Why three phonologies for Pacoh?

Richard L. WATSON
Summer Institute of Linguistics

1. Introduction

In four different publications from 1964 to 1980, I described Pacoh[1] vowel phonology somewhat differently. More recently David Thomas[2] mentioned to me that some readers had been troubled by these differences and he suggested that I write an explanation. First, note that all four publications were meant to describe the same dialect of Pacoh. What changed was my understanding of the features involved, part of which reflected my previous study of another dialect. So there were actually five relevant articles, although the first was never published. All five are described below.

2. Pacoh Pahi (Foothill Pacoh) vowels

(unpublished) 24 vowels: (3 rows X 3 columns) X 2 lengths + (2 X 3 glides)

Although I never published my description of Pacoh Pahi, I will start with it in order to show the stages of development in my understanding of Pacoh vowels, as well as an interesting stage in vowel change across dialects. Pahi, which is spoken in the foothills near Vietnamese speakers of Thua Thien province, appeared to have a basic nine vowel system, doubled by short versus long vowels, plus the usual high vowel offglides to schwa (iə, ɯə and uə in Chart 1). In addition, Pahi has an unusual set of high vowel offglides to [ɑ]. I described this set as phonetically [iɑ, ɯɑ, and uɑ], but phonemically as mid vowel offglides /eə, ʏə, oə/. My basis for that was an assumption that an underlying mid quality manifested itself in the lowering of the offglide rather than of the nuclear vowel. It now appears that these were originally the glided counterparts of the high '+RTR' (Retracted Tongue Root) vowels found in the High Pacoh dialect described below. The lowering effect of tongue root retraction has by this analysis been lost in the nuclear vowels, but maintained in the low offglides.

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[1] The Pacoh live in the mountains west of Hue, Vietnam, between the Ta-oih to the West, the Vietnamese to the East, the Katu to the south, and the Bru to the north. *Pacŏh* means 'people of the mountains'. There are three major Pacoh dialects distinguished by their words for 'no', among other things. The Pacoh Pahi say *avaih*, the High Pacoh of the Aluơi valley say *cáh*, and the High Pacoh of the range above Aluoi, extending over into Laos, say *lâyq*.

[2] I am grateful to David Thomas, Kenneth Gregerson and Richard Pittman for their comments.

	Front			Back-unrounded			Back-rounded		
	short	long	glide	short	long	glide	short	long	glide
High:	ĭ	i	iə	ŭ	ɯ	ɯə	ŭ	u	uə
Mid:	ĕ	e	ea	ɤ̆	ɤ	ɤa	ŏ	o	oa
Low:	ĕ	ɛ		ă	a		ŏ	ɔ	

Chart 1. Pacoh-Pahi Vowels (unpublished 1963)

Being in close contact with Vietnamese, the Pahi were gradually adapting to the Vietnamese nine vowel system. But where the 'mid' offglides /eə, ɤə, oə/ should be assigned in the Pahi chart is still in question since they are a transitional relic from the earlier register system. Or is it possible that Pahi still fits the registers of chart 4 except that the high +RTR unglided vowels have merged into their high -RTR counterparts?

Since Pacoh is similar to Bru, it is significant that Phillips, Miller and Miller (1976) presented four alternate analyses of Bru phonology in one article. They report a similar problem with offglides, but more complicated with nearly twice as many. They conclude that Bru has both high and mid offglides in register I (tight) and both high and mid offglides in register II (loose). Both Pahi and Pacoh have only two rows (6 offglides) to cover the same paramenters (high--mid and tense--lax). My memory tells me that the Pahi words with mid offglides matched the Pacoh words with high tense offglides quite closely. However, it would be very interesting to compare them with Bru words containing mid versus high offglides.

3. Pacoh vowel--1964

30 vowels: (4 rows X 3 columns) X 2 lengths + (2 X 3 glides)

In *Pacoh Phonemes* (Watson 1964), I presented thirty vowel 'phonemes', as shown in Chart 2.[3] Notice first that Chart 2 is set up to present a basic twelve vowel system, adding a 'mid-tense' category to the Pahi nine vowel positions. It is this 'mid-tense' category which includes the counterparts of the so-called 'mid' offglides of Pahi.

A review of that 1964 article took exception to my claim of thirty vowels, stating that there were obviously only nine vowels plus a feature 'tense' plus two features of length. This criticism was premature and invalid as it was based on a nine vowel system. Such a feature analysis is relevant only if based on the six vowel register analysis of sections 5 and 6 below.

[3] All of the vowel charts shown in this paper use IPA symbols although I used a Vietnamese based Pacoh orthography earlier. The orthographic symbols are shown in a footnote to section 4 below for those who wish to compare.

	Front			Back-unrounded			Back-rounded		
	short	long	glide	short	long	glide	short	long	glide
High:	ĭ	i	iə	ŭ̆	ɯ	ɯə	ŭ	u	uə
Mid-tense:	ę̆	ę	ęa	ɤ̆	ɤ	ɤa	ǫ̆	ǫ	ǫa
Mid-lax:	ę̆	ę		ɤ̆	ɤ		ǫ̆	ǫ	
Low:	ă	ɛ		ă	a		ɔ̆	ɔ	

Chart 2. High Pacoh Vowels--1964

4. Pacoh vowels--1966

In *Reduplication in Pacoh* (1966) I presented the same chart as that of section 3 above, except that 'mid-tense' was relabeled 'pharyngealized' and 'mid-lax' was simply 'mid' (see Chart 3). This change represented a small progression from the practice of forcing all vowels into a tongue height system to the recognition of a different kind of articulation. However, it still did not recognize the full significance of a difference of phonation to the system, as shown in sections 5 and 6 below.

	Front			Back-unrounded			Back-rounded		
	short	long	glide	short	long	glide	short	long	glide
High:	ĭ	i	iə	ŭ̆	ɯ	ɯə	ŭ	u	uə
Pharyng:	ę̆	ę	ęa	ɤ̆	ɤ	ɤa	ǫ̆	ǫ	ǫa
Mid:	e	e		ɤ̆	ɤ		ŏ	o	
Low:	ă	ɛ		ă	a		ɔ̆	ɔ	

Chart 3. High Pacoh Vowels--1966

5. Pacoh vowels--1979

30 vowels: 2 registers X ([2 rows X 3 columns] X 2 lengths + 3 glides)

The *Pacoh-Vietnamese-English dictionary* (Watson, Watson and Cubuat 1976: viii) contains a brief description of Pacoh vowels. In this case I had reached the stage of seeing the system broken into two subsystems, labeled 'lax' and 'tense', in which the previous high and mid became the high and low of 'lax' while pharyngealized and low became the high and low of 'tense' (see Chart 4). This represented a major breakthrough in my recognition that the Pacoh vowel system is very symmetrical and clearly consists of two parallel sets of high and low vowels. Notice that it is only necessary to mark tongue root retraction on the 'tense' register I vowels as the lax register II vowels are considered 'normal'. The 'tense' vowels are somewhat lower in terms of tongue-height quality, but this is only incidental to the tongue-root retraction discussed in section 6 below.

	Front			Back-unrounded			Back-rounded		
	short	long	glide	short	long	glide	short	long	glide
Lax =	TRA register =			Register II		=	-RTR		
High:	ĭ	i	iə	ŭ	ɯ	ɯə	ŭ	u	uə
Low:	ĕ	e		ŏ	ɤ		ŏ	o	
Tense =	TRR register =			Register I		=	+RTR		
High:	i̯	i̯	i̯a	ŭ̯	ɯ̯	ɯ̯ə	ŭ̯	u̯	u̯ɑ
Low:	e̯	e̯		ŏ̯	ɤ̯		ŏ̯	o̯	

Chart 4. High Pacoh Vowels--1979/80/94

It may be unfortunate that I did not propose an orthography[4] which utilized specially marked high vowel symbols for high tense, rather than mid vowel symbols. However, I was influenced by the phonetic lowering, which increases from front to back, to the extent that the high back tense vowel (*u*) has a tongue height slightly lower than the low back lax vowel (*o*), actually sounding like a tense ɔ. Any future orthography revision should take this better understanding into consideration, whether it opens up better options or not. Using high vowel symbols for both registers would reduce the large number of combinations of *e*'s and *o*'s. On the other hand, it would necessitate the use of more diacritics above or below *i*'s, to which some people would object.

At this point I should note that the terms 'tense', 'lax', 'pharyngealized' or 'laryngealized' all proved to be completely unsatisfactory as they were sometimes used for opposite articulations in other languages. As described by Gregerson (1976:328-41), in Jeh and Halang the 'abnormal, tense, pharyngealized' vowels were the 'hollow, breathy' vowels of their advanced tongue root articulation; whereas those of Sedang, and I can add Pacoh, are the 'creaky, raspy' vowels of a retracted tongue root articulation. In one system tension results from abnormal advancement while in another it results from abnormal retraction (or abnormal enlargement or reduction of the pharyngeal cavity). Looked at in this way, it is clear why vowels found in cognates of the Old Khmer register I may be 'normal' in Jeh and Halang and 'abnormal' in Sedang and Pacoh, while those found in cognates of Old Khmer register II tend to be 'abnormal' in Jeh and Halang but 'normal' in Sedang and Pacoh.

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[4]

	Front			Back-unrounded			Back-rounded		
	short	long	glide	short	long	glide	short	long	glide
High:	ĭ	i	ia	ŭ	ư	ưa	ú	u	ua
Pharyn:	ĕ	ĕ	ea	ŏ	ơ	ơa	ŏ	ŏ	oa
Mid:	ê	ê		ó	ơ		ŏ	ô	
Low:	é	e		á	a		ó	o	

High Pacoh Vowels in proposed orthography--1966

6. Pacoh vowels--1980

My analysis here is basically the same as that of section 5 above, but developed a bit further. In *A Grammar of Two Pacoh Texts* (1980) the two two-level subsystems are labeled 'TRA register' and 'TRR register, as also noted in Chart 4. The explanation for my fourth stage, given in that volume, is quoted below:

> ...In previous descriptions, I have considered the vowel system to have three tongue heights (high, mid, and low) with the addition of a pharyngealized 'tense' category between high and mid. However, the evidence for 'register' in Mon-Khmer languages has become so strong that I am now dividing my description of the Pacoh system into two registers (cf. Gregerson 1976, Huffman 1976,[5] and Ferlus 1980).Vowels which sound 'normal' in Pacoh belong to a tongue-root advance register (hereafter called TRA register).
>
> Vowels which sound 'tense' in Pacoh belong to a tongue-root-retracted register (hereafter called the TRR register) (Watson 1980:79-80).

7. Pacoh vowels--1994

Having shifted to African languages since 1981, I see strong resemblances between the '+ATR (Advanced Tongue Root) versus -ATR' phenomenon of African vowel harmony languages and what I called TRA versus TRR in Pacoh. However, the similarities are not straightforward and there are significant differences as well.

7.1 Tongue-root labeling

First, to refer only to tongue root articulation is an oversimplification since there is always a package of features involved and acousticians, in particular, often do not recognize tongue root as being the most important. For example, compare Ladefoged, Maddieson and Jackson (1987) with Stewart (1967) and Pike (1967). Leoma Gilley (1992) uses the term 'Expanded Pharynx' for Shilluk of Sudan, following Lindau (1979). However, across Africa there is no question of the same general kinds of phonological phenomena--prototypically two sets of 5 vowels[6] in which the +ATR set is 'marked' and 'dominant', i.e. abnormally pronounced and causing -ATR (recessive) vowels in the same word to assimilate to +ATR. This is also called 'cross-height vowel harmony' (cf. Stewart 1971 or Hall and Yokwe 1981). However, in Southeast Asia it seems just as likely for the more abnormal

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[5] In the classification proposed by Huffman (1976:587) Pacoh belongs to:

B. Original voiced: voiceless distinction reflected in the vowels:

3. Register (phonemic vowel register; retention of sub-phonemic differentiation in the stops vis-a-vis register): Kuy, Chaobon, Chong, Bru, Mon.

[6] In many African languages there is no +ATR counterpart for /a/; and in some the vowel system has reduced to seven vowels and the significance of vowel harmony is waning. In most West African languages vowel harmony is restricted to -ATR affixes assimilating to +ATR roots, whereas in eastern Africa vowel harmony may move equally from suffixes to roots (see Kutsch-Lojenga).

vowels to be of the retracted 'creaky' tongue root set as to be of the advanced and 'breathy' set, as noted in the last paragraph of section 5.

For simplicity I prefer to use tongue-root terminology for Pacoh vowel articulation, and since the African ATR labeling order is better known than TRA and TRR, I have switched to that ordering of the abbreviations, as Gregerson did in his 1984 article (if not sooner). However, for languages like Pacoh I prefer +RTR versus -RTR since retraction is more pronounced in opposition to 'normal, lax' vowels. The Pacoh themselves refer to the retracted vowels as *tĕ̂h* 'tight/tense'. If I were describing a Mon-Khmer language with pronounced ATR 'breathy' vowels, such as Halang (Gregerson 1976), I would want to use +ATR versus -ATR. This may be unconventional, but more meaningful. I feel that it could be particularly useful where vowel harmony is involved. For comparative work, however, remember that in Mon-Khmer register I vowels are those that are most retracted, whether labeled +RTR or -ATR (because of historical relationship with voicless initial consonants), while register II vowels are those most advanced, whether labeled +ATR or -RTR. If it is true that Hre of VietNam is 'half-tense' versus 'half-lax', it would seem best to use ATR versus RTR without plus or minus.

Mon-Khmer register does not appear to involve vowel register harmony to the same extent that ATR does in African languages. For example, the pretonic vowels of all four prefix types of Pacoh (Ca, Ci, Cu, CâL/N) can occur with all tonic vowels, of either register. (There may be a slight 'coloring' of the pretonic vowels, which could warrant instrumental testing). In ideophones (Watson 1966) the vowels of both parts of Pacoh complex words tend to belong to the same register, but this is not a case of vowels of one register being changed by vowels of the other. On the other hand, Gregerson (1976:358) reports vowel harmony between the pretonic and tonic vowels of Rengao words, and he quotes Huffman (1967:58-68) as describing a similar vowel harmony effect in Khmer.

7.2 African ATR and Southeast Asian register

With respect to the Southeast Asian phenomenon, Eugenie Henderson (1952) used the term register in her description of Khmer because of the complex of features involved, which is comparable across Mon-Khmer languages. There tends to be a dichotomy in voice quality ranging from breathy to clear to creaky, in pitch ranging from high to mid to low, in voicing of initial consonants, in vowel height between close and open, in vowel gliding between onglided, plain or offglided, and in tension from tense to lax. In some cases there has been a general movement from a distinction between voicing in initial consonants to a distinction in vowel quality and/or pitch. But in Africa I am not aware of any typical relationship between tongue root vowel quality and initial consonant voicing or pitch distinctions, which rather exist simultaneously and function independently. In many African languages there is a historical tendency for systems to reduce from a 9 or 10 vowel harmony pattern to a seven vowel pattern and weakening of harmony. At the same time a few Bantu languages adjacent to Nilo-Saharan languages have moved from seven vowels towards a full nine or ten-vowel harmony system. African vowels tend to be pure without onglides or offglides. Also, the Pacoh system of six plus six contains high central (actually back unrounded) vowels which do not exist in the African five plus five vowel systems. Finally, I am not aware of any grammatical function of register in Mon-Khmer,

whereas African ATR often signals grammatical differences, such as plurality. On the other hand, this may be related to the magnitude sound symbolism as described in Gregerson (1984). In which case, African plurality may be viewed more as an expression of magnitude than of number.

In spite of significant differences between ATR in Africa and register in Southeast Asia, there could be great value in more comparison of the two. For example, in both there are cases of more than a simple dichotomy of features. In Teso-Turkana languages of northeastern Africa the -ATR feature of certain morphemes is found to dominate the normally dominant +ATR feature of nearby morphemes. This bears some similarity to Todrah (Gregerson and Smith 1973) with its three-way division between ATR, normal, and RTR. The complicated features of Dinka of Sudan might bear comparison with the four-way register division reported for Chong (Theraphan 1991 and Edmondson in this volume of *MKS*.)

8. Conclusion

In conclusion, the reasons for my changing descriptions of Pacoh vowels were partly due to my beginning with a dialect which more closely resembled the Vietnamese nine vowel pattern and partly due to training in tongue-height articulation which only gradually gave way to an understanding of tongue-root articulation and phonation types.

More historical-comparative phonological work is needed on the Katuic group in order to understand these similar yet very distinct systems better. For example Ta-oih with 20 vowels (van der Haak 1993) and Ngeq with 24 (Smith 1973) both have final glottalized nasal and liquid consonants, which Pacoh with 30 vowels and Bru with 41 (Miller 1967) do not have. Katu with 21 vowels distinguishes preglottalized from lenis voiced stops. (see Thomas 1967 for a reconstruction of Katuic consanants.)

African ATR or expanded pharynx vowels appear to have a very different history from Southeast Asian vowel 'registers', but there are similarities which seem worthy of comparative study.

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Received: 17 May 1995.

443 Parkview Dr.
Duncanville, TX 75137
USA
e-mail: Dick_Watson@sil.org