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Syllabic Consonants in Chinese: Representation and Syllabification

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In the description of eight varieties of Chinese fanqie secret languages¹, Chao (1931) shows that syllabic nasals in the secret languages behave both as an onset consonant and a syllabic nucleus at the same time. In the Taiwanese secret language described by Li (1985), the syllabic nasals of the source syllables always surface as non-syllabic consonants in the coda position. Based on these facts, several analyses of Chinese secret languages propose that syllabic nasals have a doubly linked structure, as shown in (1).

(1) Representations of syllabic nasals in Chinese fanqie languages

a.	Yip 1982, Bao 1990	b.	Lin 1988, 1989 (for Taiwanese)	
	O R		N Co	O=onset R=Rime
	N		X X	N=nucleus
	X X		X X	Co=coda
	\ /		\ /	
	m		m	

In Yip (1982) and Bao (1990), the syllabic nasal is suggested to occupy both the onset and the nucleus positions. In addition, a VC structure is proposed for Taiwanese syllabic nasals in Lin (1988, 1989). The doubly linked structure suggests that these syllabic nasals are structurally geminates. The questions to be addressed then are: (i) are Chinese syllabic consonants geminates? (ii) If so, is the geminate structure an underlying or surface representation? In this paper, I would like to argue that Chinese syllabic consonants are derived geminates. In the first section, I review why syllabic nasals are proposed to have a geminate structure in the analyses of Chinese fanqie languages. Section two suggests that Chinese syllabic consonants are not underlyingly marked as syllabic or long. Arguments for the proposal based on the distribution of high vowels/glides and that of syllabic/non-syllabic consonants are given in section three. In section four, I propose that the surface geminate structure of Chinese syllabic consonants is derived by rule. The final section discusses the representation of syllabic consonants in general.

1. Syllabic consonants in Chinese fanqie secret languages

Chinese fanqie secret languages are language games spoken by children, thieves and fortune tellers. In this section I will briefly review data from three Chinese fanqie languages (FLs) and the analyses given in Yip (1982), Bao (1990), and Lin (1989). (2) gives examples from the Kunshan Mo-pa language. (2.a.b.) show that in the derived disyllabic word, the first syllable contains the onset of the source syllable with a new rime [o], and the second syllable consists of the rime of the source syllable and an onset that has the opposite continuancy value from the source onset. The syllabic nasals in (2.c.d.e.) appear as an onset in the first syllable, and as a rime in the second syllable.

- (2) Kunshan Mo-pa FL (Chao 1931, Yip 1982, Bao 1990)
- | | | | | | | |
|----|-----|------|--------|------|--------|----------|
| a. | ma | ---> | mo-ma | ---> | mo-pa | 'mother' |
| b. | təw | ---> | to-təw | ---> | to-ləw | 'many' |
| c. | ŋ | ---> | mo-mŋ | ---> | mo-pŋ | 'not' |
| d. | ŋ | ---> | no-nŋ | ---> | no-tŋ | 'you' |
| e. | ŋ | ---> | ŋo-ŋŋ | ---> | ŋo-kŋ | 'five' |

Similar behavior can also be observed in the Changzhou Məŋ-la language.

- (3) Changzhou Məŋ-la FL (Chao 1931, Yip 1982, Bao 1990)
- | | | | | | | |
|----|-----|------|---------|--------|-------|----------|
| a. | ma | ---> | məŋ-la | | | 'mother' |
| b. | key | ---> | kəŋ-ley | | | 'enough' |
| c. | ŋ | ---> | məŋ-lm | , ---> | məŋ-ŋ | 'matron' |
| d. | ŋ | ---> | ŋəŋ-lŋ | ---> | ŋəŋ-ŋ | 'five' |

The Changzhou secret language splits the original syllable into two, and adds a fixed rime [əŋ] in the first syllable and a fixed onset [l] in the second. In (3.c.d), the syllabic consonants occupy both the onset position and the rime position in the FL forms.

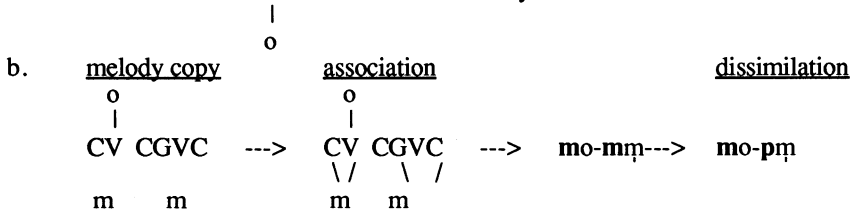
Taiwanese syllabic nasals behave somewhat differently. (4.a.b.) show that in the Taiwanese FL, the rime of the source syllable together with a fixed onset [l] appears in the first syllable, and the onset of the source syllable occurs in the second syllable with a new rime [i]. If the source syllable has a [+consonantal] coda, the coda consonant appears in both syllables in the FL forms, as in (4.c.d.). The coda consonant in the second syllable is further changed to an alveolar nasal. The examples in (4.e.f.) show that the syllabic nasals become codas and exhibit similar patterns as the coda consonants in (4.c.d.) do.

- (4) Taiwanese FL (Li 1985, Lin 1988, 1989)
- | | | | | | | |
|----|-------------------|------|----------------------|------|-----------------------|---------|
| a. | be | ---> | le-bi | | | 'buy' |
| b. | t ^h aw | ---> | law-t ^h i | | | 'head' |
| c. | kam | ---> | lam-kim | ---> | lam-kin | 'sweet' |
| d. | aŋ | ---> | laŋ-iŋ | ---> | laŋ-in | 'red' |
| e. | m | ---> | lŋ-im | ---> | ləm in | 'no' |
| f. | t ^h ŋ | ---> | lŋ-t ^h iŋ | ---> | ləŋ-t ^h in | 'sugar' |

Both Yip (1982) and Bao (1990) treat FL formation as reduplication but propose different rule systems. In either approach, syllabic nasals have to be doubly linked to two skeletal slots. In Yip's analysis, the consonantal melody of the syllabic nasal is linked to both the C and V slots. The derivation is shown in (5).

(5) Yip's (1982) analysis of Kunshan Mo-pa FL formation

a. The skeleton: CV CGVC The melody: m



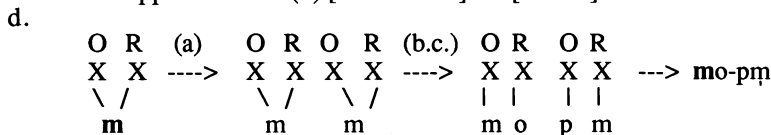
Bao (1990) proposes a different mechanism but also requires the syllabic nasal to be doubly linked. In this model, the whole syllable is reduplicated first. Then in the first syllable, the rime is replaced with [o], and in the second syllable the onset undergoes dissimilation. The sample derivation is given in (6.d.).

(6) Bao's (1990) analysis of Kunshan Mo-pa FL formation (Bao 1990)

a. Total copying of the source syllable

b. In the first syllable, replace the rime with [o]_σ

c. (i) In the second syllable, replace the value of [continuant] in the onset with the opposite value. (ii) [αcontinuant] --> [αvoice]



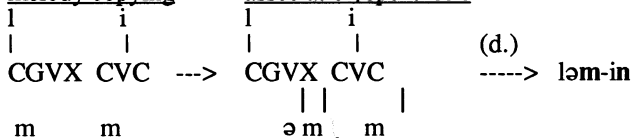
(7) is an analysis of the Taiwanese FL following Yip's reduplicative model. Assuming that syllabic nasals in Taiwanese can be linked to either the nucleus or the coda, Lin (1989) proposes a right to left association and allows the syllabic nasal to surface as a coda consonant. The derivation is given in (7.e.).

(7) Lin's (1989) analysis of the Taiwanese FL

a. Melody copy b. Direction of association: R--> L. No spreading.

c. ə epenthesis d. Place features delinking and default coronal insertion

e. melody copying association/epenthesis



It appears that evidence from the secret languages supports a geminate representation for syllabic consonants (8.a). It is interesting to note that in the model of moraic phonology proposed in Hayes (1989), both geminate consonants and syllabic consonants have the same moraic structure, as shown in (8.b.).

(8)	a.	XX	X	b.	Hayes (1989)	
		\ /			μ	
		m	m			
		[m]	[m]		m	m
					[mm] or [m]	[m]

Such a theory then predicts that syllabic consonants may be considered to be geminates. If these Chinese syllabic nasals do have a geminate representation, are they underlyingly represented as such? We now examine if geminate structure is the underlying representation for Chinese syllabic consonants.

2. Chinese syllabic nasals in underlying representation

Several possible underlying forms can be posited to reflect the surface contrast of syllabic and non-syllabic consonants. (9) gives three common ways to indicate the contrast. As shown in (9.a. b.), a syllabic consonant may be represented as a CV or VC sequence or underlyingly marked as the syllabic nucleus. The moraic representation in (9.c.) is ambiguous in that it could mean (9.a.) or (9.b.), or maybe both.

(9) Possible underlying representations of Chinese syllabic and non-syllabic C's

a.	CV/VC	C	b.	ζ /V	C	c.	ζ	C
	XX	X		N		μ		
	\ /			X	X			
	m	m				m	m	
				m	m			

We now briefly examine how underlying syllabicity and length contrasts are marked in Hayes' (1989) version of moraic theory.

(10) Hayes 1989

a.	Contrastive long & short V's	b.	Contrastive short V's and glides
	$\mu \mu$		μ
	\ / = /i:/		= /i/
	i		i = /y/
c.	Contrastive long & short C's	d.	Syllabic and non-syllabic short C's
	μ		μ
	= /mm/		= /m/
	m		m = /m/
			m

Hayes proposes that if there is a long and short vowel contrast in a language, then the long vowel has two moras, while the contrasting short vowel receives one mora (10.a.). In a language where short vowels and glides contrast, the representations for vowels and glides would be like (10.b.). (10.c.) shows the contrast in long and short consonants. As mentioned by Hayes, syllabic consonants may have the same moraic structure (10.d.) as geminate consonants.

In this moraic model only when moraic structure is employed contrastively would there be underlying moras assigned to segments. Specifically, Hayes states,

(14) Obligatory 'zero' onset (Chao 1948,1968; F. Li 1966, Duanmu 1990)

a.	/i/	/u/	/m/	b.	/an/
	[yi]	[wu]	[mm]		[ʔan], [ŋan],[ʎan],[Han]

That is why some analyses maintain that for every Chinese vowel initial syllable, there is an empty C slot in underlying representation, which will be filled in by melodic spreading as in (15.a.) or by insertion as in (15.b.).

(15)	a.	CV	--->	CV	b.	CVC	--->	CVC
				\				
		i		i		a n		? a n
(16)	a.	V	--->	CV	b.	VC	--->	CVC
				\				
		i		i		a n		? a n

(16) is another possible analysis where the C slot for an onset is inserted. We will assume the insertion schema in (16); however, we are not concerned about which analysis is better. The main point is that the vowel initial syllable /i/ is not doubly-linked in underlying representation even though it is doubly linked on the surface.

Consider now the underlying representations given in (17).

(17)	a.	*XX	* XX	b.	* N	* μ	c.	? XX	N	μ
		\ /	\ /					\ /		
		i	m		i	i		m	m	m
		/i:/	/mm/					/m/		

Since there is no length contrast in Chinese, the underlying geminate structure as in (17.a.) should be rejected. The underlying marking of syllabicity for high vocalic segments in (17.b.) is redundant because the distribution of high vowels and glides is totally predictable. Several studies on syllabification and underspecification have shown that if syllabicity of a segment is predictable, then pre-associated nucleus need not be present in underlying representation. Within this framework, the most common treatment of the predictable vowel/glide alternation is that a vowel and its corresponding glide have the same representation, and it surfaces as a glide when it is not syllabified as the nucleus of a syllable. Therefore, an underlying high vowel is not assigned a mora or marked as syllabic. The question now is whether or not we should have a distinct representation for Chinese syllabic consonants, for instance, like any one in (17.c.).

If we look at the distribution of syllabic and non-syllabic consonants within a morpheme, we find that a consonant is non-syllabic when it is adjacent to a vowel, e.g., [ma] [paŋ]. If there is no vowel in the morpheme, a syllabic consonant appears, e.g., [mm], [tŋ]. Such a predictable distribution is very similar to that of high vowels and glides. This fact leads us to believe that syllabic and non-syllabic consonants, like high vowels and glides, have the same underlying representation.

More evidence comes from alternations. Alternations between syllabic and non-syllabic consonants are also predictable under affixation and contraction. Examples from various Chinese languages are given in (18-21). In Pingyang, the *er* suffix is

a velar nasal. This suffix becomes a coda consonant in (18.b.) when it forms one syllable with the stem. If it is not contracted with the stem, it surfaces as a syllabic consonant, as shown in (18.c.).

(18) Pingyang *er* suffixation and syllable contraction (R. Li 1963)

	<u>stem</u>	<u>plain <i>er</i> -form</u>	<u>diminutive <i>er</i> -form (disyllabic)</u>	
a.	ŋ			<i>er</i> 'son, child'
b.	li	li:ŋ		'plum'
c.	bi		bi ŋ	'comforter'
d.	tæ	tæ:ŋ	tæ ŋ	'knife'

Taiwanese syllable contraction in (19.a.) shows that after contraction and re-syllabification, the original high vowel becomes a glide. In the same fashion, the syllabic nasal in (19.b.) alternates with the non-syllabic coda nasal.

(19) Taiwanese syllable contraction (Cheng 1985)

a.	hit	taŋ	si	-->	hyaŋ	si	'then, at that time'
b.	tʂa	hŋ		-->	tʂaŋ		'yesterday'

Examples from Pingding in (20) demonstrate that the retroflex lateral is syllabic if it stands alone; if it is inserted into a syllable and adjacent to a vowel, it is non-syllabic.

(20) Pingding *er* infixation (Xu 1981)

	<u>stem</u>	<u><i>er</i> form</u>	
a.	l̥		<i>er</i> 'son, child' (syllabic retroflex lateral)
b.	tʂʰa	tʂʰl̥ a	'bean' (retroflex lateral as onset)
c.	xua	xl̥ a	'flower' (retroflex lateral as onset)

(21) provides examples from Huojia where the alternation pattern between syllabic/non-syllabic consonants and that between high vowels and glides is the same.

(21) Huojia Mandarin *zi* suffixation (He 1982, Lin 1989)

	<u>stem</u>	<u>--></u>	<u><i>zi</i> -form</u>	<u>---</u>	
a.	pi	-->	piou	--->	pyow (---> py:ow) 'nose'
b.	l̥	-->	l̥ ou	--->	l̥ ow 'son, child'

If we do not have to posit different underlying forms for Chinese high vowels and glides, it seems that we do not have to for syllabic and non-syllabic consonants, either. Therefore, all these examples of phonological alternations support our hypothesis that syllabic and non-syllabic consonants are not contrastive and should have the same underlying representation. In moraic theory, we may add that if the distribution of syllabic and non-syllabic consonants is predictable, then no underlying moraic structure is posited for syllabic consonants.

4. Geminate structure

If Chinese syllabic consonants do not have underlying geminate structure, we have to account for the behavior of syllabic consonants in the secret languages where a geminate representation seems to be necessary. As mentioned earlier, most Chinese languages require an onset at the phonetic level. I propose that the geminate structure is derived by an addition of the onset followed by melodic spreading. The rule is formulated as in (22.b.).

(22)	<table style="border-collapse: collapse;"> <tr> <td style="text-align: center; vertical-align: top;">a.</td> <td style="text-align: center; vertical-align: top;"> <u>UR</u> X m </td> </tr> </table>	a.	<u>UR</u> X m	b.	<u>Obligatory onset with spreading</u> <table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="text-align: center;">N</td> <td style="text-align: center;">---</td> <td style="text-align: center;">O N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">---</td> <td style="text-align: center;">X X</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> <td style="text-align: center;">\ /</td> </tr> <tr> <td style="text-align: center;">m</td> <td></td> <td style="text-align: center;">m</td> </tr> </table>	N	---	O N	X	---	X X			\ /	m		m
a.	<u>UR</u> X m																
N	---	O N															
X	---	X X															
		\ /															
m		m															

A secret language form is then derived from a fully syllabified morpheme where the onset is already in place. An example from the Kunshan Mo-pa language is given in (23). In this example, the consonant becomes doubly linked by rule (22.b.) before reduplication begins. In fact, in Bao's analysis of fanqie languages, the morpheme must be syllabified before it undergoes FL formation since the structure descriptions of his rules have to refer to onsets and rimes.

(23) <u>FL forms are derived from a fully syllabified string in Bao's model</u>						
R						
N	O R		O R O R		O R O R	
X	--> X X	---->	X X X X	---->	X X X X	----> mo-pm̩
	\ /		\ / \ /			
m	m		m m		m o p m	

(24) gives evidence showing that rule (22.b.) applies to both high vowels and syllabic consonants. We can see that /i/ and /m/ have the same derivations when they undergo FL formation. Given such evidence, we suggest that the geminate-like structure of Chinese syllabic consonants results from the general syllable condition that requires an onset rather than from the underlying geminate representation.

(24) <u>Kunshan Mo-pa FL</u>							
a.	i	-->	yi-yi	-->	yo-yi	-->	yo-tçi
b.	m̩	-->	m̩m̩-m̩m̩	-->	mo-m̩m̩	-->	mo-pm̩

In Taiwanese, however, the syllabic nasal does not seem to be linked to the onset. As mentioned in section one, the previous analysis suggests that Taiwanese syllabic nasals are linked to the nucleus and the coda rather than to the onset and the nucleus. Bao's rules for Taiwanese FL formation are given in (25). These rules are inadequate in deriving the correct FL form from a syllabic consonant. The derivation in (25) shows that if the nasal has a VC structure, rule (25.ii) does not apply since there is no onset to replace. The fixed [l] would fail to appear.

(29)	<u>copy</u>		<u>onset addition/epenthesis</u>		<u>resyll/dissimilation</u>				
	N Co	N Co	N Co	O N Co	N Co		O N Co	N Co	
	\ /	-->	\ /	\ /	-->	\ /		-->	
	m		m	m		l ə m	i m		l ə m i n

In sum, the surface geminate structure for Chinese syllabic consonants occurs as a result of lengthening. The lengthening rule is either induced by the requirement of an obligatory onset or general nucleus lengthening in an open syllable. That Taiwanese syllabic consonants do not function as an onset is because there is no melodic spreading to the onset in Taiwanese.

5. Conclusion and implications

In conclusion, syllabic and non-syllabic consonants are not contrastive underlyingly in Chinese because their distribution is predictable from general syllabification. The surface geminate structure for syllabic consonants is derived by rule. The implication of this proposal is that in languages where the distribution of syllabic and non-syllabic consonants is predictable, the geminate-like behavior of syllabic consonants may occur as a result of a general condition on syllable structure or a general lengthening rule, but not because of a geminate-like underlying form.

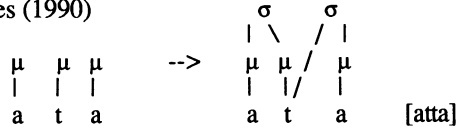
A syllabic consonant is often considered to have a distinct underlying representation from its regular counterpart, e.g., CV vs C, and [+syllabic] C vs [-syllabic] C. In accordance with recent research on syllabification theory and underspecification, we maintain that syllabicity information of a syllabic consonant need not be coded underlyingly unless there exists an underlying syllabic contrast, e.g., a minimal pairs like [m̩.bi] vs [mbi], or there is evidence based on phonological alternations.

The syllabic nasal /m/ in Gokana discussed in Hyman (1984) appears to be a consonant that has to be underlyingly marked as moraic based on evidence from alternations. In (30), we can see that, unlike the syllabic consonants in Chinese, /m/ in Gokana surfaces as syllabic even if it is followed by a vowel. If the Gokana syllabic nasal is not moraic or underlyingly syllabic, we would wrongly predict an output form like [bá m̩] for (30.a).

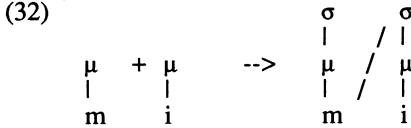
(30)	<u>Syllabic nasals in Gokana (Hyman 1984)</u>				
a.	bá + m̩ + í	-->	bá m̩ m̩		(*[bá m̩])
	arm my this			this my arm	
b.	m̩ + a	-->	m̩ má		(*[ma])
	inside intr.		to fill (intr.)		

One interesting fact is that this underlyingly marked syllabic consonant behaves like a geminate. In Hayes' proposal, the consonant melody of a geminate consonant is 'flopped' onto the following vowel-initial syllable.

(31) Geminate C's in Hayes (1990)



The syllabic /m/ in Gokana exhibits the same behavior.



Furthermore, (33.a.b.) show that only the syllabic nasal gives the vowel initial suffix an onset, while a regular consonant does not. This contrast indicates that this syllabic /m/ may be a geminate. In fact, it is treated like a geminate in Hymen's theory since it is assigned two weight units.

- | | | | | | | |
|------|----|---------|-----|-----|-------|-------------------|
| (33) | a. | m | + a | --> | mí má | 'to fill (intr.)' |
| | b. | bír - á | | --> | bírá | 'become black' |

Since underlyingly syllabic consonants seem to behave as geminates, I hypothesize that the underlying syllabicity contrast of consonants may suggest an underlying length contrast. That is, the Gokana /m/, for example, is not an underlyingly syllabic consonant but an underlying geminate consonant. If this is the case, then moraic phonology may be superior to the CV theory in that it suggests the connection between geminate and syllabic consonants by giving them the same representation. Whether or not underlying syllabic consonants are geminates is an empirical question, and we need more data to confirm this hypothesis. If this hypothesis proves to be true, then there may not be any underlyingly syllabic contrast but only a length contrast for consonants.

Notes

¹ Fanqie languages are game languages that make use of the 'fanqie' principle. The fanqie principle is the traditional method used by Chinese lexicographers to mark the pronunciation of Chinese characters. The pronunciation of each character is represented by two characters, with the first one exemplifying the pronunciation of the initial consonant, the second, the rime and the tone.

References

Bao, Z. (1990) "Fanqie Languages and Reduplication," Linguistic Inquiry 21.3, 317-350.

Chao, Y. R. (1948) "The Voiced Velar Fricative as an Initial in Mandarin," Le Maître Phonétique 89, 2-3.

Chao, Y. R. (1968) A Grammar of Spoken Chinese, University of California Press, Berkeley.

Chao, Y.-R. (1931) "Eight Varieties of Secret Language Based on the Principle of Fanqie" BIHP Academia Sinica 2, 320-354.

- Cheng, R. L. (1985) "Sub-syllabic Morphemes in Taiwanese," Journal of Chinese Linguistics 13, 12-42.
- Duanmu, San (1990) A Formal Study of Syllable, Tone, Stress and Domain in Chinese Languages, Doctoral dissertation, MIT.
- Hayes, B. (1989) "Compensatory Lengthening in Moraic Phonology," Linguistic Inquiry 20, 253-306.
- He, W. (1982) "Huojia Fangyan Yunmu de Fenlei," (Classification of Finals in the Huojia Dialect), Fangyan 1982, 22-36.
- Hyman, L. (1984) A theory of Phonological Weight, Foris.
- Li, F. (1966) "The Zero Initial and the Zero Syllabic," Language 42,300-302.
- Li, P. J.-K. (1985) "A Secret Language in Taiwanese," Journal of Chinese Linguistics 13, 91-121.
- Li, R. (1963) Hanyu Fangyan Diaocha Shouce (Manual of Survey of Chinese Dialects), Kexue Press, Beijing.
- Lin, Y-H. (1989) Autosegmental Treatment of Segmental Processes in Chinese Phonology, Doctoral dissertation, University of Texas at Austin.
- Lin, Y.-H. (1988) "Nasal Segments in Taiwanese Secret Language," Arizona Phonology Conference I, 60-74, University of Arizona, Tucson.
- McCarthy, J. and A. Prince (1987) "Quantitative Transfer in Reduplicative and Templatic Morphology" ms. University of Massachusetts, Amherst, and Brandeis University.
- McCarthy, J. J. and A. Prince (1986) "Prosodic Morphology," ms., University of Massachusetts, Amherst, and Brandeis University, Waltham.
- Xu, T. J (1981) "Shanxi Pingding Fangyan de 'Erhua' he Jinzhong Suowei de 'Qian l Ci'," ("Er Affixation in the Pingding Dialect of Shanxi Province and the So-called 'l Infixes' in Central Shanxi") Zhongguo Yuwen, 408-415.
- Yip, M. (1982) "Reduplication and C-V Skeleta in Chinese Secret Languages," Linguistic Inquiry 13.4, 637-661.