A Study on the Emergence of the Unmarked in Chinese Reduplication and Phonological Issues*

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Chung, Chin-Wan. 2011. A Study on the Emergence of the Unmarked in Chinese Reduplication and Phonological Issues. *The Linguistic Association of Korea Journal. 19*(2). 105-129. The current study focuses on partial reduplication of three Chinese dialects. The study reveals that the location of on-glides in the dialects is different. The study also shows that the emergence of the unmarked occurs not only in the reduplicant but also in the base under the proposed constraint ranking schema. The realization of the diminutive morpheme[1] in the different syllable position in three dialects is explained by two different alignment constraints.

Key Words: partial reduplication, constraint, reduplicant, diminutive, TETU

1. Introduction

Reduplication refers to a process by which a portion or an entire string of sounds, called the 'base' is copied. This copied portion is dubbed the 'reduplicant' (Wilbur 1973) and is placed at the edges of the base. The former is called partial reduplication while the latter full reduplication. Reduplication of any type carries a certain semantic function such as plurality, repetition, intensity or kindness to mention a few (Moravcsik 1978: 310-318). The exemplary

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1) The diminutive morpheme in this study is assumed to be a type of fixed segment which is reminiscent of the fixed segmentism with a morphological basis (Alderete et al. 1999).

data of full and partial reduplication are give in (1).

(1) Indonesian full reduplication (Cohn 1989)

a. wanita	→	wanita-wanita[2]	'women'
b. mašarakat	→	mašarakat-mašarakat	'societies'

Nootka partial reduplication (Stonham 1990; Shaw 1992)

c. čims-'iħ	→	či- čims-'iħ	'hunting it'
d. wa:s-čiɫ	→	wa:- wa:s-čiɫ	'naming where....'

Reduplication is a morphological process that involves many interesting issues of phonology. Cross-linguistically, one of the most important phonological insights of partial reduplication is that it shows the emergence of the unmarked (TETU) in the reduplicant in terms of its feature and prosodic structure (McCarthy and Prince 1994a, 1995). The idea of TETU is that a markedness constraint such as NOCODA, which does not play an important role in regular phonology, comes to be crucial in certain linguistic phenomena such as partial reduplication.

Some Chinese dialects use partial reduplication along with a morpheme {l} or {r} to produce diminutive formation. Noteworthy aspects of diminutive formation in some dialects of Chinese are that each dialect has a slightly different copying nature when the diminutive morpheme is incorporated into the reduplicant with respect to the different position of affixation. It may seem tangential to the main point but a phonological issue that can be drawn from the current study is that on-glides in the dialects are seemingly affiliated with different sub-syllabic constituents. Thus, glides can be classified as either a part of nucleus or a part of onset. As illustrated in many languages, the partial reduplication of Chinese dialects also shows the implementation of TETU. However, one deviation from the normal emergence of the unmarked is that one of the dialects seemingly shows TETU in the base rather than the reduplicant, which is contrary to what is expected in partial reduplication.

2) In full reduplication, since both the base and the reduplicant are identical, it is difficult to define which part is the base or the reduplicant. The direction of the reduplication is generally decided by language-specific factors.

The aim of this paper is three-fold. First, the slightly different implementation of partial reduplication in three dialects of Chinese is closely observed and accounted for based on constraints and their ranking. Second, I explain how the emergence of the unmarked in the base can be represented within Optimality Theory (Prince and Smolensky 1993, 2004). Third, the paper elaborates on how medial glides of three Chinese dialects are grouped in their sub-syllabic classification in the partial reduplication process. I also propose how sub-syllabic structure of post-consonantal glides revealed in the study can fit with the traditional syllable structure of Chinese.

The paper is organized as follows: Section 2 presents the data taken form partial reduplication within three dialects of Chinese. Section 3 reviews and points out some problems of previous analyses on Chinese partial reduplication. A constraint based account of the Chinese partial reduplication is presented in section 4, which is followed by the conclusion and implications of the paper in section 5.

2. Data

I present the examples of partial reduplication in Fuzhou, Jianou, and Anxiang. Before the data are presented, I first capture the summary of diminutive formation. The partial reduplication occurring in diminutive formation is also known as 'fission reduplication' (Sun 2001) and the 'L-word' (Bao 2000). Diminutive formation generally occurs with mono-syllabic words and the three dialects share a common procedure which they undergo in that process. It is briefly summarized in (2). I unified slightly different types of diminutive formation into one (Bao 2000).

(2) Diminutive formation
   a. Copy the syllable and place it to the right edge of the first syllable.
   b. Replace the onset or the coda with *l* or *r* in the second syllable (*l*: Fuzhou and Jianou; *r*: Anxiang).
   c. Delete coda in the first syllable (for Anxiang).
   d. Neutralize the vowel in the second syllable to [ə] (for Fuzhou).

As indicated in (2), it is a case of partial reduplication because either onset or coda element of the copied part is replaced with *l* or *r* in the output, which signals a failure of the complete copying of the base. In terms of meaning, the reduplicated forms generally diminutize the associated word. For example, when a noun is partially reduplicated, it generally denotes 'a small noun.' But diminutive formation does not always add the meaning of smallness. Often the diminutive formation carries a stylistic feature (Duanmu 2000: 212-213).

I first present the examples of the Fuzhou diminutive formation. The examples are mainly drawn from Bao (2000) who cites Liang (1982). I do not mark tones unless they indicate critical meaning distinction.

(3) Fuzhou (Bao 2000)

a. CV(G)(C) → CV-lV(G)(C)

paiŋ	→	pa laiŋ	'to turn'
p'ɔyŋ	→	p'ɔ lɔyŋ	'to expand'
taŋ	→	ta laŋ	'to shine on'
miŋ	→	mi liŋ	'to hide'
tau	→	ta lau	'to hang'
tɛu	→	tɛ lɛu	'to drop'
ta	→	ta la	'to entangle'
mo	→	mo lo	'to protrude'

b. V(G)(C) → V-lV(G)(C)

ouʔ	→	o louʔ	'to fold'
ou	→	o lou	'to dent'
œʔ	→	œ lœʔ	'to throw up'
o	→	o lo	'to stick'

c. CGVG(C) → CGV-lGVG,C

tsiaŋ	→	tsia liaŋ	'to splash'
ts'ou	→	ts'o lou	'to startle'
k'ieu	→	k'ie lieu	'to shrink'
tuɔi	→	tuɔ luɔi	'to grab on to'
ts'uo	→	ts'uo luo	'to screw'

d. GVC → GV-lGVC

uaʔ	→	ua <u>luaʔ</u>	'to poke out'
ua	→	ua <u>lua(i)</u>	'not straight'
uo	→	uo <u>luo</u>	'together'

As presented in (3a)-(3d), Fuzhou diminutive formation copies the first syllable and the copied part is placed at the end of the first syllable. In the reduplicant, the diminutive morpheme replaces the onset element of the reduplicant, which mimics the fixed segment in the reduplicant in that it not only replaces the onset of the reduplicant but also it fills the onset position of the reduplicant when the base begins without its onset as shown in (3b) and (3d). The examples in (3a), (3b) and (3c) reveal that off-glides in this dialect are treated as part of the coda element, which is demonstrated by their appearance in the coda of the reduplicant and their deletion within the base. For example, the post-nuclear /y/ in /p'ɔyŋ/ → [p'ɔ <u>lɔyŋ</u>] 'to expand' appears in the coda along with *ŋ* but it is not realized in the base because it is deleted along with *ŋ* in the base. On the other hand, the pre-nuclear glides in (3c) and (3d) are considered part of the nucleus. If they were to be treated as part of the onset, they would not occur in the reduplicant when the onset is replaced with the diminutive morpheme: /ts'uo/→ [ts'uo <u>luo</u>] *[ts'uo <u>lo</u>] 'to screw'. This shows that on-glides and off-glides in this dialect are asymmetrically grouped in the sub-syllabic structure. It is noted that the first syllable (base) in Fuzhou partial reduplication always ends without its coda even if a coda is presented in the input. This shows an interesting aspect of reduplication, which will be discussed in the analysis section.

Next, I present the examples of partial reduplication in Jianou, which show a similar partial reduplication process like that of Fuzhou. I adopted the data from Da (1996).

(4) Jianou (Da 1996)

a. CV(G)(C) → CV(G)(C)-lV(G)(C)

paiŋ	→	paiŋ <u>laiŋ</u>	'to turn'
kau	→	kau <u>lau</u>	'to mix, blend'
tiŋ	→	tiŋ <u>liŋ</u>	'to twist'

ŋaŋ	→	ŋaŋ <u>laŋ</u>	'to clog'
pu	→	pu <u>lu</u>	'to roll'
ts'u	→	ts'u <u>lu</u>	'to flip one's eyes'
tse	→	tse <u>le</u>	'wrinkle'
pa	→	pa <u>la</u>	'untidy'
mɔ	→	mɔ <u>lɔ</u>	'unsmooth'

b. V(G)(C) → V-lV(G)(C)

ɔŋ → ɔŋ <u>lɔŋ</u> 'to blend'

c. CGVG → CGV-lGVG

niau → niau <u>liau</u> 'to wind'

d. GVC → GVC-lGVC

yiŋ → yiŋ <u>lyiŋ</u> 'to lean aside'

As presented in (4a-d), the first syllable is copied and the reduplicant is suffixed while the diminutive morpheme appears as the onset of the reduplicant. One difference from the partial reduplication of Fuzhou, in terms of the segment in the output, is that all the input segments of Jianou appear in the output without undergoing any deletion. Jianou treats the on-glide /y/ as part of the nucleus as shown by the data in (4c) and (4d). If it were a part of the onset element, it would be replaced with the diminutive morpheme in the reduplicant, but it appears in the reduplicant with the following nucleus as shown in /niau/→[niau <u>liau</u>] *[niau <u>lau</u>] 'to wind.' This indicates that the on-glide /y/ in this dialect is a part of the nucleus. As for the other on-glide, I cannot definitively determine the sub-syllabic treatment of /w/ in this dialect since there is no data for /w/. The sub-syllabic classification of off-glides is evident from the given examples because they consistently appear along with a consonant in the base as well as in the reduplicant.

Finally I present the partial reduplication of Anxiang in (5a-c). The data are mainly drawn from Yip (1992) and Da (1996). The examples of partial reduplication in this dialect show some characteristics found in Jianou regarding the faithful realization of the input elements in the output.

(5) Anxiang (Yip 1992; Da 1996)

a. CV(G)(C) → CV(G)(C)-CVr

p'a	→	p'a p'ər	'claw'
ke	→	ke kər	'square'
p ' a u	→	p'au p'ər	'bulb'
tou	→	tou tər	'peak'
loŋ	→	loŋ lər	'cage'
kan	→	kan kər	'stick'

b. CGV(C) → CGV(C)-CGr

tyi	→	tyi tyər	'flute'
p'wu	→	p'wu p'wər	'shop'
tye	→	tye tyər	'plate'
myan	→	myan myər	'quilt'
xwaŋ	→	xwaŋ xwər	'frame'

c. GVC → GVC-lGVC

yan	→	yan yər	'courtyard'

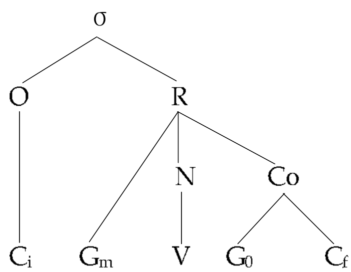
As illustrated in (5a-c), all the input segments appear in the output just like Jianou, yet this dialect has four differences compared to Fuzhou and Jianou in the nature of reduplication. First, the diminutive morpheme is realized as the coda of the reduplicant, replacing the post-nuclear glide and a following consonant if there is one as shown in /p'au/→[p'au pər] *[p'au pəur] 'bulb' and /kan/→ [kan kər] *[kan kərn] 'stick'. Second, the nucleus of the base is neutralized to *ə* in the reduplicant as illustrated in all the examples of (5). Third, the post-consonantal glides are treated as part of the onset forming of an onset cluster because glides are copied along with a preceding consonant in the reduplicant. Finally, the diminutive morpheme in this dialect is found in the coda position as *r*, which is also different from Fuzhou and Jianou where the morpheme is realized as the onset element as *l*.

As presented in this section, partial reduplication examples in Fuzhou, Jianou, and Anxiang show that even though the dialects share some common factors with respect to partial reduplication, they have clear differences among themselves as well. In the following section, I briefly present pervious studies of partial reduplication and point out problems of the accounts.

3. Previous Analyses

I review two previous analyses of partial reduplication in the Chinese dialects. After I present the two previous analyses, I discuss some important issues that they did not discuss in their analyses. Bao (2000) proposes the syllable structure of Fuzhou as given in (6). Based on the syllable structure in (6), he puts forth the two rules to account for partial reduplication in Fuzhou.

(6) The syllable structure of Fuzhou



C_i: Initial consonant
G_m: Medial glide
G_0: Coda glide
C_f: Final consonant

Bao argues that there are five sub-syllabic elements but that a single syllable cannot have all five elements in the output. Thus, the maximal syllable segments that can occur in one syllable is four. His two rules, given in (7), are based on this syllable structure.

(7) Two rules in Fuzhou partial reduplication (Bao 2000:294)
   a. Replace (C_i): Replace C_i with *l* in the second syllables.
   b. Delete (Co): Delete Coda in the first syllable.

He claims that the output forms in (3) can be achieved as illustrated in (8).

(8) Derivation of Fuzhou partial reduplication

Base:	Co pa iŋ		Co k'ieu	
Copy:	Co pa iŋ	Co pa iŋ	Co k'ieu	Co k'ieu
Replace C_i:	Co pa iŋ	Co la iŋ	Co k'ieu	Co lieu
Delete Co:	pa	Co la iŋ	k'ie	Co lieu
Output	pa	laiŋ	k'ie	lieu

Bao's rule-based approach explains the partial reduplication examples of Fuzhou. This rule-based account, however, fails to specify an important issue in partial reduplication such as TETU in the base, which is triggered by the rule in (7b). The rules in (7) apply and explain the examples of partial reduplication but the possible effect of rule application is not clearly reflected in the rule-based analysis of Fuzhou partial reduplication.

Unlike a rule-based analysis, Da (1996) proposes an account of Jianou diminutive formation based on the constraints given in (9).

(9) Constraints for Jianou diminutive

a. *COMPLEX: No sequence of segments are allowed either at the onset or coda position.

b. *CODA: $*C]_\sigma$ Syllable final coda is prohibited.

c. PARSE (X): X must be incorporated into the phonetically-interpreted representation.

d. ALIGN ($[r]_{AF}$, R, Stem, R): Align the diminutive morpheme /r/ to the right edge of the stem.

Da treats the diminutive morpheme *r* as a suffix and it is incorporated as the onset element in the Jianou partial reduplication, which indicates that it would be violated in the analysis and it is not a high-ranking constraint. Parse is undominated since all the elements in the input always occur in the output. *COMPLEX is ranked higher than *CODA because creating a singleton coda is more desirable than creating a complex onset or a coda cluster. Da evaluates the violation of the *CODA gradiently in that if a candidate has a coda cluster, it results in two violations of the constraint. The exemplary constraint tableau is given in (10).

(10) Input: {pu, r} 'roll'

Candidates	PARSE	*COMPLEX	*CODA	ALIGN
a. <p>lu	*!			u
b. plu		*!		u
c. pul			*!	
d. lu.pu				up!u
☞ e. pu.lu				u

Candidate (a) is not optimal since it violates the highest ranking constraint by not parsing *p* in the output. Candidates (b) and (c) are also undesirable due to their violation of *COMPLEX and *CODA, respectively. Candidate (d) is inferior to the optimal form because its diminutive morpheme is further away from the right edge of the stem than that of the winning candidate.

Da's constraints and their ranking explain the examples of Jianou diminutive forms without employing a reduplicative morpheme in the input. But if I consider more examples which have a coda consonant, the proposed constraint ranking fails to account for some candidates as illustrated in the following tableau.

(11) Input: {kau, r} 'to mix, blend'

Candidates	PARSE	*COMPLEX	*CODA	ALIGN
a. kau<l>	*!		*	
b. klau		*!	*	au
c. kaul		*!	**	
☞ d. kau.la			*	a
☚ e. kau.lau			**!	au

As shown in (11), the intended optimal candidate (e) loses to (d), which violates *CODA only once by realizing only *a* to avoid the additional violation of *CODA. Candidate (d) does not violate PARSE because it has all correspondents of the input {kau, r} in the output and the *a* is added in order not to create a coda cluster in the first syllable. This problem is triggered by not using the reduplicative morpheme in the input. Thus, without having any reduplicative morpheme, no candidate in the output has to copy the base segments in order to form the second syllable. The optimal candidate loses to (d) even if I permute the ranking between *CODA and ALIGN because the violations of candidate (d) is a proper subset of candidate (e). Accordingly, the constraints and their ranking in (11) fail to explain the examples of diminutive formation in the Jianou dialect.

The problem also arises if I review Da's application of the same constraint ranking to the examples of the Anxiang diminutive formation because the constraint ranking cannot select the optimal output for some data. The following tableau illustrates an example from Anxiang.

(12) {xwaŋ, r} 'frame'

Candidates	PARSE	*COMP	ALIGN	*CODA
a. xwar<ŋ>	*!	*		*
b. xwaŋ.xwar		**!		**
☛ c. xwaŋ.xwər		**!		**
d. xwəŋ.xwər		**!		**
☞ e. xwaŋ.xər		*		**
f. x<w>aŋ.xər	*!			**

As shown in (12), the intended optimal form (c) is edged out by the incorrect optimal form (e). If I ignore the candidate (e) for a moment, I still face a problem of tied candidates between (c) and (d). Candidate (d) does not violate PARSE since the input vowel *a* is parsed and neutralized to *ə*. Thus, the given constraint ranking is still unable to select the actual optimal form. Again this problem is caused by not using the reduplicative morpheme in the analysis.

4. Analysis

In this section, I provide an alternative account for partial reduplication in Fuzhou, Jianou, and Anxiang within the theoretical framework of Correspondence Theory (McCarthy and Prince 1995). The characteristics of each dialect concerning partial reduplication is implemented by a different constraint ranking. I first deal with Fuzhou partial reduplication, which is followed by Jianou and Anxiang.

4.1. Partial reduplication in Fuzhou

In accordance to previous researchers (Bao 2000, Feng 2001, Sun 2001), I consider that diminutive formation in Fuzhou is a case of partial reduplication because the base element is copied and the onset element of the reduplicant is replaced with *l*. Thus, the reduplicant is short of copying all the segments in the base, which are the typical properties of partial reduplication. In the analysis, I use a reduplicative morpheme to copy the base segments to realize this morpheme. I adopt the full reduplication model proposed by McCarthy and Prince (1995: 252, 273) instead of the basic model. The full model includes one more reduplicative correspondence relation between the input and the reduplicant in addition to the faithfulness relations between the input and the output, and the base and the reduplicant. The new faithfulness relation in the full model monitors the correspondence between the input and the reduplicant. The constraints that are used in the analysis are presented in (13).

(13) Constraints for Fuzhou partial reduplication

a. ALIGN-RED: Align the left edge of the reduplicant with the right edge of the base.

b. MORPHREAL: Every underlying morpheme should be realized.

c. ALIGN-DIM: Align the left edge of the diminutive morpheme with the left edge of the reduplicant.

d. MAX-IR: Every segment in the input has its correspondent in the reduplicant.

e. MAX-BR: Every segment in the base has its correspondent in the reduplicant.

f. *COMPLEX: No sequence of segments are allowed at the onset or at the coda position.

g. NOCODA: Syllables are open.

h. MAX-IO: Every segment in the input has its correspondent in the output.

ALIGN-RED requires that the reduplicant be affixed to the right edge of the base so the reduplication is suffixing in nature. This constraint is ranked high in the analysis. MORPHREAL stipulates that any morpheme in the input should be realized in the output (Samek-Lodovici 1993). This constraint is highly ranked along with ALIGN-RED. ALIGN-DIM is also highly ranked in the analysis because the diminutive morpheme should replace the onset element of the reduplicant without any exception in Fuzhou partial reduplication. MORPHREAL and ALIGN-DIM do not show any ranking, so MORPHREAL is ranked equally with ALIGN-DIM.

MAX-IR requires a complete correspondence between the input and the reduplicant while MAX-BR demands a faithful mapping between the base and the reduplicant. These two constraints do not show any particular ranking between them. MAX-IR and MAX-BR, however, dominate *COMPLEX and NOCODA in that MAX-IR and MAX-BR call for a perfect mapping even if such a perfect correspondence creates a complex syllable margin or a coda element, which leads candidates to a violation of *COMPLEX and NOCODA.

In the present analysis, I rank ALIGN-DIM higher than MAX-IR and MAX-BR since the diminutive morpheme should override the onset of the reduplicant, even at the cost of violating MAX-IR and MAX-BR. However, NOCODA disallowing syllables ending with a consonant should be ranked over MAX-Io because in Fuzhou partial reduplication, the base does not end with any coda.

Based on the constraints and their ranking relations, I present an analysis of the partial reduplication of Fuzhou. In the tableaux, I do not include the constraints which do not play an important role in the selection of an optimal output. I first consider an input that has a singleton onset and a single coda element in (14).

(14) /taŋ/ → [ta-laŋ] 'to shine on'

/taŋ-RED-l/	AL-DIM	MAX-IR	MAX-BR	NOCODA	MAX-IO
a. taŋ.tlaŋ	*!			**	
b. taŋ.laŋ		*	*	**!	
☞ c. ta.laŋ		*	*	*	*
d. ta.la		**!	*		*

Candidate (a) is not optimal since it violates ALIGN-DIM, which is caused by not replacing the onset element of the reduplicant with the diminutive morpheme. Candidate (b) has two violations of NOCODA due to the faithful mapping of coda element of the input into the output. This is edged out by the optimal candidate (c) which has only one violation of NOCODA. The optimal form is selected over candidate (d), which has one more violation of MAX-IR by not realizing *ŋ* of the input in the reduplicant. Thus, candidate (c) emerges as optimal in (14).

We now consider an input that has an on-glide and the following tableau shows how the post-consonantal glide is treated in partial reduplication.

(15) /tsiaŋ/ → [tsia-liaŋ] 'to splash'

/tsiaŋ-RED-l/	MAX-IR	MAX-BR	*COMPLEX	NOCODA	MAX-IO
a. tsiaŋ.liaŋ	*	*		**!	
b. tsiaŋ.lia	**!	**!		*	
☞ c. tsia.liaŋ	*	*		*	*
d. tsia.laŋ	**!	**!		*	*

In (15), the optimal form is candidate (c), which has one violation of MAX-IR, MAX-BR, NOCODA, and MAX-IO, each. Candidate (a) is inferior to the optimal form due to its two violations of NOCODA. Candidates (b) and (d) are also sub-optimal because they incur one more violation of MAX-IR and MAX-BR than the winner. The constraint ranking revealed from Fuzhou partial reduplication is presented in (16).

(16) Constraint ranking for Fuzhou partial reduplication
ALIGN-RED, MORPHREAL, ALIGN-DIM ≫ MAX-IR, MAX-BR ≫
*COMPLEX, NOCODA ≫ MAX-IO

What is noteworthy from the evaluation of *COMPLEX in (15) is that no candidate violates the constraint and it clearly indicates that the on-glide *y* does not behave as part of onset in this dialect. The other interesting aspect inferred from the analysis is that the simple syllable structure occurs in the base, which is motivated by the ranking MAX-IR and MAX-BR over the markedness constraint, NOCODA, which in turn dominates the faithfulness constraint, MAX-IO[3]. Thus, I propose the ranking schema for TETU in the base and its implementation in Fuzhou is given in (17).

(17) The ranking schema for TETU in the base

Schema: IR/BR-FAITH ≫ PHONO-CON ≫ IO-FAITH

MAX-IR, MAX-BR ≫ NOCODA ≫ MAX-IO

The emergence of the unmarked in the base occurs in reduplication when a phono-constraint is not observed in the reduplicant, which is propelled by high-ranking MAX-IR and MAX-BR over NOCODA. On the other hand, NOCODA is observed only in the output of partial reduplication while it is not observed in regular phonology of Fuzhou, which implies that NOCODA is almost invisible in regular phonology and reduplicant in Fuzhou. It can be argued that a constraint-based account has an edge over a rule-based analysis with respect to the formal treatment of TETU in the base. This is because a rule-based account cannot formally represent the occurrence of the unmarked syllable structure in the base of Fuzhou partial reduplication, which I have pointed out in section 3.

4.2. Partial reduplication in Jianou

In this sub-section, I analyze partial reduplication in Jianou, which has a similar pattern of partial reduplication to that of Fuzhou. But as I have seen in the data in (3a-d) and (4a-d), Jianou and Fuzhou have differences in their reduplication patterns as well. I first present the constraints to be employed in the analysis. I adopt the constraints proposed for Fuzhou in the analysis of Jianou and the constraints are repeated in (18).

3) McCarthy and Prince (1995) do not include this type of ranking relation which leads to TETU in the base. Thus, TETU in Fuzhou might add an additional type to the typology of this sort.

(18) Constraints for Jianou partial reduplication

a. ALIGN-RED: Align the left edge of the reduplicant with the right edge of the base.

b. MORPHREAL: Every underling morpheme should be realized.

c. ALIGN-DIM: Align the left edge of the diminutive morpheme with the left edge of the reduplicant.

d. MAX-BR: Every segment in the base has its correspondent in the reduplicant.

e. *COMPLEX: No sequence of segments are allowed at the onset or at the coda position.

f. NOCODA: Syllables are open.

g. MAX-IO: Every segment in the input has its correspondent in the output.

In Jianou, ALIGN-RED, MORPHREAL, and ALIGN-DIM are undominated. I rank MAX-IO higher than MAX-BR and all the other two markedness constraints, *COMPLEX and NOCODA because all the input segments always appear in the output in Jianou. MAX-IO is also ranked higher than MAX-BR since this is partial reduplication. That is, an onset consonant of the base cannot appear in the reduplicant because it is overridden by the diminutive morpheme. *COMPLEX is used to verify how on-glides in this dialect are treated in sub-syllabic structure. The effect of *COMPLEX is mostly hidden by ALIGN-DIM when the diminutive morpheme is affixed after the initial consonant of the reduplicant on behalf of overriding it. *COMPLEX and NOCODA are ranked low and they do not show a particular ranking between them. Based on the constraint relations, I first present an input that has an off-glide element. In the tableau below, the irrelevant constraints are not included when choosing the optimal form.

(19) /kau/ → [kau-lau] 'to mix, blend'

/kau-RED-l/	AL-DIM	MAX-IO	MAX-BR	*COMPLEX	NOCODA
a. kau.kaul	*!**			*	**
b. kau.klau	*!			*	**
☞ c. kau.lau			*		**
d. kau.la			**!		*
e. ka.lau		*!	*		*

Candidates (a) and (b) are not optimal since they crucially violate the high-ranking AL-DIM. It can be inferred from the tableau that the best choice of realizing the diminutive morpheme is its replacement of the onset of the reduplicant. If it does not replace the onset, its best landing option is a true suffix or the second member of the onset cluster, but both strategies force the crucial violations of AL-DIM. The second strategy leads to a concomitant violation of *COMPLEX as well. Candidate (e) is eliminated because of its critical violation of MAX-IO, by not realizing an input segment in the output. The best competitor in (19) is candidate (d) but it is inferior to the optimal form due to its extra violation of MAX-BR. As shown in (19), MAX-IO plays an important role in Jianou. I now present the evaluation of an input that has an on-glide in (20).

(20) /niau/ → [niau-liau] 'to wind'

/niau-RED-l/	AL-DIM	MAX-IO	MAX-BR	*COMPLEX	NOCODA
a. niau.niaul	*!***			*	**
b. niau.nial	*!**		*		**
☞ c. niau.liau			*		**
d. nia.liau		*!	*		*
e. niau.lia			**!		*

Candidates (a) and (b) lose to (c), the optimal candidate, because they incur multiple violations of high-ranking ALIGN-DIM. Candidate (d) is also edged out by candidate (c) due to its violation of MAX-IO by not realizing an input off-glide in the output. Candidate (e) is ruled out by its additional violation of MAX-BR. As reduplicants from (20c) to (20e) show, the diminutive morpheme *l* only replaces the initial consonant *n* which indicates that the post-consonantal glide *y* in this dialect is treated as part of the nucleus. This is clearly reflected in the evaluation of *COMPLEX in (20) in which only candidate (a) incurs a violation of the constraint because of the coda cluster *ul*. The constraint ranking revealed from tableaux (19) and (20) for Jianou partial reduplication is given in (21).

(21) Constraint ranking for Jianou partial reduplication
ALIGN-RED, MORPHREAL, ALIGN-DIM ≫ MAX-IO ≫ MAX-BR ≫ *COMPLEX, NOCODA

The constraint ranking in (21) is similar to that of Fuzhou partial reduplication but in Jianou MAX-IO is ranked high to implement a complete mapping between the input and the output since there is a perfect correspondence between the input and the output. Concerning the classification of on-glide in Jianou, it can be inferred that the *y* is treated as part of the nucleus like Fuzhou. It can also be assumed that the second on-glide in Jianou is likely to be classified as part of the nucleus even though it is not presented in the data. In the following sub-section, I will focus on Anxiang partial reduplication.

4.3. Anxiang partial reduplication

Anxiang dialect shows several differences from Fuzhou and Jianou as discussed in section 2. The diminutive morpheme in Anxiang is incorporated into the reduplicant as a suffix *r*. The morpheme substitutes a coda element of the reduplicant, which includes an off-glide. Only a vowel in the reduplicant is neutralized to *ə*, which implies that a pre-nuclear glide is treated as part of the onset in this dialect.

In order to analyze partial reduplication in Anxiang, I use ALIGN-RED, MORPHREAL, MAX-IO, MAX-BR, and *COMPLEX. These constraints are not repeated in this section since I have already introduced them in 4.1 and 4.2. However, new constraints are introduced for Anxiang in (22).

(22) New constraints for Anxiang partial reduplication

a. ALIGN-DIM-R: Align the right edge of the diminutive morpheme with the right edge of the reduplicant.

b. IDENT-IO(V): Input and output vowels are identical in their feature specification.

c. CONTIG-BR: The portion of the base standing in correspondence forms a contiguous string, as does the correspondent portion of the reduplicant (McCarthy and Prince 1995)[4].

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4) According to McCarthy and Prince (1994a, 1995), CONTIGUITY can be sub-divided into two different cases: No Skipping in B. and No Intrusion into R. In this paper, the former sub-type of CONTIGUITY is adopted. This is because a case of intrusion in the reduplicant is handled by *COMPLEX in the analysis.

d. *V-PLACE: Vowels should not have place features (Feng 2001).
e. IDENT-BR(V): Base and reduplicant vowels are identical in their feature specification.

ALIGN-DIM-R specifies that the diminutive morpheme is realized as the suffix element of the reduplicant. This constraint is undominated in Anxiang. IDENT-IO(V) requires identical vowel features between the input and the output. Thus, it bans any change of an input vowel feature in the output. It should be highly ranked in Anxiang partial reduplication since there is no vowel feature deviation from an input vowel to an output vowel mapping. CONTIG-BR stipulates that copying should not skip any internal element of the base yet skipping of an edge element does not violate the constraint (McCarthy and Prince 1994a, 1995). CONTIG-BR is high-ranked along with ALIGN-DIM-R, IDENT-IO(V), ALIGN-RED, MORPHREAL, and MAX-IO, and these high-ranked constraints do not show any ranking among themselves.

*V-PLACE requires that vowels not have place features, which implies that all the full vowels violate this constraint while ə satisfies it because ə is presumed to not have place features. This constraint is broadly construed as a member of *STRUC, which calls for 'no phonological structure'(Prince and Smolensky 1993, 2004; McCarthy and Prince 1994a). IDENT-BR(V) calls for the identical vowel feature correspondence between the base and the reduplicant.

IDENT-IO(V) dominates *V-PLACE because an input vowel maintains its features in the output while a vowel in the reduplicant neutralizes to ə, which leads to satisfying *V-PLACE. If the ranking between IDENT-IO(V) and *V-PLACE is reversed, all the vowels in the output should be neutralized to ə. Since the high-ranking constraints ALIGN-DIM-R, ALIGN-RED, MORPHREAL, MAX-IO, CONTIG-BR, and IDENT-IO(V) do not show any ranking among themselves, I rank these high-ranking constraints over *V-PLACE by transitivity. *V-PLACE is ranked higher than IDENT-BR(V) because a vowel in the reduplicant is neutralized to satisfy *V-PLACE at the cost of violating IDENT-BR(V).

Mc-IO is ranked higher than *COMPLEX because an onset cluster consisting of a consonant and an on-glide is always realized in the output as in /p'wu/→ [p'wu-p'wər] 'shop.' On the other hand, *COMPLEX, MAX-BR, and IDENT-BR(V) are not ranked high in the analysis: MAX-IO takes precedence over MAX-BR while IDENT-IO(V) and *V-PLACE dominate IDENT-BR(V). Since *COMPLEX, MAX-BR, and IDENT-BR(V) do not show a particular ranking among themselves, we rank them equally.

Based on the constraints and their interaction, I present a simple input, which has only a consonant and a vowel. In the constraint tableau, we do not include the high-ranking constraints, ALIGN-RED and MORPHREAL, or the constraints that are irrelevant.

(23) /p'a/ → [p'a-p'ər] 'claw'

/p'a-RED-r/	AL-DIM-R	ID-IO(V)	*V-PL	*COMP	ID-BR(V)
a. p'a.p'ar			**!		
☞ b. p'a.p'ər			*		*
c. p'a.p'rə	*!		*	*	*
d. p'ə.p'ər		*!			

The optimal output is (b), which only violates *V-PLACE and IDENT-BR (V) once each. Candidate (a) is eliminated due to its extra violation of *V-PLACE. Candidate (c) is undesirable because it violates ALIGN-DIM-R by realizing the diminutive morpheme as part of the onset element forming an onset cluster in the reduplicant. Candidate (d) is also eliminated due to its crucial violation of IDENT-IO(V), which is caused by neutralizing an input vowel in the output.

Next, I evaluate an example which has an on-glide and a coda element in the base in (24). The tableau below reflects how constraints evaluate the on-glide in its sub-syllabic structure classification.

(24) /xwaŋ/ → [xwaŋ-xwər] 'frame'

/xwaŋ-RED-r/	ID-IO(V)	CONT-BR	*V-PL	*COMP	ID-BR(V)
a. xwaŋ-xwar			**!	**	*
☞b. xwaŋ-xwər			*	**	*
c. xwəŋ-xwər	*!			**	
d. xwaŋ-xər		*!	*	*	*

The optimal candidate (b) violates *V-PLACE and IDENT-BR(V) minimally, and incurs two violations of *COMPLEX. Candidate (a) is not optimal since it violates *V-PLACE twice by maintaining the two full vowels in the base and the reduplicant. Candidate (c) is eliminated due to its neutralization of the input vowel in the output violating IDENT-IO (V). Candidate (d) is ruled out since it incurs a violation of CONTIG-BR by skipping a medial segment of the base in the reduplicant. It should be noted that the on-glides in Anxiang act as part of the onset forming an onset cluster with a preceding consonant. This is shown by the evaluation of *COMPLEX in all the candidates in (24). The constraint ranking revealed from (23) and (24) for Anxiang partial reduplication is provided in (25).

(25) Constraint ranking for Anxiang partial reduplication
ALIGN-RED, MORPHREAL, ALIGN-DIM-R, IDENT-IO(V), MAX-IO, CONTIG-BR ≫ *V-PLACE ≫ MAX-BR, *COMPLEX, IDENT-BR(V)

It should be noted from the constraint ranking (25) that the ranking shows TETU concerning the vowel feature in the reduplicant. The neutralization of the reduplicant vowel is secured by the high-ranking IDENT-IO(V) dominating the markedness constraint *V-PLACE, which, in turn, dominates IDENT-BR(V). *V-PLACE triggers the neutralization of vowels but the neutralization of the output vowels is blocked by the high-ranking IDENT-IO(V) in the output while ranking *V-PLACE over IDENT-BR(V) allows the neutralization of a vowel in the reduplicant. The implementation of TETU in the reduplicant concerning the vowel feature is represented in (26).

(26) The ranking schema for TETU in the reduplicant

Schema:	IO-FAITH	≫	PHONO-CON	≫	BR-FAITH
	IDENT-IO(V)	≫	*V-PLACE	≫	IDENT-BR(V)

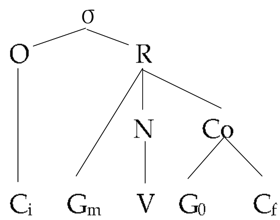
5. Conclusion

In this paper, I have analyzed partial reduplication in Fuzhou, Jianou, and Anxiang. Instead of rules, I have used constraints and their ranking to explain various different aspects of partial reduplication in these three dialects. In Fuzhou partial reduplication, TETU occurs not in the reduplicant but in the base, which is not common in partial reduplication. In accounting for such an unusual case of TETU, I have employed MAX-IR to reflect the mapping between the input and the reduplicant. The ranking schema for TETU in the base of Fuzhou is given in (17). This type of TETU cannot be captured in a rule-based account. With respect to the sub-syllable location of on-glides, Fuzhou treats them as part of the nucleus while off-glides form a cluster with a next consonant.

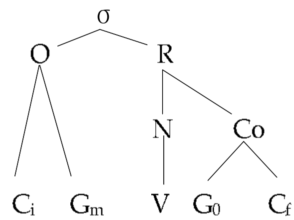
Jianou shows a similar reduplication pattern with Fuzhou but all the input segments including coda appear in the base, which is reflected in the ranking of MAX-IO over NOCODA. Concerning the classification of on-glides in Jianou, they are classified as part of the nucleus. The constraint ranking for Jianou is presented in (21). The current analysis has an edge over the constraint-based account by Da (1996) in that the present account has used a reduplicative morpheme, which forces copying of the base segment. On the other hand, duplication of the base is not called for in Da's analysis where the reduplicative morpheme is not included. As I have already discussed in section 3, some analytic problems arise if the reduplicative morpheme is not used in the analysis.

In the analysis of Anxiang, new constraints are introduced in order to explain the neutralization of a vowel in reduplicant. In Anxiang, the diminutive morpheme is realized as the coda element, which is secured by ALIGN-DIM-R. On the other hand, the neutralization of a vowel in the reduplicant is regarded as a case of TETU with respect to the vowel features. TETU in the reduplicant is explained by the typical ranking schema proposed by McCarthy and Prince (1994a, 1995), which is given in (26). As for the classification of the on-glides, Anxiang treats them as part of the onset, which is different from Fuzhou and Jianou. Thus, the three Chinese dialects classify the post-consonantal glides differently. The variant syllable structures of Fuzhou, Jianou, and Anxiang as for the classification of on-glides are given in (27): C_i: Initial consonant, G_m: Medial glide, G_0: Coda glide, and C_f: Final consonant

(27) a. Fuzhou and Jianou



b. Anxiang



With respect to the classification of the post-consonantal glides in the syllable structure of modern standard Chinese, some linguists such as Bao (1990a) and Chiang (1992) argue for the onset grouping of the on-glides while Lin (1989) and Wan (1999) support the nucleus grouping of the pre-nuclear glides. Thus, the behavior of the on-glides in the partial reduplication process in three dialects of Chinese reflects the differing sub-syllabic classification of on-glides in standard Chinese. It is not uncommon in the languages that the classification of pre-nuclear glides is not uniformly proposed as in English (Davis and Hammond 1995) and Korean (Kim and Kim 1992; Lee 1993).

There are several implications that can be deduced from the results of the analysis. First, the classification of on-glides and off-glides can be symmetrical as in Anxiang in which they are grouped with consonants forming consonant clusters while it is asymmetrical as in Fuzhou and Jianou. Second, the sub-syllabic location of on-glides in different dialects also reflects variant classification of the post-consonantal glides in the sub-syllabic structure of standard Chinese. Third, unlike many cases of TETU in reduplicant of partial reduplication, Fuzhou shows TETU in the base, which is not mentioned in the discussion of the ranking schemata for various kinds of TETU in reduplication by McCarthy and Prince (1994a, 1995).

References

Alderete, John, Jill Beckman, Laura Benua, Amalia Gnanadesikan, John McCarthy, and Suzanne Urbanczyk. (1999). Reduplication with fixed segmentism. *Linguistic Inquiry 30,* 327-364.

Bao, Zhiming. (1990a). Fanqie languages and reduplication. *Linguistic Inquiry 21,* 317-350.

Bao, Zhiming. (2000). Syllable constituency and sub-syllabic processes. *Journal of East Asian Linguistics 9,* 287-313.

Chiang, Wenyu. (1992). *The prosodic morphology and phonology of affixation in Taiwanese and other Chinese languages.* Unpublished doctoral dissertation. University of Delaware.

Cohn, Abigail. (1989). Stress in Indonesian and bracketing paradox. *Natural Language and Linguistic Theory 7,* 167-216.

Da, Jun. (1996). A constraint-based approach to the chameleon /r/ in Mandarin dialects. In *Proceedings of NELS 26,* 57-70.

Davis, Stuart and Hammond, Michael. (1995). On the status of on-glides in American English. *Phonology 12,* 159-182.

Duanmu, San. (2000). *The phonology of standard Chinese.* Oxford: Oxford University Press.

Feng, Guanjun. (2001). *A case study of Chinese diminutive affixation.* Unpublished manuscript.

Kim, Chin-Wu and Kim, Hyoung-Youb. (1992). The character of Korean glides. *Studies in the Linguistic Sciences 21,* 113-125.

Lee, Yong-Sung. (1993). *Topics in the vowel phonology of Korean.* Seoul: Hanshin Publishing Inc.

Liang, Yuzhang. (1982). L-word in the dialect of Yi County. *Zhongguo Yuwen 1991,* 206-210.

Lin, Yen-hwei. (1989). *Autosegmental treatment of segmental processes in Chinese phonology.* Unpublished doctoral dissertation. University of Texas, Austin.

McCarthy, John J. and Prince, Alan. (1994a). The emergence of the unmarked: Optimality in prosodic morphology. In *Proceedings of NELS 24.* 333-279.

McCarthy, John J. and Prince, Alan. (1995). Faithfulness and reduplicative identity. In J. Beckman, L. W. Dickey, and S. Urbancyzk (Eds.), *University of Massachusetts occasional papers in linguistics 18* (pp. 249-348). Amherst, MA: GLSA, University of Massachusetts.

Moravcsik, Edith. (1978). Reduplicative constructions. In Joseph Greenberg (Ed.), *Universals of human language* (pp. 297-334). Stanford: Stanford University Press.

Prince, Alan and Smolensky, Paul. (1993/2004). *Optimality theory: constraint interaction in generative grammar*. Malden, MA: Blackwell. [Revised of 1993 technical report, Rutgers University Center for Cognitive Science. Available on Rutgers Optimality Archive, ROA-537].

Samek-Lodovici, Vieri. (1993). A unified analysis of cross-linguistic morphological gemination. In *Proceedings of CONSOLE 1*, 265-283.

Shaw, Patricia A. (1992). Templatic evidence for the syllable nucleus. In *Proceedings of NELS 23*, 463-477.

Stonham, John. (1990). *Current issues in morphological theory*. Unpublished doctoral dissertation. Stanford University. Stanford, CA.

Sun, Jingtao. (2001). *Fission reduplication in old Chinese*. Paper presented at the 4th International Conference on Classical Chinese Grammar, University of British Columbia, British Columbia, 15-17 August.

Wan, I-ping. (1999). *Mandarin phonology: Evidence from speech errors. Unpublished doctoral dissertation*. SUNY at Buffalo.

Wilber, Ronnie. (1973). *The phonology of reduplication*. Bloomington: Indiana University Linguistic Club.

Yip, Moira. (1992). Prosodic morphology in four Chinese dialects. *Journal of East Asian Linguistics 1*, 1-35.

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