VOICE REGISTER THEORY AND THE SPLITTING OF TONAL SYSTEMS

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In Andre Haudricourt's valuable 1961 article, "Two-way and three-way splitting of tonal systems in Far-Eastern languages," there is an impressive presentation of correlations between tone patterns and types of voicing, aspiration and glottalization of initial consonants. It cites earlier work on the subject by Roman Jakobson (1931) and Bernhard Karlgren (1915). His 1965 article added further insights. All of this work is convincing.

Missing from the materials however is a theory to suggest how voice register, accent and contraction may have been involved in the shift from phonemic contrast of initial consonants to tonemic contrasts. In the now appreciable literature on voice register (see especially Henderson 1952, Catford 1964, Ladefoged 1964, Lee 1965, Li 1966, Miller 1967, Pike 1967, Shorto 1967, Stewart 1967, Smith 1968, Egerod 1971, Gregerson 1976, Thurgood 1977, Pittman 1978) there is strong theoretical support for what the authors above (and various others) have done. It sheds light on the presumed mechanisms by which the various tonal developments have come about.

Voice register, in linguistics, is a two-term (more rarely three-term) contrast which is due to the configuration of the vocal tract, especially between the larynx and the mouth, and the harmonics of the air waves passing through this pharyngeal cavity as they are affected by the vocal cords and pharyngeal musculature. A large number of languages in Asia and Africa exploit two principal sets of harmonics (registers) for lexical and grammatical contrasts. A much smaller number, including some in Burma, exploit three.

In applying this theory to Haudricourt's data we begin with an assumption of ancient CVCVC(V) word bases. We also suggest that each syllable of such word bases could be articulated with the harmonics of either the upper or the lower register. The hypothesis goes on to assume that, under the influence of differential syllable stress, some syllables were reduced or lost altogether, but that a distinctive feature of register contrast remained, being realized as a distinctive feature of tone on the remaining syllable(s).

Using a convention of KV (voiceless stop plus vowel) to represent the upper register, and GV (voiced stop plus vowel) to represent the lower register, the total possible combinations of the two registers in CVCVC word bases is eight: KKK, KGK, KGG, KKG, GGG, GKG, GKK, GGK (omitting the V symbols for abbreviation convenience). It turns out,

however, as Benade pointed out in 1960, that the contrast between KGG and KKG is very difficult to maintain, as is the contrast between GKK and GGK. KGG and KKG therefore almost always merge, as do GKK and GGK, leaving only six common combinations.

All fifteen six-box Asian languages charted by Haudricourt fit into this description. The "initials" dimension specified on the left side of each chart represents the first/second register contrast of the initial syllable of each word base. The upper row in each case represents first (upper) register, the lower row represents second (lower) register. The "tones" dimension across the top of each chart represents the three possible sequences of register in an ancient CVCVC word base: A. No register change; B. Single register change; C. Double register change. Cantonese, Po-Pei Chinese, Vietnamese, Shan, Lü, White Tai, Tho, Lungchow Tai, Wu-Ming Chuang, Lai-Ping Chuang, Lung-Sheng Chuang, Chih-Lung Chuang, Western Miao, Central Miao, and Sui-Ngam fit into this pattern.

The fundamental picture can most easily be visualized by an interpretation of Haudricourt"s chart of Sgaw-Karen, based on an assumption of ancient word bases of only two syllables without final consonants: CVCV.

	Upper register, second syllable	Lower register, second syllable
Upper register, first syllable	KK	KG
Lower register, first syllable	GK	GG

Chart 1: Interpretation of Haudricourt's chart of Sgaw-Karen.

The dimensions of the six-box charts can best be visualized as follows:

	A. No register change	B. Single register change	C. Double register change
Upper register first syllable	K K K	K K/G G	K G K
Lower register first syllable	G G G	G K/G K	G K G

Chart 2: Interpretation of Haudricourt's six-box charts. (Read K/G as "K or G")

It is important to point out that the order of entries in the charts is arbitrary. The "single register change" column represents up-glides or down-glides in a tone language. The "double register change" column represents (ideally) "high-low-high" or "low-high-low" configurations. But any transpositions permitted in matrix algebra or topology theory may be possible also in these data. Note, for example, the difference between the Chinese Academy of Sciences chart convention and that followed by Li Fang Kuei (Pittman 1978), and the "accidental inversion" in Haudricourt's 1961 article (1972: 86).

Assuming that an upper register is most often reflected as a high or rising tone, and that a lower register is most often realized as a low or falling tone, the question arises as to why this does not always happen. The answer, of course, is that tones, like segmental phonemes, are subject to modification by phonetic environments and are often permuted by adjacent sound features. They are also subject to "dominance" rules in each language, whereby some influences outrank others. The presence of a "wrong" tone contour in some boxes is therefore not surprising. With adequate data it can be explained.

In response to the question of what Asian language could illustrate this development, I would like to suggest that Cham be considered. As an Austronesian language it has an abundance of CVCVC word bases. At the same time it has register, primary stress, and

loss of contrast features which make it a candidate for becoming a monosyllabic tonal language with four, six, or even more tones.

The most difficult type of language to fit into this hypothesis is the nine-box type represented in Haudricourt's data by Tung. The problem is not insurmountable, however. Either a three-register language or a language with two registers plus register neutralization (a register archifeature) may develop nine tones. The three register options plus the three successive consonant-type options in a CVCVC word base give the nine total possibilities.

	A. No register change	B. Single register change	C. Double register change
Upper register first syllable	K K K	K K/G G	K G K
Mid or archiregister first syllable	N N N	N K/G K/G	N K/G G/K
Lower register first syllable	G G G	G K/G K	G K G

Chart 3. Interpretation of Haudricourt's chart of Tung.

(Read N as "Neutralized" or "No" register syllable.)

The possible contractions whereby a tri-consonantal root may be shortened to a monosyllable are numerous. Here, for example, using

numbers for consonants, and e and o for the first and second syllable vowels respectively, are some of them: CVCVC (1e2o3) may become 12o3, 2o3, 1o, 2o, 1e, 2e, 1e3, 1e2, 12o, 1o3, 1e23.

The theoretical model we propose to account for Haudricourt's data assumes the preservation of a distinctive feature of register realized in a coalesced form with a distinctive feature of register from one other consonant or syllable, in the case of four-tone languages, and from two other consonants or syllables in the case of six, eight, or nine-tone languages. One way to illustrate this is to use symbols a and b for distinctive features of first and second registers respectively. Then the four different possibilities of original disyllabic word bases may be represented as having contracted as follows: CaVCbV > CVab, CaVCaV > CVaa, CbVCbV > CVbb, CbVCaV > CVba.

The six different contraction probabilities of CVCVC word bases are: CaVCaVCa > CVaaa, CbVCbVCb > CVbbb, CaVCbVCa > CVaba, CbVCaVCb > CVbab, CaVCVCbV > CVab, CbVCVCaV > CVba.

The thoughtful reader will realize that no comment has been made about changes of vocalism as a basis for "transphonemicization" (Haudricourt's term), i.e., preservation of contrastive features. The omission was deliberate. Changes of vocalism can and do maintain phonemic contrast, as has been abundantly illustrated elsewhere (e.g. in Indo-European). But such changes were not in focus in

Haudricourt's article and hence are not in this.

Lest differences of terminology in this article and Haudricourt's original be assumed to reflect differences of analysis, I want to disclaim any such intention. In fact his Tone A, Tone B, Tone C terminology can be precisely equated with such expressions as "first, second, third registers". That being the case, it may be asked why this article is being written at all. The answer is that it brings register theory and register languages into the picture, greatly expanding the scope, relevance, and application of Haudricourt's conclusions.

To summarize, then, the hypothesis suggests that words with original CVCVC bases in a number of languages, with primary stress on the final syllable, began to lose contrast in the penultimate and antepenultimate syllables. Since they were register languages, however, and since register can be realized not only in consonantal but also in tonal contrasts, loss of consonantal contrasts due to reduced stress and contraction was compensated for by development of tonal contrasts. The concentration of two, or even three, contrastive features from two or three successive syllables into one set of tone contrasts was no problem, since languages easily accomplish such shifts in the manner and placement of contrast. The theory takes not only

initial and final consonants (syllables) into account, but also medials as well. It is recognized that there are languages (e.g. Kalmyk) with primary stress on initial syllables, in which the process works in reverse, but those languages are not in focus in this paper.

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