ ŋ**	**p t c k**	**Ø w j r l s h**

In words with final nasals, Diffloth distinguishes what I call here, for the sake of coherence within this paper, a 'strong creakiness' (**-m^{ʔ}**, **-n^{ʔ}**,..), realized at the end of rhymes with

vowels, from a 'weak creakiness' (**-'m**, **-'n**,..), realized on rhymes with long vowels. The two sets are in complementary distribution and the difference is not relevant phonologically. It should be noted that it doesn't exist in Ong.

The most spectacular effect of the earlier creaky voice is the change of **-p -t -c -k** into **-m^{ʔ} -n^{ʔ} -j^{ʔ} -ʔ**.

Clear voice has no effect on finals.

(One may regret that the interaction between creaky voice and the devoicing of initials in Talan has not been investigated yet).

***Pearic**:* The situation in Chong, a Pearic language, is similar to the situation in Katuic.

6. Comments on Diffloth's hypothesis

Let us analyse here the hypothesis concerning a Proto-AA creaky voice:

• One can remark an important difference between on the one hand Vietic, and on the other hand Katuic (and also Pearic). In Vietic, the alleged earlier creakiness has no effect on rhymes in plosives finals (**-p -t -c -k** > viet *-p -t -ch/-c*) while it does have an effect on rhymes in voiced finals through tones *sắc-nặng* (vs *ngang-huyền*). In Katuic, creakiness affects all sorts of rhymes. If creakiness really existed in Proto-AA, it should affect Vietic and Katuic in the same way.

• In the Katuic subgrouping, only Talan and the closely related Ong show effects of the alleged Proto-AA creaky voice. In the Mon-Khmer branch of the AA family (i.e. excluding the Munda branch), only Vietic, Katuic and Pearic show such effects. If a voice contrast *clear* vs *creaky* **[v~v́]** had existed in Proto-AA, it would be hard to imagine that it got lost in most Katuic and AA languages. If it had happened, such an important contrast would have turned into a new contrast to avoid the risk of numerous semantic confusions. Nothing of the sort has been observed in the well known Katuic branch, the vocalism of which has been reliably reconstructed by Diffloth himself (1982), nor in any other AA language.

• Within Pearic, Diffloth showed a very interesting correspondence between a non-glottalized word base and its

glottalized derivate (note: **v** clear, **v'** clear/glott., **v̤** breathy, **v̤'** breathy/glott.).

kʰeːt	"to comb"	**kəneːˀt**	"a comb"
kɐ̤ːp	"roast w. sticks"	**kənɐ̤ːˀp**	"roasting sticks"
pɐ̤ːk	"to laugh"	**kənɐ̤ːˀk**	"a joke"

One can remark that non-glottalized word bases are monosyllabic while correspondent glottalized derivates are sesquisyllabic. This opens the way to solve the problem of the origin of constricted rhymes in Vietic (viet *sắc-nặng*) and the glottalisation/creakiness in Katuic and Pearic. It suggests a relationship between these features and sesquisyllabism.

To sum up, the phonetic features in question can hardly originate from a "Proto-AA creaky voice". I will try to demonstrate that they were generated at a later stage as a consequence of sesquisyllabism, under the influence of the Chinese language of the Han times.

7. The theory of monosyllabization in Ancient Chinese

It may be useful to state here the theory of monosyllabization in Ancient Chinese (Ferlus 1998b), in order to understand the origin of Vietnamese *sắc-nặng* tones and subsequent developments. This phenomenon took place between Old Chinese and Middle Chinese. OC is known through the *Shijing* (Book of Odes), compiled around the Vth century BC. Its rhymes have been reconstructed by William A. Baxter (1992). MC is the stage of the lost *Qieyun* (a rhyming dictionary) completed in 601 A.D. by Lu Fayan and known through the later *Yunjing* (a rhyme table).

The reader of the present paper should note that this theory of monosyllabization in Ancient Chinese has not gained wide acceptance yet in the community of sinologists.

Old Chinese was a disyllabic language. That means that one part of its vocabulary was made up of monosyllabic words, while the other part was made up of disyllabic words, more accurately of the sesquisyllabic type (according to Matisoff's definition). This type is still widely represented in many AA languages of Southeast Asia (Ferlus 1996). A sesquisyllable is a type of disyllable made up of a main syllable preceded by a

presyllable. The main syllable is similar to a monosyllabic word, while the presyllabe is a reduced and unstressed syllable without phonemic vowel. The presyllable can be a morphological prefix as well as a neutral element without any individual meaning.

monosyllable: CV(C)
sesquisyllable: C-CV(C)

In short, OC sesquisyllables *C-CV(C)* developed a tenseness (T). It can be supposed that it was due to the coalescence of the double onset tenseness of the initial cluster *C-C-*. By contrast monosyllables *CV(C)* developed a laxness (L). Then, sesquisyllabic words became monosyllabic by losing their presyllables. Therefore, the former contrast of syllabic type *C-CV(C)* vs *CV(C)* was replaced by a new contrast *tense* vs *lax* (T~L). This phenomenon was associated with a vowel splitting showing vowel lowering in T syllables and vowel rising in L syllables. It is easy to observe these vowel changes when comparing some very interesting reconstructions of OC and MC rhymes, especially those of Baxter (1992). Incidentally, the present theory proves the wellfoundedness of these reconstructions. My hypothesis is that the contrast T~L was generated by the syllabic type, with the ensuing conclusion that MC was a phonation type language.

Later on, at a second stage, after these changes have occurred, the softening of medial **-r-** blurred the situation. It is the stage of MC, characterized by the famous four-division system: the T syllables belong to divisions I/IV (no medial **-r-** in OC) or to division II (medial **-r-** in OC), while the L syllables belong to division III (with or without medial **-r-** in OC) characterized by the famous *yod* of Karlgren's reconstructions (1957).

Old Chinese		Middle Chinese	divisions
C-CV(C) (tenseness)	>	CV(C)/T (v. lowering)	I/IV (– **r**) or II (+ **r**)
CV(C) (laxness)	>	CV(C)/L (v. rising)	III (± **r**)

The important point to remember is the fact that tenseness must have occurred in sesquisyllables *C-CV(C)* and laxness in monosyllables *CV(C)*. This contrast T~L is suspected to have

spread onto some other languages, such as the ancestor of Vietnamese, that were in close contact with Chinese.

Nota: These assertions call for further explanations. Firstly, it should be noticed that before the extensive, structural phenomenon of monosyllabization that affected the whole sesquisyllabic vocabulary took place, a slow and random monosyllabization could have taken place. Secondly, some type of sesquisyllables with soft elements in the initial cluster could have developed a laxness, as monosyllables did.

8. Proposal for a new hypothesis on VM tonogenesis

I claim that the ancestor language of Vietnamese fell under Chinese influence as a consequence of the Han conquest of Ancient Vietnam. I will call this ancient stage "Early PVM", and use the term "Late PVM" for what is usually called PVM. Because of bilingualism, the tenseness of OC sesquisyllables induced a tenseness on Early PVM sesquisyllables. Similarly, the laxness in OC monosyllables induced a laxness on Early PVM monosyllables. In short, the contrast T~L was transferred from OC into Early PVM.

Old Chinese			Early PVM	
C-CV(C)	(tenseness)	*transfered to*	C-CV(C)	(tenseness)
CV(C)	(laxness)	*transfered to*	CV(C)	(laxness)

In historical phonetics one must clearly distinguish the innovation of a phonetic change from its propagation. The innovation occurs in one language, at a precise moment, in a restricted place. It is in general difficult, and indeed often impossible, to locate the cradle of an innovation. The propagation can spread by waves during a very long time on many languages in areal contact. Some changes that occurred in OC more than two millenia ago are now reaching minor languages of Southeast Asia. Another important point is that the effects (in the long run) of the primary phonetic change on the influenced language differ from those that take place in the innovating language.

Here, the innovating language was OC and the influenced language was Early PVM. The effects of the contrast T~L (the primary phonetic change) in OC were mostly vowel splitting

associated with a phenomenon of vowel lowering in T syllables and a vowel rising in L syllables. On the other hand, in Early PVM, the contrast T~L had no effect on vowel height. The tenseness went towards a glottal constriction in certain contexts, giving a marked rhyme, while the laxness remained an unmarked rhyme. The resulting language was Late PVM.

Old Chinese		Early PVM	>	Late PVM
C-CV(C)/T	=	C-CV(C)/T	>	C-CV(C) (glottal constriction)
CV(C)/L	=	CV(C)/L	>	CV(C) (unmarked)

The effects of tenseness on the rhymes of Early PVM sesquisyllables depend on three principal contexts: 1/ rhymes with voiceless endings, plosives (**-p -t -c -k**), fricative (**-s**) and spirant (**-h**); 2/ rhymes with final glottal stop (**-ʔ**) and 3/ rhymes with nasal/lateral endings (**-m -n -ɲ -ŋ -l**). It is commonly agreed that Early PVM is a language without vowel endings. Now, I shall describe those three cases in detail:

1. Tenseness had no effect on Early PVM rhymes that ended with plosives **-p -t -c -k** (> Viet *-p -t -ch/-c*). In Vietnamese, the pair of tones written as *sắc-nặng* are attested in this context. But they are not in contrast with the two other pairs of tones; they are only identified with *sắc-nặng* because of a phonetic likeness of contour.

Tenseness had no effect on rhymes in **-h**, represented in Vietnamese by rhymes in vowel with *hỏi-ngã* tones. It also has no effect on rhymes in **-s**, represented by rhymes ending in *-i/-y* with *hỏi-ngã* tones.

As a consequence, within the context of voiceless finals, there is no means of restituting the syllabic status of Early PVM words.

2. The effects of tenseness on Early PVM rhymes that ended with **-ʔ** are rather problematic and in addition need some further developments. Let us examine successively the two types of correspondences between Khmu and Vietnamese seen above: Khmu **-ʔ** with Viet *sắc-nặng* (expected correspondences) and Khmu **-ʔ** with Viet *ngang-huyền* (unexpected correspondences).

Expected correspondences:

Khmu -ʔ	Viet *sắc-nặng*	
sɔʔ	*chó*	dog
kaʔ	*cá*	fish
taʔ	*đứa*	individual
ʰlaʔ	*lá*	leaf
seʔ	*chấy*	headllouse
buʔ breast	*vú/bú*	breast / to suck breast
pleʔ	*trái*	fruit
bɔʔ wear in a clothe	*bó*	tie in a bundle
sroʔ	*[khoai] sọ*	taro
rŋkoʔ	*gạo*	husked rice
klɲaʔ < **kŏl ɲaʔ**	*nhựa*	resin
klmeʔ < **kŏl meʔ**	*mía*	sugar cane

This first type of correspondence shows a good correlation between Khmu monosyllables ending in **-ʔ** and Vietnamese syllables with *sắc-nặng* tones. The two words **klɲaʔ** "resin" and **klmeʔ** "sugar cane" are apparently sesquisyllabic, but they must be reanalyzed into **kŏl ɲaʔ** and **kŏl meʔ**, in which **kŏl** (Viet *cây*) means "tree". The case of **rŋkoʔ** "husked rice" will be examined later. I presume that the words on this list were monosyllabic in Early PVM like in most cognates in present-day Khmu. By the way, we are here facing again the data that led Haudricourt to formulate his well-known theory on the origin of tones in Vietnamese.

Unexpected correspondences:

Khmu -ʔ	Viet *ngang-huyền*	
kmaʔ	*mưa*	rain
mpoʔ	*(chiêm) bao*	to dream
tmpaʔ	*(con) ba ba*	tortoise (*Trionyx*)
lmboʔ	*bò*	zebu
sɲiʔ	*ngày*	day
cndreʔ	*chày*	pestle
ɟruʔ	*sâu*	deep
ɟriʔ	*si*	banian
meʔ	*mày/mi*	thou/you

Another example involving Arem can be added:

pdoʔ yeast	**dɔ** (in Arem)	Alcohol

On the other hand, this second type of correspondence shows a perfect correlation between Khmu sesquisyllables ending in **-ʔ** and Vietnamese syllables with *ngang-huyền* tones. The explanation of what seems to be abnormal is, in light of the analysis put forward above, very clear: the tenseness that was developed on Early PVM sesquisyllables caused the loss of the final glottal stop, leaving an open syllable in Late PVM. A model for this is provided by the Sedang language, in which a previous glotto-pharyngeal constriction was dropped, bringing about the loss of final plosives and spirants (Gregerson 1976; Sidwell 1998; Smith 1967).

In short, the final glottal stop **-ʔ** was not affected by the laxness of monosyllables from Early PVM to Late PVM, and shifted later into Vietnamese *sắc-nặng* tones. But it was wiped out by the tenseness of Early PVM sesquisyllables, thus creating the new type of open syllable in Late PVM that later rose into Vietnamese *ngang-huyền* tones.

3. The effects of tenseness on Early PVM rhymes of sesquisyllables with finals **-m -n -ɲ -ŋ** (> Viet *-m -n -nh/-ng*) and **-l** (Viet *-i/-y*) are rather simple. It generated (what I suppose to be) a glottal constriction, thus creating a new contrast in Late PVM with unmarked rhymes issued from laxness on Early PVM monosyllables. The glottal constriction shifted into Vietnamese *sắc-nặng* tones contrasting with *ngang-huyền*.

Chart: The effects of T~L contrast from Early to Late PVM

*finals	**p t c k**	**s h**	**ʔ**	**m n ɲ ŋ w j l**
*sesquisyll./T	not affected		**ʔ** > Ø	constriction
*monosyll./L	not affected		**ʔ** unchanged	not affected
Viet. tones	*sắc-nặng*	*hỏi-ngã*	*sắc-nặng ~ ngang-huyền*	*sắc-nặng ~ ngang-huyền*

9. Concluding remarks

It is difficult to find evidence for the hypothesis put forward here. Evidence for the historical relationship between ancient sesquisyllables and *sắc-nặng* tones (contrasting with the

two other pairs) is difficult to etablish. The main reason for this difficulty is that there is a very large scale of time, presumably more than one millenium, between the stage of Early PVM, situated at the beginning of our era, and the crucial stage of the spirantization of medial obtruents (Ferlus 1982), about the XIIth century—a phenomenon that provides us with firm evidence about the sesquisyllabicity of Ancient Vietnamese. The problem is difficult to solve because we do not know accuratly how and when monosyllabisation took place. Four types of situations can illustrate the problem of the two stages where phonetic phenomena involved sesquisyllabism.

• A word as *gáy* "to sing (of rooster)", attested by **tkal**^{3} in Pong, a VM language, gives evidence for sesquisyllabicity at the two stages. The *sắc* tone presupposes a sesquisyllable in Early PVM and the initial *g-* is a result of spirantization that was produced at the medial in sesquisyllable. So, one can restitute the chain of changes: Early PVM **tkal** > Late PVM **tkal**^{ʔ} (tenseness), then in Ancient Viet **tkal**^{ʔ} > **tɣal**^{ʔ} (spirantization) > **ɣal**^{ʔ} (monosyllabization) > modern Viet *gáy*.

• According to my hypothesis, words as *bốn* "four", *tám* "eight" and *chín* "nine" must have been sesquisyllables in Early PVM, but they are monosyllables by the XIIth century. One can note that "eight" and "nine" are attested by sesquisyllables **tmham** and **tmθin** in Mang, a neighbouring Austroasiatic language. On the same way, *chín* "ripe, cooked" and *móng* "finger nail" are attested by the sesquisyllables **psiːn** and **tm^{h}mɔːŋ** in Khmu.

• The word *gươm* "sword" seems to be a counter-example. The initial *g-* proves that this word was a sesquisyllable in Ancient Vietnamese, and it is still attested by **tkɨəm** in Sắch/Rục. But it does not show either of the expected *sắc-nặng* tones! The reason is that it is an ancient borrowing from Chinese, probably introduced after the Early PVM stage.

• At last, let us look at *gạo* "husked rice", that also looks like a counter-example. It can be reconstructed as **rkoʔ** in Early PVM, and is regularly attested by a sesquisyllable in VM languages, Arem **ᵑkɔ**^{ʔ}, Sắch/Rục **tko**^{3}, Thavung **ako**^{3}, even in Khmu **rŋkoʔ**. The initial *g-* is regular in Vietnamese but the

nặng tone is unexpected in an Early PVM sesquisyllable with a final **-ʔ** that would have been dropped at the stage of Late PVM. The explanation is that the presyllabic trill **r-** presents a soft articulation, in comparison with the firm articulation of the following plosive initial **k-**, and in consequence the coalescence of the two units was not sufficient to create a tenseness on the initial cluster.

The difference between Early PVM and Late PVM is of the utmost importance. The changes caused by the intrusion of the contrast T~L into Early PVM are specific of Late PVM and mark the birth of the VM branch. The loss of final glottal stop **-ʔ** in sesquisyllables, but not in monosyllables, between Early PVM and Late PVM, created the condition for the emergence of the first tonal contrast.

Converted into Unicode, in September 2014.

The bibliography has been improved. In particular, we have reinserted the reference <Diffloth 1989, Proto Austroasiatic creaky voice> *that had mysteriously vanished in the Proceedings of the 11th SEALS Conference, 2001.*

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