FO BEHAVIOR OF VOWELS INFLUENCED BY ASPIRATED AND UNASPIRATED INITIALS IN SOUTHEAST ASIAN LANGUAGES : IMPLICATIONS FOR TONOGENESIS THEORIES

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1. Introduction[1]

How voicing and aspiration associated with certain speech sounds are produced has been a subject of considerable interest for over 2,500 years (Dixit 1987: 77). Consonantal perturbations of Fo associated with obstruents have been well attested in many languages (Hombert et al 1979: 38) but previous work has concentrated mostly on the effect of voiced versus voiceless intials on Fo values. However, the correlation between aspiration and fundamental frequency has not been investigated seriously. Though linguists had put some remarks on the connection between aspirated initials and tones the picture is somewhat confused. In some languages aspirated initial is related to higher tone whereas in other languages aspirated initial is related to lower tone. For example, in Lungchow aspiration has a lowering effect (Li, 1977: 21) where as in Southern Thai aspiration seems to be associated with a high tone. For "Wu Chiang" Chinese (Ho 1976, Ballard 1975 cited in Hombert 1978) it is found that aspiration is related to a low tone: on the contrary, aspiration is associated with a high tone in Saek (Sarawit 1973 cited in Hombert 1978). According to the confused patterns of a correlation between aspirated initials and tones, no plausible explanation for such inconsistency can be stated.

On experimental basis, Hombert and Ladefoged (1976, cited in Henderson, 1982) have set up experiments to test the effect of aspiration on Fo of following vowels but could find no appreciable differences between the effect of voiceless aspirated stops compared with voiceless unaspirated stops. Consequently, Hombert comes to the conclusion that,

We cannot make a prediction based on phonetic data as to which series will give rise to a relatively high tone.

As I myself have been working with Southeast Asian minority languages for several years and many languages I worked with have a nice contrastive set of aspirated and unaspirated stops in their inventory, I really want to know how aspirated and unaspirated initial stops in those Southeast Asian languages, particularly the non-tonal ones, reflect their effect on Fo values of following vowels. In addition, I also want to see if the perturbation patterns obtaining from the measurements will shed some light on tonogenesis.

In order to get a clearer picture of Fo behavior resulting from the effect of aspirated and unaspirated stops, acoustical measurements of Fo in several Southeast Asian non-tonal languages have been conducted.

2. Procedure

In this study, the languages chosen as sources of the data are 6 Southeast Asian non-tonal languages: Bru, Khmu, Mon, So, Lavue and Moken. Five subjects from each language participated in the study. The wordlist in each language consisted of 4 real word tokens. The wordlists for this study will be shown below.

Bru:

/paːy/	'coil, ring'	vs	/phɔːy/	'broom'
/tɒːn/	'piece'	vs	/thɒːn/	'to give change (money)'

Khmu:

/tɔːk/	'to roof'	vs	/thɔːk/	'to pick up'
/pɔːk/	'to roast'	vs	/phaːk/	'to deposit'

Mon:

/tɔː/	'handle'	vs	/thɔː/	'gold'
/tạːt/	'to pat'	vs	/thạːt/	'element'

So:

/tɔː/	'to continue'	vs	/thɛː/	'to shave'
/pɔːt/	'to hold in the hand'	vs	/phɔːt/	'to release'

Lavue:

/kam/ 'husk of rice vs /(phui) kham/ 'bullet resistant'
/tɔ:/ 'run, run away' vs /thɔ:/ 'a kind of basket'

Moken :

/tipa: / 'water dipper' vs /kapha:/ 'orphan'
/pa:t/ 'four' vs /pha:k/. 'wet'

Each token was spoken as a word in isolation after the reading of its meaning in Thai by the author. Each speaker recorded 4 repetitions of the token sets. Fo was measured using the pitch tracking program in WinCECIL, a speech analysis produced by the Summer Institute of Linguistics (SIL). Measurements were made at the starting point of each Fo curve (point S) and measured into the Fo curve for 100 ms^2 at 50 ms intervals, i.e., at S+50 and S+100. The normalized Fo contours indicating the mean Fo values of the vowels following aspirated and unaspirated initials were plotted. Microsoft Excel was used for averaging and plotting the average Fo contours.

3. Results and Discussion

The results of the acoustical measurements of Fo contours as influenced by aspirated and unaspirated initial stops in the 6 SEA non-tonal languages will be illustrated in table 1 and figures 1-7 below.

LGS.	INITIALS	Fo VALUES	Fo CONTOUR
MOKEN	p-VS ph-	p> ph	p=*F*; ph=*R*
LAVUE	k-VS kh-	k>kh	k=*FR* ;kh=*F*
KHMU	k-VS kh-	k>kh	k &kh=*FR*
	t-VS th-	th>t	t &th=*FR*
SO	p-VS ph-	ph>p	p &ph=*FR*
MON	t-VS th-	th>t	t=*RF*;th=*F*
BRU	ph-VS p-	p> ph	p=*R*;ph=*F*

Table 1 Fo Behavior of Vowels Influenced by Aspirated and Unaspirated Initials in Southeast Asian Languages **(F** = falling **R** = rising **FR** = falling-rising**)**

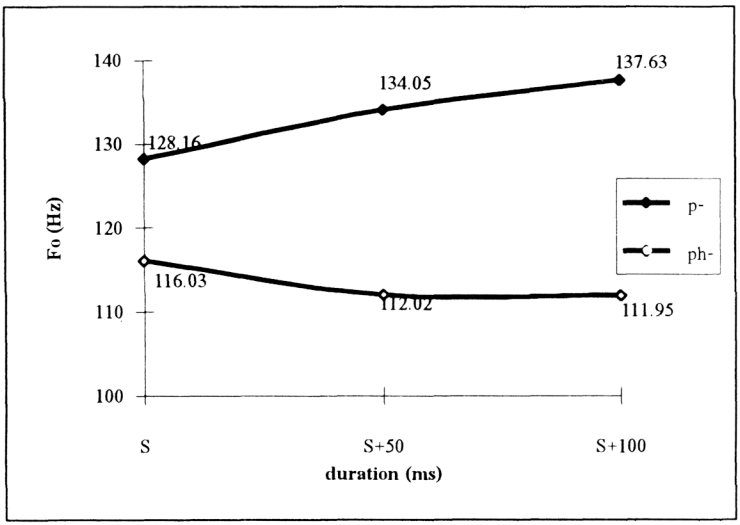

Figure 1 Fo of p- VS ph- in Bru