THE GREAT TONE SPLIT: DID IT WORK IN TWO OPPOSITE WAYS?

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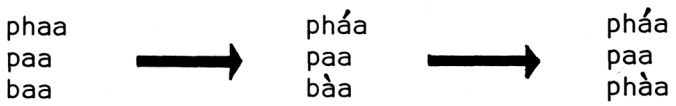
The great tone split was a sound change that swept through China and northern Southeast Asia nearly a thousand years ago. It was probably the 'greatest' sound change we have record of today, for it affected almost all of the words of almost all of the languages of this vast area. (Indeed, it makes the 'great vowel shift' of English, by comparison, seem unworthy of the name.) Simply put, voiced, glottal, and aspirate initial consonants split all existing tones in two (or three) and then partially coalesced, thereby shifting some laryngeal distinctions from initials to tones. A typical example is shown below.

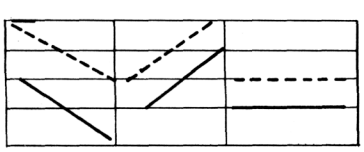


1. How did it happen? Traditional explanation and evidence.

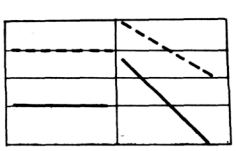
There seems to be complete agreement in the literature on how different consonant types go about splitting tones: voiced initials tend to lower tones and aspirate initials tend to raise them; and the tones with glottal initials get drawn one way or the other (giving two different levels for the old tone) or else stay in between (giving three). We might call this the 'voiced-low, aspirate-high' (or V-L) effect. There are three main types of evidence for this.

1) The tone systems of modern languages. Haudricourt (1972) gives the following two tone systems as perfect examples of the V-L effect. (For easier comparison of relative pitch levels, the modern reflexes of the same ancient tone are shown in the same box of reference lines. Dotted lines show tones from aspirate and glottal initials, and solid lines show tones from voiced initials.)

Cantonese



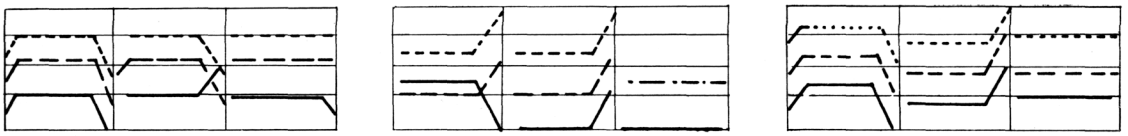
Sgaw-Karen



A slightly less perfect example showing a three-way split is the Nakhon Srithammarat dialect of Southern Thai. A slight reconstruction which makes the example perfect is shown to the right. The Southern Thai dia-

lect of Satun is added in the middle as additional evidence for the reconstruction. Dotted lines show tones from aspirate initials; dashed lines, glottal; and solid lines, voiced.

Nakhon Srithammarat | Satun | Reconstruction



The source for these Southern Thai dialects is my book *From Ancient Thai to Modern Dialects* (hereafter referred to as *AT*).

2) High-Mid-Low terminology in reference to classes of letters. The Thai system of writing was clearly devised to fit a language that had not yet undergone the great tone split, and to give rules for its use with a post-split language like modern Thai it is necessary to classify the consonant letters by their ancient sounds. The traditional terminology for these classes is Low (for ancient voiced consonants), Mid (for ancient glottals), and High (for ancient aspirates).

3) Actual pitches following voiced and aspirate initials in various languages. The lower starting point of tones and intonations following voiced consonants has long been noted. English 'pin' and 'bin' spoken with falling intonation, for example,usually have actual pitch shapes as indicated below.

Erickson (1974b) has made systematic measurements in modern Thai which clearly bear this out. This tendency seems to be so universal, in fact, that some would call it not only natural but even a necessary resultant of the way the larynx works. Matisoff (1973) seems to imply this.

To sum up the evidence, 1) there are some perfect examples of V-L among modern languages, 2) there is at least one case where a language actually uses the word 'low' to name the letters for ancient voiced sounds and 'high' to name the letters for ancient aspirates, and 3) the V-L effect seems to be completely natural. It is, indeed, very convincing, and I am quite prepared to accept it--for Cantonese, Sgaw-Karen, Southern Thai, and for the language of the people who started the High-Mid-Low terminology, that is.

But to apply evidence from some of the languages that underwent the great tone split to all of them is another matter. There is, in fact, considerable evidence that points to precisely the opposite effect in some languages, namely 'voiced-high, aspirate-low' (V-H). And this is what I propose to investigate here.

2. A closer look at the evidence from modern dialects.

a. The direction and limits of 'collapse' or 'erosion'. After Haudricourt (1972) presents the tones of Cantonese and Sgaw-Karen and points out the V-L effect, he says, 'However, once it is established, the tonal system evolves without regard for its old etymological pitch levels', and then proceeds to give about 30 more tonal systems without any comment on their V-L nature.

But 'evolving without regard for old etymological pitch levels' doesn't mean evolving without direction or limit. Everything in the universe has direction and limit: the direction eventually overriding all others is that from order to randomness (increase in entropy[1]) and complete randomness is the limit. Correlations must have reasons--forces that keep them from randomness. If the force is removed, the correlation will immediately start to collapse and approach randomness --but it won't go beyond. If all black cars, and no others, were given licence plates ending in 2, there would be a correlation between licence plate numbers and black color. If this policy were then discontinued, the percentage of black cars having licence plates ending in 2 would decrease from 100 percent to 10 (randomness or zero correlation), and there it would stop. It couldn't continue on down to 9, 8, 7, etc. (The direction down from 10 percent would be 'uphill' towards the opposite correlation.) Similarly, if the great tone split produced 100 percent V-L tones (as with Cantonese), this correlation would eventually wear down to 50 percent V-L (randomness or zero correlation), and there it would stop. Except for an occasional dialect, it couldn't 'wear down' to 25 percent. (The direction down from 50 percent would, again, be 'uphill' towards the opposite correlation.) And if we found whole branches of dialects with 25 percent V-L, we couldn't explain this as the wearing down, 'erosion', or 'collapse' of a V-L correlation.

b. Measuring degrees of V-L and V-H. The meaning of 100 percent V-L seems clear enough for Cantonese, but what does it mean to say that Standard Thai is 83 percent V-H? Or that the Northern Thai *Branch* is 79 percent V-H? A few special symbols are needed to see exactly what is to be compared with what and how these comparisons are to be interpreted in percentages.

I will use 0, 1, and 2 for the three ancient tones (for 'unmarked', máy ʔèek, and máy thoo, respectively, in Thai writing) and V and A for ancient voiced and aspirate initials.[2] A combination like V1 will then mean the *modern tone* in syllables that had *ancient* voiced initials and the *ancient* 'number 1' tone. Relevant tonal comparisons will be shown as below.

V0 ˅ A0 means that the V0 tone is lower than the A0 tone and is thus evidence for V-L.

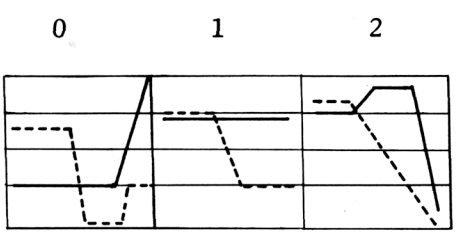
V1 ˄ A1 means that the V1 tone is higher than the A1 tone and is thus evidence for V-H.

V2 = A2 means that the V2 tone has the same level as the A2 tone (or that the two tones aren't comparable) and is thus evidence for neither V-L nor V-H.

If the three tonal pairs in a language were as shown in this example, then it would be 50 percent V-L and 50 percent V-H, since one of the three pairs shows V-L, one shows V-H, and one shows neither. All possible combinations together with their V-L and V-H percentages are shown below. (2V ˅ A, for example, means that any two V tones are lower than their corresponding A tones.)

V-L percentage				V-H percentage
100	3V ˅ A			0
83	2V ˅ A	1V = A		17
67	2V ˅ A		1V ˄ A	33
67	1V ˅ A	2V = A		33
50	1V ˅ A	1V = A	1V ˄ A	50
50		3V = A		50
33	1V ˅ A		2V ˄ A	67
33		2V = A	1V ˄ A	67
17		1V = A	2V ˄ A	83
0			3V ˄ A	100

The problem here, of course, is how do we tell which tone of a pair is higher. With Cantonese and Nakhon Srithammarat, the answer is obvious; but consider the hypothetical language shown below. A tones are dotted and V tones solid.



We might decide to compare the starting points since the relevant conditioning factor was the initial consonants. Or we might compare the

area under the two curves since this sums up the pitch height at every point and thereby gives an overall comparison. The former method would give 83 percent *V-L* and the latter 83 percent *V-H* (the area under the two curves in the '0' tones is about the same). Or, to avoid such situations (where one's definitions can change a language from one extreme to another), it might be better to consider such non-comparable cases as equal, or not to consider them at all. This is almost the same as combining the first two methods; that is, V-H or V-L would mean that *both* methods show V-H or V-L, and all cases where the two methods didn't agree would be called equal. I will use all three methods (starting points, areas, and both) and present the results of each to give an indication of how much our definitions might be distorting the facts.

The next big problem is how do we average percentages of different dialects, for it is the *average* of members of a group that can't go beyond certain limits: isolated cases can reach any extreme. If we happen to have nine varieties of a group showing one tendency and only one variety of a group showing the other, a straight average of the ten will only reflect our skewed sampling--not the facts. But if we try to take care of this by giving each 'dialect' equal weight (regardless of the number of 'specimens' we happen to have), we would immediately fact the insoluble problem of defining 'specimens', 'dialects', and 'groups'. And we would still have the possibility of skewed sampling since a single (possibly quite untypical) specimen could be given the weight of an entire group. I will average both by unweighted specimen-types[3] and by equally weighted groups and present the two results as another partial check on the validity of the methods used.

A third problem is how do we interpret the different kinds of descriptions given by different sources. If someone describes the AO tone of a dialect as simply 'rising' and the VO tone as 'mid', how can we compare their starting points? Or the area under their tone curves? And even if the relative heights are clearly shown, we might get quite different results from two different people describing the same dialect. I will meet this problem by using a single source--and one that attempts to show relative tone heights throughout their lengths. This source is my own book (*AT*).

The chart on the next page shows the different V-H percentages (starting point comparisons, area comparisons, and both) for each specimen-type of the Shan, Phuan, Northern Thai, Central Thai, Lao, and Phu Thai groups. These three percentages are averaged in two different ways (by specimen-types and by groups) giving six final overall measurements of the V-H magnitude.

It is immediately seen that no matter how we measure or average, the message comes through loud and clear: in certain groups of Thai dialects there is a definite V-H correlation. The single exception, the Luang Prabang group of Lao, is statistically overwhelmed by the other Lao groups. But more important, its special V-L developments from earlier V-H are quite transparent (see section d below).

V-H PERCENTAGES FOR SIX BRANCHES OF THAI DIALECTS

	Start	Area	Both	Sub-Groups			Main Branches		
Chiang Rai Shan	100	100	100						
SHAN							100	100	100
Chiang Rai	100	83	83						
Phrae, Nan	83	50	67						
Lampang	100	67	83						
Chiang Mai	83	100	83						
NORTHERN THAI							92	75	79
Ban Mi Phuan	67	67	67						
PHUAN							67	67	67
U Thong	50	67	67						
Bangkok	83	83	67						
CENTRAL THAI							67	75	67
Phu Thai	83	83	83						
PHU THAI							83	83	83
Luang Prabang	17	17	17						
Kaen Thao	50	50	50						
Dan Sai	17	50	33						
Loei	17	50	33						
LP Sub-group				25	42	33			
Thurakhom	83	83	83						
Vientiane	83	83	83						
Lom Sak	83	83	83						
Khon Sawan	67	67	67						
Chaiyaphum	83	83	83						
Nong Khai	83	83	83						
Roi-et, etc.	67	67	67						
Ubon, etc.	83	83	83						
Bua Yai	83	83	83						
Khon Kaen	83	83	83						
Udon	83	83	83						
Phanom Phrai	83	83	83						
Si Saket, etc.	83	83	83						
Vt Sub-group				81	81	81			
Yo	100	83	83						
Khorat	100	100	100						
Yo Sub-group				100	92	92			
LAO							69	71	69
AVERAGES	75	75	74				79	79	77

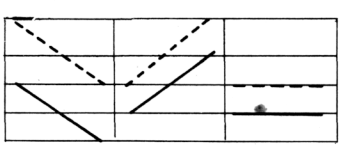
The Southern Thai dialects don't need to be listed separately. The thirteen specimen-types in *AT* have developed in quite different ways from each other, but no matter how we measure them, they show 100 percent V-L throughout. Tak Bai is treated as a case by itself. The main reason it was classed as a distant member of Southern Thai in the first place was its V-L characteristic, so for present purposes it must be set apart. Note that the percentages given below are V-L, not V-H as in the main chart.

Southern Thai	100	100	100
Tak Bai	83	67	83

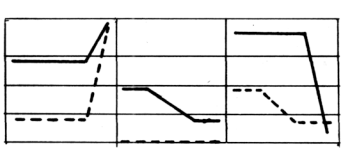
c. Conclusions. Some groups of Thai dialects show definite V-H correlations, and at least one shows an even more definite V-L. How can we explain this? As stated in 2a above, we can hardly explain the V-H correlation as original V-L plus erosion (changes unrelated to the original conditioning factors). But what about V-L plus some force *indirectly* related to the original conditioning factors? (Notice that *directly* related factors are impossible after the split since the conditioning factors have then disappeared with changes like b > ph and hm > m.) Matisoff (1973) mentions tonal flip-flops: '... a phenomenon ... whereby a high tone and a low tone abruptly switch places.' But if an original V-L split plus flip-flops were to explain the modern V-H figures, it would not be enough just to show that flip-flops were possible or even common. They would have to have happened much more often than not; in fact, they would have had to be almost mandatory. Of course, the present situation could be explained by as few as three flip-flops: the parent of all V-H groups could have flipped all three of its tonal pairs. But such far-fetched coincidences aren't necessary. We can go back a step further and say that a single flip occurred before the split. A flip in the conditioning factors. In other words, a V-H split. I think that the inescapable conclusion is that some languages or branches underwent a V-L split and others a V-H.

Now I realize that there are some important things that the figures given above don't show. None of the ways of comparing tonal pairs, for example, considers tone contours. The beauty of the Cantonese evidence for V-L is not just that each V tone is lower than the corresponding A tone, but that they are otherwise identical. Compare Cantonese with Chiang Rai Shan, the best of the V-H dialects in *AT*, and Khorat, another 100 percent V-H dialect.

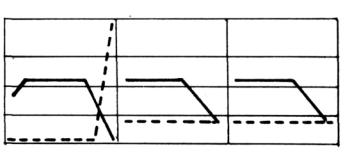
Cantonese



Chiang Rai Shan

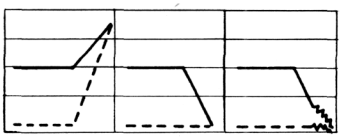


Khorat



The Cantonese evidence is a lot more convincing, but Khorat would get the same 100 percent weighting in any comparison. And this extra-neatness, which doesn't show up in the statistics, abounds in V-L types. The 'neatest' V-H dialect I have found is Wang Thong,[4] an island of Northern Thai in Central Thai area (Pisanuloke province). But its neatness is of a different type to the typical V-L dialect where L means 'lowered throughout'. For Wang Thong's V-H, H means 'raised head only' (the tail remains unchanged).

Wang Thong



I think the answer to the extra neatness of the V-L dialects lies in the time of the split. In *AT*, I put the time of the V-H split before 950 AD and that of the V-L split as after 1250. There could have been two 'great tone splits' separated by over 400 years. The evidence for the V-H split (having gone through 400 more years of erosion) would be much less distinct. And even in isolated cases where it might have remained relatively unchanged (Wang Thong?), it might reveal quite a different mechanism of tone height change.

d. Explaining the exceptions in the V-H branches. When reconstructing parent languages, it is my opinion that explainability should take precedence over similarity. That is, a reconstruction such that modern languages can be logically explained as developments from it is better than one much more similar to all modern languages but without possible explanations for their developments. The best solution, of course, is one that has both similarity and explainability. A parent that underwent a V-H split would be far more similar to the six branches with predominantly V-H characteristics being considered here than one which underwent a V-L split, but the real test lies in the explaining. This section offers explanations for the 25 percent non V-H instances in these six branches. But first a note on the dynamics of tone change and the kinds of 'explanations' we can expect.

As with the dynamics of sound change in general, tone changes result from an imbalance in the two forces that normally hold phonemes in place: 1) the principle of least effort, and 2) the need to maintain distinctions. These forces work simultaneously on the various tonal components like register and contour. I will refer to 'least effort' working on register as 'gravity'. Any tone will tend to gravitate to the most natural height for its contour unless it is held away by an opposition. The most natural height for a level tone is mid; a falling tone, mid-high; and a rising tone, mid-low. Tones with similar contours (like VO and A1 in Bangkok--notice they don't have to belong to

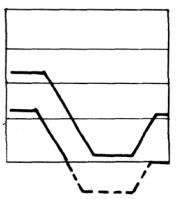
an original tone split opposition) will 'repel' each other like similar electrical charges. One tone may thus be said to 'hold' another one down or 'push' it up. If a tone that has been holding a similar tone down changes contour, it can be said to 'release' the other or 'let' it move up. This is as far as we need go for present purposes; reasons for contour changes won't be discussed at all.[5]

Now on with the explanations for the 25 percent non V-H cases. There are five main types.

1) The 'number 1' tones in Northern Thai. In some dialects of Northern Thai, V1 and A1 start at about the same level, and A1 subtends more area (and is thus higher overall). The explanation is this. In Chiang Mai, VO is level and V2 is humped (both as in Bangkok), whereas in Chiang Rai, Phrae, Nan, and Lampang, VO is rising and V2 is falling. The different effects on the 'number 1' tones are considerable. In Chiang Mai, the level VO has *kept* A1 down and the humped V2 has *let* V1 move up. In the other dialects, the rising VO has *let* A1 move up and the falling V2 has *kept* V1 down. Hence the V-L appearance of the 'number 1' tones in all but Chiang Mai.

2) The 'number 2' tones in Central Thai, Chiang Mai, and Phuan. Bangkok is a typical example of this. My curves (in *AT*) for the two tones (based on ear impressions) show the starting points equal and the area under the V2 (high) tone greater. Abramson's (1962) curves (based on mechanical measurements) show the A2 (falling) tone starting higher but having slightly less area. The comparison is not clearly V-H or V-L, and an explanation is needed. It is easy: V2 changed contour (from fall to hump) and let A2 move up.[6] This appears to have happened quite recently in Bangkok. Bradley's curves (based on mechanical measurements) of 1916 show the A2-V1 (falling) tone starting below the mid tone.[7]

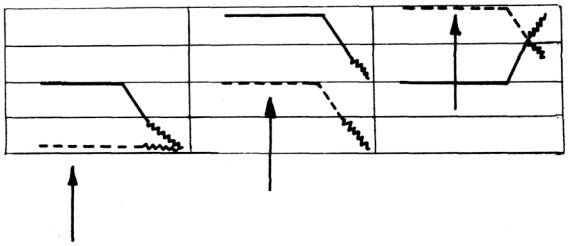
3) The 'O' tones in U Thong of Central Thai and the Luang Prabang branch of Lao. The falling-rising AO tone starts higher and subtends more area than the VO tone. The answer lies in the special nature of this contour. Even though it starts above mid, it is still the lowest possible register for the contour (anything lower would have to go below the range of the voice, as shown below.



Furthermore, wherever this contour occurs, there are nearby dialects that have *low*-rising instead. This is clearly a case of a fault in our methods of measuring height, and it suggests a more realistic method (but one difficult to apply). It is this. The lowest possible registers

of all contours should be called equally low, the highest equally high, and so with all steps in between.

4) The 'number 2' tones in the Luang Prabang branch of Lao. A2 is high with a slight creaky fall, and V2 is mid with a slight creaky rise. This is not so easily explained. I called it a case of 'breaking' in *AT* (like the iy > ay change of the great vowel shift of English) with a sequence of changes as shown below.



The first stage is what is found in most of Lao; the second stage is found in the Vientiane-Lom Sak sub-group of the Vientiane branch; and the third stage is the Luang Prabang exception being explained here. The pressure to move up (the source of this pressure is not clear) simply continues until the V2 tone cannot go any higher and 'breaks'. (This might be a case of Matisoff's flip-flops mentioned above.) An alternative to this explanation, of course, is to take this as a direct result of a V-L parent and explain practically everything else in the six branches as flips and breaks.

5) The 'number 1' tones in Lao. The 'number 1' tones of Roi-et and Khon Sawan provide an absolutely perfect instance of V-L. It is as good as anything in Cantonese, Sgaw-Karen, or Southern Thai. The two tones have identical level contours with A1 being higher. In all other Lao dialects except Yo (where V1 is higher than A1), the two tones have fallen together to a mid-level tone. In *AT* I treated this as a case of tones with different contours 'passing' each other. No mysterious flip-flop or break is needed. A falling V1 is pushed down by a higher falling V2 while a level A1 is pushed up by a lower level A2. Then V1, having passed A1, becomes level and resumes opposition to A1. Such contrived passing to explain a clear case of V-L as coming from an original V-H might appear to be the weakest step in defending the V-H theory, but it turns out to be quite the opposite. For the one and only case of passing and resuming opposition coincides exactly with the one and only case of a fall-together of A and V tones of the same pair. Of all the Lao dialects, only Roi-et and Khon Sawan survived this hazardous passage. Compare this with the explanations that would be needed for a V-L parent. Breaks, passes, and flip-flops would be the rule--and all without casualties. And yet in precisely the one case where no movement of any kind was necessary, an unheard-of fall-together would have occurred. As stated above, the proof lies in the explaining.

3. The High-Mid-Low terminology.

Section 2 was an answer to the first type of V-L evidence mentioned in section 1. This section will answer the second type, and the next section will answer the third.

The High-Mid-Low terminology would require no explanation, of course, if it were used by one of the V-L languages. But it is used by Central Thai, which I claim to be V-H. Why would a V-H language use V-L terminology (that is, call low consonants 'high' and high consonants 'low')? I attempted to answer this question in a 1966 article entitled 'The Language of Sukhothai: Where did it come from? And where did it go?' Briefly, the answer is this.

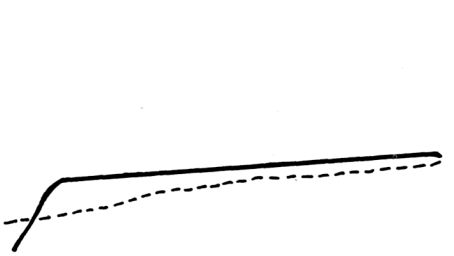
The present Thai writing system was first designed for the language of Sukhothai in about 1250 AD (before it had undergone the great tone split). Sukhothai teachers later (after 1350, maybe as late as 1500) taught Ayuthaya speakers to write the Ayuthaya dialect with Sukhothai writing. By this time, Sukhothai was in the process of (or had recently undergone) a V-L tone split. The rules for writing Ayuthaya tones with Sukhothai tone markers were complex: a given marker sometimes meant one tone and sometimes another. The determining factor was the 'class' of the initial consonant, and the three classes needed names. For the Sukhothai teacher, the names High, Mid, and Low were natural, since for him 'high' initials had high allophones of all three tones, 'mid' had mid, and 'low' had low. For the Ayuthaya student, on the other hand, these names were just meaningless labels (as they are for us today). It is interesting to note that Sukhothai speakers would probably never have named (or even noticed) the consonant classes if they hadn't had to teach their script to speakers of a V-H language. There would have been no need. (I take Sukhothai, by the way, to be the parent of Southern Thai.)

4. The physiological evidence.

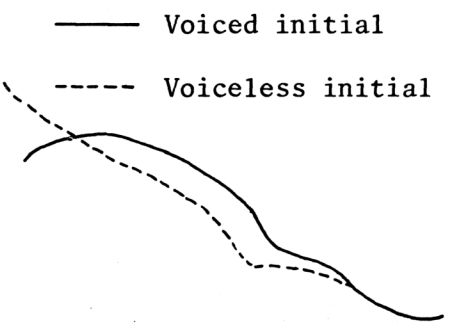
We usually expect sound changes to make physiological sense: kaki > kachi makes sense, but kaki > chaki doesn't. And while we don't usually feel obligated to say why ki changes to chi in one language and not in another, it would be very satisfying if we could. Actually, there are usually three stages in sound changes where we might expect to find reasons, and I will speculate below not only on 1) the physiological sense of both V-L and V-H (the pre-conditions that set them off), but also on 2) why different allophones develop in a given time and place in both V-H and V-L ways, and 3) why these allophones become phonemic. But first a point on listening strategies and focus.

The hearing process is a repeated scanning of a stretch of speech held briefly in the mind. The scanning is repeated until the hearer gets as much information as he needs and then abruptly stops: we hear what we need and no more.[8] Different overall phonological dynamics will favor different strategies of listening, with different optimal points of initial focus. In the reasoning below it will be assumed that syllable center focus led to V-H developments, and focus on the point where the vowel begins led to V-L.

1) What were the physiological pre-conditions for both V-L and V-H? I think the answer is suggested by careful comparisons of the pitch in syllables beginning with voiced and voiceless consonants. An example from Erickson's (1974a) article on tone shapes in Thai is shown below left, and one from Lea's (1973) article on intonations in English is shown below right. (Lea's separate pitch contours for syllables with voiced and voiceless initials have been superimposed for ease of comparisons.) Both Erickson and Lea call attention to the initial *rise* effect from voiced consonants, and Lea mentions the higher *beginning* and *peak* following voiceless consonants and even refers to a higher *average* in an earlier work (House and Fairbanks, 1953). But neither of them mention the fact that the pitch in the syllables beginning with voiced consonants is higher throughout most of the syllable. And yet it clearly is in all three of Erickson's examples and in Lea's 'general' or 'typical' contours taken from hundreds of examples.[9]



Thai High tone
(from Erickson)



English falling intonation
(from Lea)

The 'natural' thing in all languages which was mentioned in section 1 is simply for the pitch of the voiced consonant to *be lower* than that of the vowel--not for the consonant to *lower* the pitch of the vowel, as commonly assumed. One laryngeal signal is sent for the consonant and another for the vowel (that is, the tone). The tone signal is such as to *produce* the desired pitch regardless of environmental factors, and in order to make the overall phonetic smear of the consonant-plus-vowel pitch sound right, the pitch on the vowel must be a little higher after a voiced consonant.[10] The natural working of the larynx in any synchronic description is thus for tones or intonations in syllables with voiced initials to *start* lower but *be* higher. The former could be the pre-condition for V-L and the latter for V-H.

2) How do these pre-conditions bring about noticeably different allophones.[11] And why? The *speaker*, of course, doesn't notice the 'being higher'; for his whole goal is to make the V tones sound *the same* as the A tones. But if the *hearer* narrows his focus down to syllable center, he might catch the 'being higher' and not the 'averaging out'. If he tries, now, to imitate this 'being higher' in his own speech, he will have to go one step higher; for the first step higher

in his own speech sounds (really 'feels'--the feedback is not by ear) *the same* to him, and now he wants to sound *higher*. The next person imitating him, in turn, will have to go one step higher still. And thus the separation in allophones gradually develops. (For the development of V-L allophones, the reader can substitute the different point of focus and follow through the same line of reasoning.) The 'how' is thus the difference between speaker's feedback and hearer's focus. And the 'why' is the nature of the focus (brought on by overall phonological dynamics) plus various aspects of fashion and prestige.

3) Why did the pitch allophones become phonemic? The listening strategy for speakers of V-H languages, now, is to start at the center of a syllable and work out; and for V-L speakers, it is to start at the point where the vowel begins and work out. For both types, after the tonal allophones have developed, the listener gets all the laryngeal information he needs about initials before he gets to them. He thus doesn't bother to listen for the laryngeal components of initial consonants, and new generations don't learn them. The marked (more energy-consuming) components (voiced for obstruents and aspirated for sonorants) are thus lost, and the tone allophones become phonemic.

I repeat that this whole section is sheer speculation. If it is to stand up, it must also explain things that it wasn't designed to explain. I offer one such point. If V-L languages had an earlier point of focus than V-H languages, we would expect them to better preserve initial consonant distinctions than V-H languages, but not finals. And this is the case: Southern Thai keeps initial consonant clusters far better than any of the other six branches, and it is the only branch that has begun to lose a final (final k is changing to ? in some Southern dialects).

Summary.

The evidence from modern Thai dialects points to two opposite kinds of tone splits: voiced initials lead to low tones (V-L) in one kind, and to high tones (V-H) in the other. Both developments can be 'explained' by control phonology (see note 10). And the ill-fitting High-Mid-Low terminology in Thai is simply a case of a V-H dialect borrowing a writing system from a V-L one.

NOTES

[1] The only thing mysterious about this process (increase in entropy) is its naming: an *esoteric* word is applied to a *negative* concept (*un*available energy or *dis*order). The process itself is as intuitively natural as it is universally prevalent. It is easy to imagine a very intricately designed building collapsing into an orderless heap. This is the natural direction from order to disorder. But try to imagine the reverse: the matter in the heap

spontaneously organizing itself into a building with all its 'carefully planned' intricacies, as in a moving picture of the collapse run backward! There are many common, everyday words like 'collapse', 'erosion', and 'decay' that suggest the direction of entropy increase, and we can do without 'entropy' here. I mention it only as an indication that I'm not making up my own principles as I go along.

2 For those readers who know the Thai writing system, L (for 'low' consonants) instead of V, and H (for 'high' consonants) instead of A, as used in *AT*, would be much easier to handle. But in the present context, there would be too much confusion, since whether 'high' and 'low' consonants have high or low tones is the whole point. I will completely disregard glottal initials ('mid' consonants of Thai writing). This will in no way affect any of the arguments and will provide for considerable simplification.

3 This refers to specimens that are similar enough to each other to have been given a single chart in *AT*.

4 I got this data from a single brief encounter with a speaker of the dialect, and it isn't completely certain.

5 Here is an example of this loose use of 'tonal dynamics'. While passing through Rayong (a province in the Central Thai dialect area), I first heard a mid-rising VO tone. I predicted that A1 would be mid (without a level VO to hold it down it would have gravitated to mid). I was right. I next heard a high-falling V2 tone and predicted that the A2-V1 tone would be mid-falling (the high-falling V2 would have kept it from gravitating up as it had done in Bangkok). I didn't catch an example to confirm this prediction, but I feel confident enough to go on record here with the prediction.

6 In Central Thai, of course, V1 had long since fallen together with A2. Both of these tones had probably been mid-falling with tone-ending (plain vs. creaky) as the main opposition. It isn't clear what forces overcame this opposition.

7 McFarland (1944) on page x gives the tone shapes as reported by Cornelius B. Bradley in the University of California Publication in American Archeaeology, Vol. 12, No. 5, 1916.

8 Compare this with an expert sound spectrogram reader whose only purpose is to get the meaning from the spectrograms. He surely won't run a spectrogram all the way to the top frequencies if he has long since got the message. He would surely stop at the very instant he understood what was said and proceed on to the next spectrogram.

9 If it should turn out that these examples from Erickson and Lea are not typical of all languages, I would still keep the same reasoning and say that in some languages such a situation could easily develop

(as I had been saying before I saw these two studies).

10 This is my own phonological theory, which might be called 'control phonology', whereby commands and behavior operate in a closed feedback loop. It is partially presented in the first section of *AT* and in an unpublished paper of 1965 entitled 'Phonemics without Sounds'. For the general psychological theory involved, see Powers (1973).

11 The 'starting lower' and 'being higher' stage shown in the Erickson and Lea examples above is not a case of 'clearly different allophones'. Such differences are not normally heard at all.

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