

Introduction

Application is an interesting topic in the area of the prosodic morphology, even in Optimality Theory (McCarthy & Prince 1995). In Chinese Fuzhou dialect, there are many kinds of applicated forms. For example, the total reduplication forms ($A > AA$) of a monosyllabic noun would be represented as the diminutives (Chen 1998). Partial reduplication forms ($AB > ABB$ or B) of disyllabic adjectives in Fuzhou (Qu 1995) amplitude the degree of modification. However, monosyllabic words could be augmented to disyllabic words by the processes of reduplication and insertions of fixed segments, e.g. Fuzhou Qiejiaoci (henceforth *Q*), e.g. *tuoi > tuo tuoi* 'holding hands'. In *Q*s the final coda segment of the first syllable is always truncated and the */l/* is always inserted as the onset. In this paper, reduplication, truncation, and fixed segmentism in *Q*s would be analyzed in Optimality Theory (henceforth OT). The important issue is that the language-specific syllabic template for application is not needed. And the appearance of non-copied part is due to avoid the marked structure.

Fuzhou Phonology

Consonants

Fuzhou consonantal system (Jan 1981, Chen & Zheng 1990, Chen 1998) listed in (1), Fuzhou has fifteen consonants.

(1)	p	p ^h	m	
	t	t ^h	n	l
	ts	ts ^h	s	
	k	k ^h	ŋ	x
?				

the important phonotactic rules are listed below:

- (2a) Bilabial stops change to the labial fricative $/β/$ between two vowels, while become to the labial stop $/m/$ when follow a nasal.
- (2b) the apical consonants $/t, ts, s/$ change to the lateral $/l/$ between two vowels, while become to the coronal nasal $/n/$ when follow a nasal.
- (2c) $/ts, ts^h, s/$ would be palatalized to $/tʃ, tʃ^h, ʃ/$ if they are followed by high front vowels.
- (2d) the velar consonants would be deleted between two vowels, while become to the velar nasal $/ŋ/$ when follow a nasal.

Vowels

The basic vowels in Fuzhou are $/a, e, ə, o, i, u, y, /i, u, y/$ could be the on-glide or the off-glide. Fuzhou vowels could be divided into two sets of the phonetic forms, the lax and the tense, depending on the tones they are associated with (Liang 1982, Qu 1995). The so-called tense

vowels co-occur with the tones, PingSheng, ShangSheng, YangRu while the lax forms with the ChiuSheng and YinRu. In case of undergoing tone sandhi, the lax vowel will change to its tense counterpart. Generally speaking, the major differences are: a tense vowel tends to higher (e.g. au> ou), or more fronted (e.g. a >a), and the lower half of a lax diphthong is dropped, leaving behind a tense monophthong (ei>i) (Qu 1995). The lax/tense forms of the vowels are listed in (3) (Wang 1969:118)

(3) PingSheng, ShangSheng, ChiuSheng, YinRu

YangRu		
i		ei
y		œy
u		ou
a		ɑ
œy		oy
ou		ou

2.3 Tones

Fuzhou has seven citation tones, traditionally called YinPing, YankPing, ShangSheng, YinChiu, YangChiu, YinRu, YangRu. According to the pitch value, the seven tones are represented as below in (4) (Liang 1982, Qu 1995, and many other)¹.

(4) the tones tonemes

YinPing (55)	HH
YangPing (53)	HL
ShangSheng (31)	Lor M
YinChiu (213)	LH
YangChiu (353)	LHL
YinRu (13)	LH
YangRu (5)	H

As mentioned above, in Fuzhou [-High] tonal domain the vowels must be the lax forms, while

¹ Jang (2000) organizes the previous studies about the pitch values of Fuzhou tones.

	YinPing	YangPing	ShangSheng	YinChiu	YangChiu	YinRu	YangRu
Maccy&Baldwin	44	53	33	13	341	13	4
Tao1956	44	52	31	113	452	24	4
Yuan 1989	44	53	31	213	242	23	4
HanYu Fangyin 1989	44	52	31	213	342	23	4
Lan1953	55	61	33	11	242	13	56
Wang1969	55	51	33	113	242	24	45
Li & Liang1994	44	53	31	213	242	23	5
Liang&Feng 1996	44	53	32	212	242	23	5
Chen1998	55	53	33	213	242	24	5
Feng1998	55	53	33	212	242	24	5
Jang2000	55	51	31	11	353	13	5

e tense forms mostly are associated with the higher tones. In a disyllabic word domain the ones of the preceding syllable may undergo tone sandhi. The rules of tone sandhi in Fuzhou are complicated. Some of the rules concerned with the FQs would be listed in the next section, and e other will not be mentioned here.

II. Fuzhou Qiejiaoci (FQ) Formation

Fuzhou many monosyllabic words are augmented into disyllabic words (Chen 1998). The meaning FQs is almost identical to the original monosyllables. The formation of FQs is explained

- (5a) tuo1>tuo1 no1 'holding hands'
 (5b) ta1>ta1 lan 'sunshine'
 (5c) tau>ta1 au 'hang'
 (5d) mo1>mo1 lo1 'stick'

The data in (5) shown the source syllable is totally copied to form the FQs. The first derived syllable of FQs is alliterated with the source syllable and the second derived syllable is formed with the source syllable. The lateral /l/ segment is inserted as the onset of the second derived syllable of FQs. Comparing the two derived syllables of FQs the Final (rime) of the source syllable is reduplicated as the nucleus in the second derived syllable while the coda segments such as /i, u/ (vocalic codas), /ŋ/ (a nasal coda), /ʔ/ (a glottal coda) in (5a-d) are uncatenated (Liang 1982).

The tone of the second derived syllable of FQs is identical to the source syllable. The tone of the first syllable undergoes the two tone sandhi rules listed in (6):

- (6a) PingSheng > ShangSheng (31, a mid/low tone)
 YangRu
 (6b) ChiuSheng > ChiuSheng (11, low tone)
 YinRu

generally speaking the sandhi tones of the first syllable in FQs are the low ([-High]) tones, 31 tone, and 11 tone (Liang 1982). If the tone of the source syllable is high, as in (6a), the derived syllable would change to the lower tone. If the source syllable is with the low tone, the tone of e derived syllable would be more lower. As mentioned in (3) a syllable in Fuzhou with the ShangSheng and ChiuSheng has to be with the tense vowel form. Therefore the derived form with the sandhi tone would be with the tense vowel form.

The special character of FQs is to truncate the coda segment of the source syllable in derivation of FQs. That is, the CV/CGV syllabic structures are the only two possible types in the first syllable of FQs. In Fuzhou C₁C₂VC₃C₄ seems to be the largest template. However in

The sandhi tone (11) appears in the sandhi domain but not in the citation Fuzhou tones. Comparing with other tones it is very low so I use ChiuSheng to represent it.

Fuzhou syllables only two of the C_2 , C_3 (C_2C_3 to be vocalic glides), C_4 (a nasal or a glottal stop) are allowed to appear in a syllable simultaneously. According to the constraint Liang (1982) lists the fourteen syllabic types in Fuzhou. No matter what the syllabic type is, the formation of the first syllable of FQs is to reduplicate form the onset to the nuclear vowel, but the coda would not be copied. The more data are listed in (7). This interesting phenomenon would be analyzed and explained in OT in the following sections.

(7a) CVGC	tuoi>tuɔ luoi	'holding hands (as in 5a)
(7b) CVN	taŋ>ta laŋ	'sunshine' (as in 5b)
(7c) CVC	moʔ>mo loʔ	'stick' (as in 5d)
(7d) CVG	tau>ta lau	'hang' (as in 5c)
(7e) CV	pœ>pœ lœ	'kick with strength'
(7f) VGC	ouʔ>o/u louʔ	'fold'
(7g) VG	au>a lau	'indented'
(7h) VC	œʔ>œ lœʔ	'sound of vomit'
(7i) V	o>o lo	'stick'
(7j) CGVC	siaʔ>sia liaʔ	'slim'
(7k) CGVG	pieu>pie lieu	'spring out'
(7l) CGV	tie>tie lie	'drop down'
(7m) GVC	kuoŋ>kuo luŋ	'roll up'
(7n) GVG	uai>ua lai	'slope'
(7o) GV	uo>uo lu	'getting together'

IV. An OT analysis

4.1 Optimality Theory and Reduplication

Reduplication has been attracted a lot of attention in phonological theory and OT. Many languages seem to have more than one pattern of reduplication, e.g. total or partial reduplication, augmentation or truncation. Reduplication is a kind of morphological word formation where a phonological string with morphological information is repeated. Many kinds of reduplication data have shown that the whole source is copied (total reduplication) with /out phonological change, while some part of the source is copied or disappear or something new appears. Steriade (1988) proposes the derivation is not haphazard, but to avoid marked structures. That is, the many kinds of the surface reduplicating forms derive from a single linguistic system. This idea, *the emergence of the unmarked* (henceforth TETU), also has been given by McCarthy & Prince (1994, Spaelti 1997).

In previous studies of reduplication, a template has been postulated onto which segments from the base are mapped. A typical approach of partial reduplication suggests that this is the result of templates proposed by McCarthy (1979), Marantz (1982), McCarthy & Prince (1986) and many others. However such templates have no status in imposing the proper size restriction on the morphological constituent. And the determination of which part to be the reduplicant or