

DURATIONAL COMPLEMENTATION WITHIN THE SYLLABLE
IN CHINESE AND SUI

Shi Feng

Department of Chinese, Nankai University
Tianjin, China

ABSTRACT

The present investigation is based upon the citational form of individual syllables in the Suzhou and Guangzhou dialects of Chinese, and Zhonghe dialect of Sui. The duration of finals is in a complementary relationship to that of initials. And the long-short vowel distinction manifests itself in a give-and-take relationship with the ending within the final. The duration of stop endings is confirmed to be a part of the whole final although the closure is silent.

1. INTRODUCTION

The Chinese and Kam-Tai languages share many points regarding syllable structure synchronically. In both, each syllable has a 'sheng'(initial consonant or initial), a 'yun'(the remaining segmental material or final), and a 'diao'(tone) which is a kind of suprasegmental but its more important distinction is as a syllable feature. This is illustrated as follows:

Syllable Pattern
Initial-Final-[Tone]

They also have the same internal structure for finals. The final contains an obligatory main vowel as its nucleus. Sometimes a high vowel appears in front of the main one, serving as a medial. It is also called the 'final head'. Sometimes there is a consonant or a high vowel following the nucleus, serving as the final ending. Thus the typical structure of the final is as follows:

Final Structure

(Medial)-Nucleus-(Ending)

The present investigation is based upon the citational form of individual syllables according to the two-levelled structure we introduced above.

2. COMPLEMENT BETWEEN INITIAL AND FINAL

The data from the Suzhou and Guangzhou dialects of Chinese, and the Zhonghe dialect of Sui were selected to investigate the relationship between the different components in a syllable.

Concerning the relation between initials and the final constituent, instrumental measurements of the Suzhou dialect show that the duration of finals is in a complementary relationship to the duration of initials. If the initial is short, the final in the same syllable will be longer. If the initial is longer, then the final will be shorter.

Table 1. Syllable Duration
(Suzhou)

	p	t	k
Initial	143	129	113
occlusion	135	119	101
release	8	10	12
Final	262	243	279
Syllable	405	372	392
	p'	t'	k'
Initial	204	179	160
occlusion	98	104	68
release	106	75	92
Final	226	185	211
Syllable	430	364	371ms

It is evident in Table 1 that aspirated stops are much longer

than unaspirated as regards initial duration whereas the finals following aspirated stops are much shorter than those following unaspirated. (Shi 1983) The same conclusion was also drawn from Pekingese. (Feng 1985)

It should be pointed out that initial and final are not equal in the complementation. The initial is the passive factor and the final the active. The duration of an initial is relatively stable and the duration of a final is easily variable. The cross-match test shows a final may alter its duration after different initials while an initial duration would only change a little before different finals. The difference between various initial durations is mainly due to their mode of articulation.

3. REPLACEABLE DURATION OF MEDIAL AND ENDING

Although there is a phoneme of zero initial in phonological analysis, it is in fact a glottal stop or a slightly voiced fricative at the beginning of the syllable. In the structure of finals, only the nucleus is indispensable. Both the medial and the ending are optional for some of the finals. And the nucleus will fill up the vacancy by extending its duration when the medial and/or the ending are absent in a final. Thus we call medial and ending replaceable and nucleus obligatory. As can be seen in Table 2, the duration of finals containing nucleus alone is approximately the same as those of finals involving a nucleus and a nasal ending.

Table 2. Duration of Finals (Suzhou)

	t	t'	k	k'
Syllable	378	359	387	379
Final	245	180	274	219
(=nucleus)	---	---	---	---
Syllable	369	365	394	356
Final	242	190	284	204
(=nucleus	91	61	72	68
+ending)	151	129	212	136ms

4. THE LONG-SHORT DISTINCTION OF VOWELS

In general, there is a long-short vowel distinction in Cantonese as well as Kam-Tai languages. However this long-short vowel distinction does not result in a durational distinction of syllables as a whole. The duration of main vowel, as the nucleus in a syllable, is quite different from the duration of syllable. We can balance the nucleus and the ending in duration in the same final. In the finals with a long vowel serving as nucleus, the ending is short; in those with a short vowel as nucleus, the ending is long. Therefore the duration may be either long or short for a main vowel in a final. However, in general, the duration of the two types of finals tends to be the same. (Ma & Luo 1962) The ending can play the role of adjustment in the duration of the whole syllable. The following measurements are from 10 pairs of syllables containing durational distinctions in the main vowel /a/ of Cantonese and Sui.

Table 3. Duration of Finals

	Cantonese		Sui	
	%	ms	%	ms
Vowel(L)	70	169	61	244
Ending	40	106	34	136
Final	110	275	95	380
Vowel(S)	46	116	33	130
Ending	46	116	72	284
Final	92	232	105	414

Comparing the average duration of the long vowels and the short ones, the long is in the ratio of 3:2 to the short in Cantonese, and the ratio in Sui is 2:1. The complement of the ending to the nucleus is obvious in Sui, but it is not so evident in Cantonese.

5. SYLLABLES WITH STOP ENDING

There is another kind of syllable in Cantonese and Sui, the entering tone syllable, which ends with a stop consonant such as /p/, /t/, or /k/. The long-short vowel distinction of these syllables in duration is as follows:

	Cantonese		Sui	
	%	ms	%	ms
Long Vowel	71	171	83	329
Short Vowel	44	112	25	126

The durational distinction is generally the same as those with unstopped endings in Cantonese, while in Sui the long vowels are much longer and the short even shorter. But what is the difference between the stop endings?

In general, the pronunciation of a consonant is divided into three steps: start, hold and release. It is difficult to measure the duration of stops because they do not release in the ending. As a substitution for this, the silence intervals from three informants' bisyllabic utterances were measured. This involved each entering tone syllable followed by a syllable with a voiced initial consonant in Cantonese. The following is the result:

Speaker	A	B	C	Average
Closure(with L)	106	124	107	112ms
Closure(with S)	123	153	109	128ms

Here are some individual variations in different informants. The closure duration following a short vowel is longer than that following a long vowel for A and B, but not C. However if we add the closure duration to the nucleus duration respectively, then the result will be roughly similar to that with an unstopped ending.

e.g. Final(L) 112+171=283 275ms
 Final(S) 128+112=240 232ms

Thus the closure duration of the stop ending should be considered as a part of the final duration although it is silent. The entering tone syllables are, thus, those that are interrupted with a period of silence. It is unreplaceable in the final duration.

Concerning durational relationships within the final, the long-short vowel distinction manifests itself in a give-and-take relationship with the ending. The final ending will be long if the main vowel is short and vice versa. In this way they reduce the

difference between the two kinds of finals in duration. Therefore we can say that, in citational forms, syllables of all types tend to have roughly the same duration, while their internal constituents vary in duration in a complementary way.

References:

- [1] FANT, G. (1969), Stops in CV-syllables, *STL-QPSR*, 4, 1-25.
- [2] FENG LONG (1985), The duration of initial, final and tone in Pekingese, in LIN TAO (ed.) *Experimental Works on Pekingese*, Beijing Univ. Press, 131-195.
- [3] LADEFOGED, P. (1975) *A Course in Phonetics*, Harcourt Brace Jovanovich, Inc..
- [4] LEHISTE, I. (1970) *Suprasegmentals*, M.I.T. Press.
- [5] MA, X-L. & LUO, J-G. (1962) The vowel duration in the Sino Tibetan languages, *ZGYW*, 5, 193-211.
- [6] OHALA, J. (1977) Production of tone, in FROMKIN, V. (ed.) *Tone: A Linguistic Survey*, Academic Press.
- [7] SHI FENG (1983), The acoustic features of voiced plosives in Suzhou dialect, *YYYJ*, 1, 49-83.
- [8] SHI FENG (1990) *Tone paradigms in Kam-Tai languages*, Doctoral dissertation of Nankai Univ.
- [9] SHI FENG (1991) *Tones and Stops*, Beijing Univ. Press.