Mora and Taiwanese Syllable Structure*

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ABSTRACT

The essential goal of this paper is to argue on the basis of Taiwanese that mora plays no significant role in terms of syllable structure. The arguments we have are: (a) the secret language formation, (b) nasal harmony and dissimilation, (c) labial dissimilation, and the lengthening of the syllable contracted from the trisyllabic adjective. The glottal stop insertion exhibited in Xiaoyi, Yugan, Huangyan, and Mandarin is also discussed along with the lengthening. We conclude with some remarks on the phonological status of onset and nucleus.

Key Words: Mora, secret language, nasal harmony, nasal dissimilation, labial dissimilation, syllable contraction, skeleton

1. Introduction

Mora as a unit of phonological weight in terms of syllable structure has long been recognized (Browselow 1995). However, it is not until Hayes 1989 that mora has been proposed to entirely replace the skeletal tier in formal phonology. From then on, the arguments for or against the skeletal tier and the moraic tier have been proposed (Sloan 1991, Rubach 1993, Zec 1988, McCarthy and Prince 1993). Furthermore, Broselow 1995 provides a rather detailed critical review of these two theories. With the advent of Optimality Theory (Prince and Smolensky 1993; McCarthy and Prince 1993), the notion of mora has become rooted in phonology. However, mora has scarcely been introduced to Chinese phonology until Duanmu 1993, 1994a, 1994b, and Yip 1994, where it was proposed that a

* I would like to thank the two anonymous reviewers for their insightful comments and suggestions, most of which are included here. However, limited space precludes some of their suggestions. Thanks are also due to C. C. Cheng, Morris Halle, Charles Kisseberth for their helpful discussions about most of the ideas presented here.

Chinese syllable is composed of at least two morae. In this paper, we argue that mora plays no significant role in Chinese. Limited space precludes lengthy discussion about and arguments against the proposals in the literature.

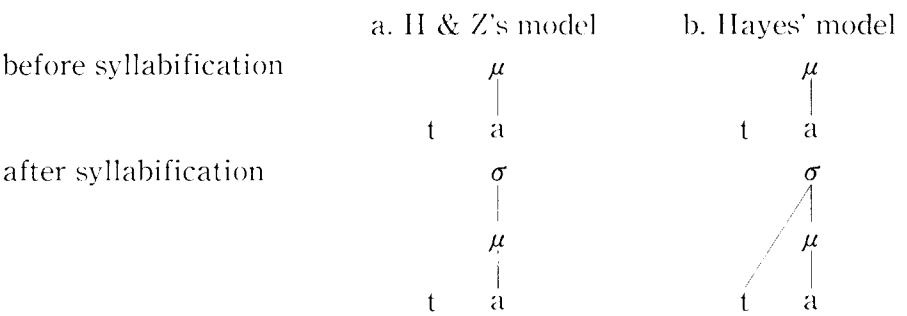
We will simply base our discussion on the Taiwanese dialects spoken in southern Taiwan. The structure of our reasoning runs as follows. (a) Syllable weight plays no role in Taiwanese stress, meter, accent, or tone. (b) A mora-based syllable structure suffers serious defects in the face of the secret language (SL) formation, nasal harmony and nasal dissimilation, labial dissimilation, and syllable lengthening in trisyllabic adjective contraction. After showing the problems encountered by the mora-based syllable structure, we revisit these phonological properties (the SL formation, nasality, labial dissimilation and nucleus lengthening) on the basis of the skeleton-based theory. Finally, we conclude with remarks on the potential problems the theory will encounter, and how to solve them.

2. Mora and the problems

2.1 Mora theories

There are basically two streams of moraic theories, the main difference lying in the treatment of the onset. One holds that the onset is part of a mora in line of Hyman 1985 and Zec 1988, as shown in (1a), while the other after Hayes 1989, McCarthy and Prince 1986 and 1993 is of the position that the onset is of no mora, as indicated in (1b).

(1)

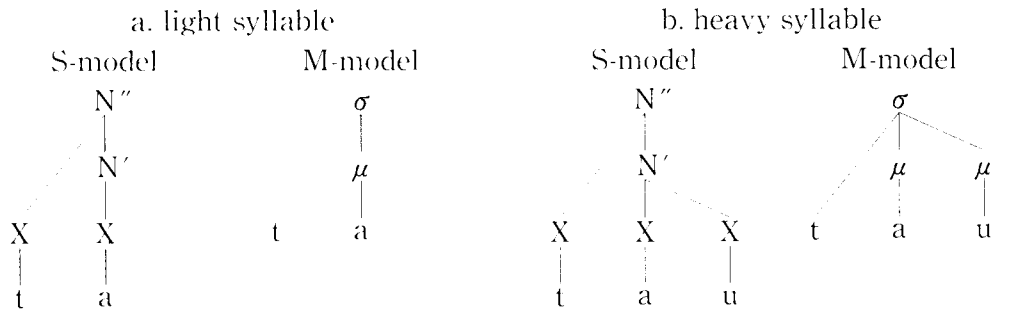


Unless noted otherwise, the moraic structure hereafter refers to (1b).[1] Since

1. More discussions about various moraic and segmental theories can be referred to Rubach 1993 and Broselow 1995.

mora has usually been tied with syllable weight in the previous literature, we begin with the notion of syllable weight. The S(egmental)-model attributes the difference in syllable weights to the distinct structure for a R(ime): a non-branching R is light, while a branching R is heavy (Clements and Keyser 1983, Levin 1985). By contrast, the basic tenet of moraic models of syllable theory is that a syllable is composed of morae: a light syllable has one mora, and a heavy syllable has two (Hyman 1985, Hayes 1989, McCarthy and Prince 1994). A comparison between these models in terms of light and heavy syllables is stated below:

(2)



2.2 Mora and syllable weight

The role of syllable weight in phonology is usually observed in stress, poetic rhymes, or accents. For instance, the stress of Latin is syllable-weight sensitive. In general, the stress of Latin falls on the penultimate if it is heavy (CVV, CVC, CVVC), and on the antepenultimate if the penultimate is light (CV): *coon-fĕc-tus* 'accomplished', but *coon-fĭ-ci-o* 'I accomplish.' In Finnish and Estonian, however, the syllable weight is reflected in the meter of folk songs (Lehiste 1965). The stress in Taiwanese, just like that in other Chinese languages, is less significant than unstress in phonology. An unstressed syllable will lose its tone. The distribution of unstress is lexically or morphologically determined.[2] Consider (3) below: (The symbol | | under the vowel denotes unstress.)

(3)

a. lexically given

aŋ$_{13}$	e	'red'
ti?$_{31}$	e	'made of metal'

2. For more discussions, see Cheng 1973.

b.	morphologically determined		
	tan_{31}	si	'but'
	aw_{55}	zit	'the day after tomorrow'
c.	$zit_{31(55)}$	$t'aw_{13}$	'the sun'
d.	functional		
	$a?_{31}$	lay	'to capture here'
	a_{55}	**lay**$_{13}$	

In (3a), the adjectival suffix *-e* is always unstressed and hence it is toneless. Its unstress is lexical-driven. In contrast, the *zit* in (3b) is unstressed while it is stressed in (3c). This is attributed to morphology, because in the morphological structure for dates such as *tso*$_{31}$ *zit* 'the day before yesterday', *pun*$_{55}$ *zit* 'today' etc., the *zit* 'day' is always unstressed. Another type of unstress, which is determined in pragmatics, is presented in (3d): when the focus is on the first syllable, then the *lay*$_{13}$ 'to come' gets unstressed, while it is stressed if it is focused. In all unstressed cases in (3), there is no vowel reduction. Therefore, we have to highlight the fact that syllable weight plays no role in the distribution of stress in Taiwanese.[3]

By the same token, the rime in Taiwanese folksongs or poems has nothing to do with syllable weight. Only syllables with the same rimes (identical vowels followed by identical consonants or glides) are allowed to rime with each other. In addition, the poetic meter in Chinese is regulated by tone, namely, even or uneven,[4] without referring to the internal structure of a syllable (Wang 1973 and Chen 1979). Thus the phonological role of mora in Taiwanese or in all other Chinese languages cannot be discussed on the basis of stress or poetic rimes.

The role of mora has been extended to such an extent that it is not limited to syllable weight only. The mora can define a phonological domain, as suggested in Hayes 1989, or as a feature bearing unit, as laid out in Clements 1990, Duanmu 1993 and 1994a. It is this respect with which we are concerned.

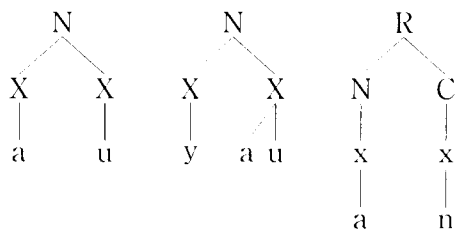
3. In Mandarin, an unstressed syllable gets vowel reduction as indicated in *mian hua* [mian huo] 'cotton' (Cheng 1973). However, there is no vowel reduction in Taiwanese unstressed syllables: *k'i lay* 'to get up', cf. **k'i loy* (the *lay* is unstressed and hence it has no tone.)

4. Elsewhere it is called "checked" and 'unchecked". The tonal pattern in poetic rhyming is specific in that the level tone (*ping shong*) forms a category, called "*ping*" while the other three tones, namely, *shang*, *qu*, and *ju*, form another called "*tzo*." Note that the four tones just mentioned are terms for the tones in Middle Chinese. Thus the regulated meters in Chinese classic poetry cannot be interpreted with the synchronic tonal categories. For details, see Wang 1973.

2.3 Characteristics of Taiwanese syllable structure

The Taiwanese syllable is distinguished in that CV, CGV, CVG, and CGVG pattern together, constituting open syllables, while at the same time CVC alone forms a closed syllable. It becomes obvious that both S- and M-models of the syllable theory fail to make such a distinction. A repairing strategy to convey the syllable structure in Taiwanese is obligatory for either model. For the S-model, our proposal here is (a) to represent rising and falling diphthongs differently, and (b) to differentiate VG (4a, b) from VC (4c):

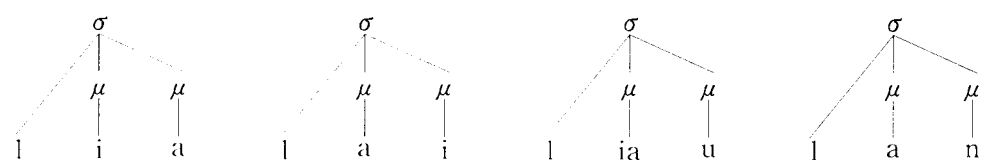
(4) a. aw b. yaw c. an



As to the M-model, there are two alternatives for the representations of Taiwanese syllables. The first alternative is to assume that every Chinese syllable is of two morae (Duanmu 1993 and 1994a, but cf. Chung 1989a and 1989b), as shown in (5).[5,6] The other alternative is to treat VC as two morae while treating GV, VG and GVG as one single mora (6). In either representation, as will be explored, the moraic structures run into difficulties.

(5)

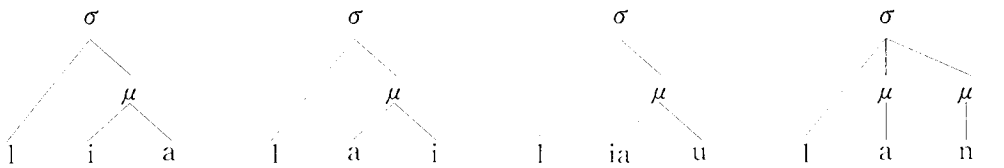
a. lya_{53} 'to catch' b. lay_{13} 'to come' c. $lyaw_{31}$ 'material' d. lan_{13} 'difficult'



5. The representations in (5) depart from Duanmu's assumption that the prevocalic glide is part of the onset. As argued in Chung 1996, the prevocalic glide in Taiwanese is part of the rime.
6. Basically, Duanmu's assumption is identical with Chung's in that there is a CVX template for every Chinese syllable. However, their difference lies in the treatment of the prevocalic glides, as mentioned in the preceding footnote. Another difference is that while Duanmu uses mora, Chung uses X-slots for the internal structure of a syllable. In fact, Duanmu did not actually analyze the syllable structure in the M-models in his 1990 dissertation. But the claim that there are two morae for every Chinese syllable has been one of the important stipulations in his 1993 and 1994 papers.

(6)

a. lya_{53} 'to catch' b. lay_{13} 'to come' c. $lyaw_{31}$ 'material' d. lan_{13} 'difficult'



We are going to test these alternatives against (a) difference between VC and VG, (b) nasality, (c) labial dissimilation, and (d) lengthening in contraction. The first three are raised to argue against (5), while the last one against (6).

In Taiwanese phonology, the difference between VG and VC is significant as revealed in the SL formation. The SL is constructed by reduplicating a mono-syllabic morpheme into a bi-syllabic one, abiding by the rules: If the source syllable ends with a vowel or a glide, then the first syllable of the SL starts with *l* and keeps the V or VG of the source syllable. The second syllable of the SL ends with *i* and keeps the onset of the source syllable (7a). However, if the source is of a VC structure, the first syllable of the SL ends with the same rime, while the second syllable either ends with a coronal nasal *n*, or with a coronal stop *t*. The appearance of *n*/*t* relies entirely on tone. If the source tone is an E-tone, its SL gets *t*; if the source syllable is of a non-E tone, its SL ends with *n* (7b).[7] (N = nasal, T = stop)

(7)

	σ-structure	Source		SL		
a.	CV	ka_{55}	▸	la_{33}	ki_{55}	'to add'
	CVG	kaw_{53}	▸	law_{55}	ki_{53}	'dog'
	CGV	$tsya_{55}$	▸	lya_{33}	tsi_{55}	'here'
	CGVG	$hyaw_{53}$	▸	$lyaw_{55}$	hi_{53}	'to know'
b.	CVN	$paŋ_{55}$	▸	$laŋ_{33}$	pin_{55}	'board'
		kam_{55}	▸	lam_{33}	kin_{55}	'sweet'
		tan_{53}	▸	lan_{55}	tin_{53}	'to wait'
	CVT	pak_{31}	▸	lak_{55}	pit_{31}	'to tie'
		hap_{31}	▸	lap_{55}	hit_{31}	'box'
		$ts'at_{31}$	▸	lat_{55}	$ts'it_{31}$	'to paint'

According to the moraic representations in (5), all the syllables in (7) share a

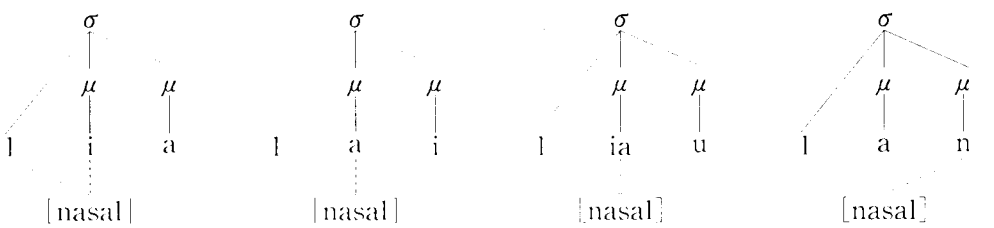
7. An E-tone syllable ends with *p*, *t*, *k*, or *ʔ*, while a non-E tone is closed with *m*, *n*, or *ŋ*.

common moraic structure, namely, a syllable of two morae. Now in order to distinguish (7a) from (7b), the mora theory should appeal to the features under the second mora node. The feature for (7a) is [−consonantal], whereas it is [+consonantal] for (7b). In this sense, the moraic theories rely heavily on the nature of the segment, which is the essential basis on which the moraic theories claim to be superior to the skeleton-based theory (Hayes 1989, see also the discussion in Sloan 1991.)

The moraic representations in (5) are even more embarrassing in the face of nasality. To be brief, the two morae in (5a), (5b) and (5c) not only have to share a common [nasal] feature, but they have to agree with the onset in nasality. In contrast, the nasal dissimilation in Taiwanese prohibits the onset from agreeing with the coda in nasality (*NX̃N). The nasal harmony and dissimilation can be illustrated as follows:

(8)

a. $n\tilde{y}\tilde{a}_{13}$ 'mother' b. $n\tilde{a}\tilde{y}_{33}$ 'enduring' c. $n\tilde{y}\tilde{a}\tilde{w}_{55}$ 'cat' d. lan_{13} 'difficult'



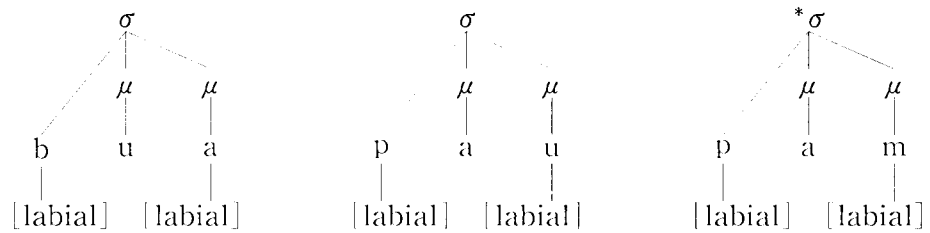
To be more specific, the rule for nasal harmony would be formulated under the following conditions. The [nasal] in the second mora should agree with the onset in nasality if the mora is of [−consonantal]. If the second mora is of [+consonantal], then the [nasal] feature should be specified in the second mora. A question arises as to why the spreading of the nasal feature should be conditioned by [+/−consonantal]? Furthermore, the onset is out of a mora. How can a phonological unit out of mora constitute a domain with a mora?[8] The point is clear that the moraic structures in (5) fail to tell (8a-c) from (8d) without other *ad hoc* stipulations.

The same is true for (5) in terms of labial dissimilation. The labial onset is not allowed to co-occur with a labial coda although it may co-occur with a labial post-vocalic glide:[9]

8. So it seems that the onset should be included in the mora, as suggested in Broselow 1995. If that is the case, then problems still arise in the SL formation.
9. The absence of **uau* is due to another independent constraint, see Chung 1996.

(9)

a. bwa_{13} 'to sharpen' b. paw_{55} 'to pack' c. *pam



To account for the labial distribution of (9), the moraic structures in (5) should differentiate VC from VG and GV. Thus the labial dissimilation within the moraic-model would indicate that if the second mora is of [+consonantal] labial, then the onset may not be a labial. If the second mora is of [−consonantal] labial, then the onset may be a labial. This is indeed an *ad hoc* stipulation.

To summarize the discussions thus far, the moraic structures in (5) fail to treat GV, VG, GVG and V as identical structures. Moreover, they are unable to distinguish VC from GV, VG, GVG and V in terms of syllable structure.

Next, we examine the moraic structures in (6). The problems encountered above are now resolved, because (6) treats GV (6a), VG (6b), GVG (6c) and V as structurally identical in having one mora, while it treats VC (6d) as two morae. In this respect, the moraic representations in (6) are superior. Meanwhile, a mora has been defined differently among languages in the literature. For example, some languages treat CVC, CVV and CVG as heavy while treating CV as light, e.g. Latin, Classical Greek and Finnish (see Newman 1972). Some languages treat CVV and CVG as heavy, while treating CVC and CV as light, e.g. Selkup and Malayalam (see Tranel 1991). In other languages, e.g. Cahuilla and Yupik, the mora of a coda depends on its context (see Hayes 1994). Taiwanese, like Rotuman (McCarthy 1996)[10], then provides still another type in which CVC counts as two morae whereas CGV, CVG and CV count as only one.

However, there are some other problems with (6). First, the representations in (6a), (6b) and (6c) violate the Minimal Word Constraint which requires that a minimal word be composed of no less than two morae (McCarthy and Prince 1993, Prince and Smolensky 1994). In particular, it is not compatible with the claim that in Chinese every syllable contains at least two morae (Duanmu 1993 and 1994a). Second, if VG, GV and GVG are structurally of one single

10. Thanks to one of the anonymous reviewers for bringing this to my attention.

mora, then syllables with those structures are predicted to behave similarly in trisyllabic contraction. This prediction is not entirely correct. A trisyllabic adjective in Taiwanese, although unanimously agreed to be derived from monosyllable reduplication (Hung 1994, Chiang 1990), may pragmatically appear as a bisyllabic form with the first syllable lengthened in duration, which varies between vowel and ending lengthening:[11]

(10)

	A. Trisyllabic forms			B. Contracted forms		
a.	sin_{35}	sin_{33}	sin_{55}	▸ $si\text{-}in_{353}$ ($sin\text{-}n_{353}$)	sin_{55}	'new'
b.	$lyaŋ_{35}$	$lyaŋ_{33}$	$lyaŋ_{13}$	▸ $lya\text{-}aŋ_{353}$ ($lyaŋ\text{-}ŋ_{353}$)	$lyaŋ_{13}$	'cool'
c.	kaw_{35}	kaw_{31}	kaw_{33}	▸ $ka\text{-}aw_{351}$ ($kaw\text{-}w_{351}$)	kaw_{33}	'thick'
d.	twa_{35}	twa_{31}	twa_{33}	▸ $twa\text{-}a_{353}$ ($twa\text{-}a_{353}$)	twa_{33}	'big'

The contracted forms in (10B) are usually transcribed as (11a) below in the literature (Yang 1991, Cheng 1993 and Hung 1994), which means that the contracted syllables are not different from other non-contracted syllables except tone:

(11)

a. Contracted syllable	b. Final syllable	Glossary
sin_{353}	sin_{55}	'new'
$lyaŋ_{353}$	$lyaŋ_{13}$	'cool'
kaw_{351}	kaw_{33}	'thick'
twa_{353}	twa_{33}	'big'

Phonetically, a contracted syllable (11a) differs from the final syllable (a non-contracted syllable (11b)) not only in tonal shapes but also in syllable duration. Thus the transcription given in (11a) fails to reflect the phonetic nature of a contracted syllable. For this reason, we will base our discussion of the trisyllabic adjective on the transcriptions in (10B) (see also the discussions in Hung 1985).

If rising and falling diphthongs are of one single mora, as represented in (5), there is no resort to explain why the lengthening of the nucleus vowels of (10B)

11. Both reviewers wondered from which dialect this lengthening comes. We would like to claim that the main data in this paper are taken from the Taiwanese dialect spoken in Southern Taiwan, in particular, in Tainan, Kaohsiung, and Pingtung areas. In fact, the tri-syllabic adjective shortened to bi-syllabic is also reported in Hung 1994:13 14. It is not entirely new at all.

may yield different results.[12] In (10Bd), a rising diphthong is lengthened, while in (10Bc), only the nucleus vowel is lengthened. This suggests that the moraic syllable structure as represented in (6) fails to account for the phonological properties of lengthening in (10).

This problem is resolved, if syllable structure is based on the representations in (5), assuming that the lengthening results from the insertion of a mora between the source morae.

Phonological phenomena like the nucleus lengthening of Taiwanese are also found in the glottal stop insertion in Xiaoyi (Guo 1989), Huangyan (Chao 1934), Yugan and Wunpo (C. Chen 1992).[13] Take Xyaoyi for example, in syllables with 412 tone, phonetically, "in the transition of the rising and falling tones, there is an obvious glottal stop" (Guo 1989:9).[14]

(12)

a.	paʔa	'to make'
	puʔu	'to repair'
b.	liaʔa	'cold'
	suaʔa	'to play'
c.	paʔai	'to dangle'
	meʔei	'beauty'
d.	kuaʔai	'stable'
	kuaʔaŋ	'wide'

The glottal stop is inserted after the first mora of a syllable, just like the nucleus lengthening of Taiwanese, if we follow the moraic representations given in (5). By contrast, this poses another problem with the moraic structures proposed in (6).

So far, we have examined the two possible moraic structures in (5) and (6), respectively. The structures in (5) are competent for the nucleus lengthening,

12. Note that there are phonetically two variations in the contracted form. The other form is quite regular in having the last segment lengthened.
13. According to C. C. Cheng (personal communication), syllables with the third tone (whose pitch values are 214) in Mandarin behave exactly the same, with a glottal stop realized in the transition of the falling and rising tones: *myaʔau*$_{214}$ 'second', *laʔau*$_{214}$ 'old.' However, it is a "creaky voice" instead of a glottal stop according to Belotel-Grenié and Grenié (1997) (cited from the anonymous reviewer's comments. That paper is not available to me thus far.) The essential point here is that there **must** be something in between the falling and rising tonal contours in phonetics.
14. We follow Guo's transcriptions of the glides as *u* and *i* respectively.

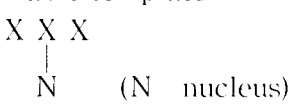
the glottal stop insertion, and the requirement that a Minimal Word should be composed of at least two morae. However, they fail to account for the phonological properties revealed in the SL formation, nasality, labial dissimilation without *ad hoc* stipulations. On the other hand, the moraic structures in (6) capture the generalizations of the SL formation, nasality, and labial dissimilation, whereas they are inadequate to fulfill the lengthening phenomenon, the glottal stop insertion, and the two-mora minimal word requirement.

It might be claimed that the nucleus lengthening, the glottal stop insertion, and the Minimal Word requirement are directly involved with syllable structure, while nasality, SL formation, and labial dissimilation are segmental. For this reason, the account for the segmental rules can be done without referring to the notion of mora. This suggestion is quite reasonable. But what we would like to point out here is that it is the nucleus lengthening, the glottal stop insertion, and the Minimal Word requirement that the moraic structures in (6) fail to account for. In addition, the moraic structures in (5) not only fail in those segmental rules, but they are unable to distinguish VG from VC in terms of syllable structure. Furthermore, the process of the SL formation is indeed involved with syllable reduplication, and hence we find no excuse to exclude it from the syllable structure. That is the main reason for us to give up the moraic role here.

3. Syllable structure based on the X-skeleton

After pointing out the weakness of the syllable structure based on mora, we will show that the only theory capable of accomodating to account for all of these phenomena examined so far is the syllable structure based on the X-skeletons. We assume that there is a three-skeleton template (13) for every Chinese syllable:[15]

(13) Syllable template

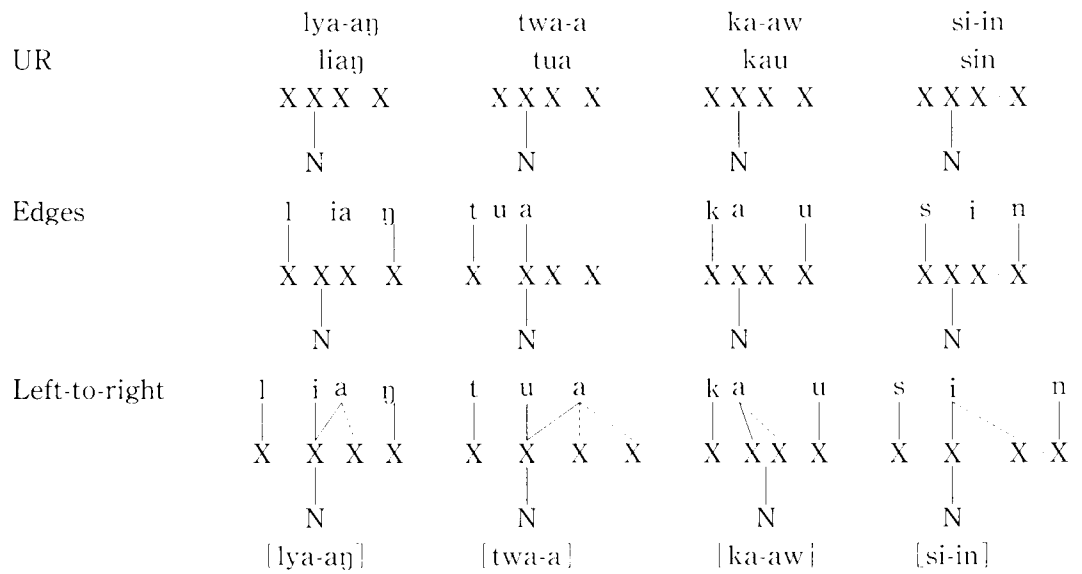


Based on the template, the nucleus lengthening is accounted for with the following assumptions. (a) A syllable contracted from the first two syllables of a trisyllabic adjective is lengthened because of getting another timing slot. (b) The association of skeletons with melodies begins with the two edges (Yip 1988).

15. For concrete arguments for the template, see Chung 1989, 1996.

(c) The vocoid is taken from left to right, with a rising diphthong associated with a single slot while a falling diphthong associated with two slots. (d) The vowel spreads rightward to the unfilled skeleton, preventing it from being stray erased. A process is exemplified as follows.

(14)

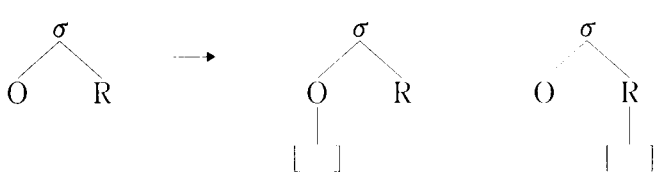


Note that the glottal stop insertion occurs in exactly the same position where the vowel is lengthened. Furthermore, both the glottal stop insertion and lengthening occur in syllables with a super-length tone (with three tonal units) such as 412 tone in Xiaoyi and the 214 tone in Mandarin. This dovetails neatly with our assumption that a syllable incurring the glottal insertion and Taiwanese lengthening has one more skeleton than unmarked syllables.

Moreover, the nature revealed from the SL formation, nasal harmony and dissimilation, and labial dissimilation lies in the difference between VC and VG. As proposed in (4), VG is a non-branching rime while VC is a branching rime.

Based on (4), we assume that the SL is derived from the reduplication of the source syllable (cf. Bao 1990), with the first syllable having a [coronal] for the onset and the second syllable a [coronal] for the rime, both by default.

(15) SL formation



The rule has collapsed two steps into one, namely, Reduplication and Substitution. We assume that there is no [-voice] feature.[16] Accordingly, the onset or the coda specified with [coronal] after substitution is induced as *l*. When it gets the nasal feature, it surfaces as *n*. If there is no nasal feature, *l* appears in the onset position (because only [voiced] is licensed in the onset position (Lombardi 1992)) and *l* comes up in the coda position, due to glottalization.[17] Since *i* is the only coronal vowel that occurs as an independent nucleus, the [coronal] in the nucleus position is encoded as *i*.[18] Note that within our syllable theory, the difference between syllables with and without a coda lies in the distinction between a branching and a non-branching R(ime). Consequently, the [coronal] feature assigned to a branching R is shared by the nucleus and the coda.

For nasality and labial dissimilation, we propose the following rules:

(16) Domain definition

N ▸ (ON)

C ▸ (C) O = onset, N = nucleus, C = coda

(17) One-feature Constraint

$*[(F_i)](F_i)]_\sigma$ F = [nasal] or [labial]

The rules in (16) claim that the onset and the nucleus of a syllable constitute a feature domain while the coda forms an independent feature domain. Accordingly, a GV, VG, or GVG sequence constitutes one single feature domain, whereas a VC syllable has two domains. The rule in (17) says that the two domains of a syllable are not allowed to have the same feature. By feature, we mean the [nasal] or the [labial]. In view of this, structures such as GV, VG, and GVG are allowed to share a [nasal] or a [labial] feature, but a VC structure permits only one feature domain, namely, the coda, to be specified with [nasal] or [labial]. However, the [nasal] and the [labial] features are different in two aspects. To begin with, in a CV, CGV or CVG structure, the segments within that domain should be all nasalized if there is a nasal feature, while the [labial] may be given to only one segment or two, e.g. pi_{53} 'to compare', $mu\tilde{a}_{13}$ 'sesame', pau_{55} 'to pack'. It is impossible for all the segments within CGV or CVG to share the [labial] feature, because forms such as **ou* and **uo* must be ruled out in Tai-

16. The proposal that the [voice] is a privative feature can be seen in Lombardi 1992.
17. We follow Duanmu 1994b by taking the view that the stop ending an E-tone is glottalized.
18. Clements and Hume 1995 and Hume 1992 provide cogent arguments for front vowels to be [+coronal]. But the other [+coronal] vowel in Taiwanese, namely, *e*, is absent when it is followed by a coda because of some other independent constraints (Chung 1996).

wanese.[19] Secondly, while the [nasal] feature spreads, the [labial] feature does not, as revealed in *kaw*$_{53}$ *wa*$_{53}$ (*kaw*$_{53}$ + *a*$_{53}$) 'dogs'. The difference between the [nasal] and the [labial] features lies essentially in their different nature. According to Halle 1995, the [labial] is a place feature, dominated under the Oral Place Node within the feature organization, while the [nasal] is a feature directly dominated by the Supralaryngeal Node. Perhaps that is why the feature [nasal] spreads while the [labial] feature does not.

In summary, the skeleton-based syllable structure characterizes all the properties presented in nucleus lengthening, nasality, labial dissimilation, and the SL formation. Therefore we advocate that the syllable structure of Taiwanese should be skeleton-based instead of mora-based.

4. Concluding remarks

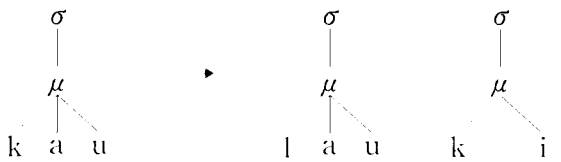
In the preceding sections, we first discussed that the role of mora in Tai-wanese phonology is not so significant in stress or poetic meters. Then we examined the moraic structures as well as skeleton-model in light of SL formation, nasality, labial dissimilation, nucleus lengthening, and the Minimal Word requirement. The conclusion is tentatively reached that the Taiwanese syllable structure can be better described within the skeletal framework. However, there is one more question worth further exploration. That is: Can the notion of nucleus (N) be treated on a par with the onset?

As far as syllable theories developed thus far are concerned, onset and rime are the only two formal phonological units.[20] Thus it is somewhat new to consider that onset and nucleus within a syllable may constitute a phonological domain. A promising resolution is that onset is put under a mora with the nucleus vowel (as suggested in Hyman 1985, and Broselow 1995). If this is the case, nasal and labial dissimilation might be more naturally accounted for. However, the cost is high in that the SL formation will be a puzzle because it is difficult to differentiate onset from the vowel, as illustrated below:

19. Diphthongs with identical backness will be ruled out in Taiwanese, and hence, **uo*, **ou*, **ie*, and **ei*.

20. Mora should be also an important unit, in particular, in the framework of Optimality Theory. But what we are concerned with here is the onset and the rime of a syllable within the non-linear framework.

(18)



Thus to examine the related phonological properties from every respect, we still think, as put in Halle's words (p. c.) "The theory of mora is not rich enough in terms of hierarchical representations."

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莫拉理論與台灣閩南語的音節結構

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摘　要

本文主要說明音韻理論中的莫拉理論，並不能夠用於解釋台灣閩南語的音韻現象。本文用於辯駁的依據是：台灣閩南語的(a)祕密語結構，(b)鼻音的和諧與異化，(c)唇音異化現象，及(d)一音節中之前兩音節的合併現象。這些現象共同之處即在闡明台灣閩南語的音節中，元音韻尾與輔音韻尾的音韻表現不同，而這正是莫拉理論之窘境。此外，本文認爲較足以解釋台灣閩南語的音節結構的理論，應該是音架論(skeleton model)。

關鍵詞：莫拉理論，祕密語結構，鼻音的和諧與異化，唇音異化，音節合併，音架論

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