

TOWARD AN ANALYSIS OF MANDARIN REDUPLICATION¹

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1. INTRODUCTION

Although a number of treatments of Mandarin grammar have discussed the phenomenon of reduplication in the language, including the well-known and comprehensive works by Chao (1968) and Li and Thompson (1981), none of these descriptions has attempted explicit formulations of Mandarin reduplication patterns. This paper is an initial step toward such a formulation. The analysis formulated in this paper is couched in the autosegmental framework first proposed by Marantz (1982).

In what follows, this paper is divided into four sections. First, it briefly introduces the Mandarin data on reduplication. This introduction constitutes Section Two. Section Three discusses problems the Mandarin data pose for Marantz' theory. Section Four sets forth an explicit theory of Mandarin reduplication. Finally, some summary remarks are made in Section Five.

2. MANDARIN REDUPLICATION

In Mandarin, reduplication is found in the derivations of verbs, adjectives, nouns and kinship terms.² Volitional verbs are reduplicated to derive attenuative forms (1a), descriptive adjectives to derive intensive forms (1b), a set of common nouns to derive repetitive forms (1c), and kinship terms to derive vocative forms (1d)³.

(1)	<u>base</u>		<u>reduplicate</u>	
	a. Verb/Attenuative			
	i) zou	"walk"	zou-zou	"take a walk"
	CVG			
	ii) xiang	"think"	xiang-xiang	"think a bit"
	CGVC			
	b. Adjective/Intensive			
	i) hong	"red"	hong-hong (de)	"very red"
	CVC			
	ii) yuan	"far"	yuan-yuan (de)	"very far"
	CGVC			
	c. Noun/Repetitive			
	i) ren	"human"	ren-ren	"everybody"
	CVC			
	ii) tian	"day"	tian-tian	"every day"
	CGVC			

d. Kinship/Vocative

- | | | | | |
|-----|-----|---------------------------|---------|---------------------------|
| i) | jie | "older sister" | jie-jie | "older sister" |
| | CGV | | | |
| ii) | sao | "older sister
-in-law" | sao-sao | "older sister
-in-law" |
| | CVG | | | |

(G = glide)

These examples suggest that Mandarin reduplication is a simple, straight forward process in all of these four categories since all involve the same kind of total reduplication in the same fashion. The total picture, however, is more complex. It should be pointed out that the above examples all involve one syllable bases⁴. The apparent identical reduplicative pattern disappears when the base contains two syllables.

- | | | | |
|-----|----------------------------------|--------------------|--------------|
| (2) | <u>base</u> | <u>reduplicate</u> | |
| | a. Verb/Attenuative | | |
| | i) da-sao | da-sao-da-sao | |
| | "clean up" | "clean up a bit" | |
| | ii) tao-lun | tao-lun-tao-lun | |
| | "discuss" | "discuss a bit" | |
| | b. Adjective/Intensive | | |
| | i) luosuo | luo-luo-suo-suo | |
| | "wordy" | "very wordy" | |
| | ii) he-qi | he-he-qi-qi | |
| | "polite" | "very polite" | |
| | c. Noun/Repetitive | | |
| | i) nan-nŭ | nan-nan-nŭ-nŭ | |
| | "man &
woman" | "everybody" | |
| | ii) ri-yie | ri-ri-yie-yie | |
| | "day &
night" | "all the time" | |
| | d. Kinship/Vocative | | |
| | i) bo-mu | *bo-mu-bo-mu | *bo-bo-mu-mu |
| | "wife of father's older brother" | | |
| | ii) yi-fu | *yi-fu-yi-fu | *yi-yi-fu-fu |
| | "husband of mother's sister" | | |

When the base contains two syllables, syllable 1 and syllable 2, the reduplicated form contains syllables 1212 in verbs (2a) but 1122 in adjectives and nouns (2b and c). In vocative forms, reduplication of dissyllabic stems is not possible (2d).

While all the above examples are instances of total reduplication, one can also find partial reduplication in Mandarin such as the following cases:

(3)	<u>base</u>	<u>reduplicate</u>
a.	buqing-chu "not clear"	bu-qing-bu-chu "very blurring"
b.	you tiao-li "organized"	you-tiao-you-li "very much organized"

Notice that in (3) the base is no longer limited to the domain of a single morpheme nor even to a single word. Rather, it is a phrase of some kind, AP in (3a) and VP in (3b). This raises a serious problem for the current reduplication theory by Marantz (1982) and McCarthy and Prince (1986), which are addressed in the next section (along with some other problems).

3. THE PROBLEMS

The first problem lies in the characterization of the reduplicative morpheme. For Marantz, each reduplicative morpheme typically has one canonical pattern which can be characterized by some kind of a template (or skeleton). Such a treatment has difficulty handling Mandarin data because no single template can be identified for any of the four reduplicative morphemes in (1) and (2). For instance, the intensive morpheme cannot be characterized in terms of a syllable template, because it varies between one syllable (1b) and two (2b), depending on the form of the base to which it attaches. Neither can the intensive morpheme be characterized in terms of a morpheme template, for it contains one morpheme in (1b) and (2b-i), but two in (2b-ii). The unit of a word cannot serve as the template for the intensive morpheme either. In the first place, Mandarin words of more than two syllables never undergo total reduplication. There is no form *gao-gao-jing-jing-jian-jian derivable from gao-jing-jian (highly advanced; literally: high-essential-summit), etc. Furthermore, the highest level of a reduplication domain in Marantz is no larger than a morpheme; a word domain does not exist.

Another problem with current reduplication theory concerns the phenomenon of discontinuous morphemes such as occur in the intensive reduplication. Recall that Mandarin intensive reduplication involves the following process of syllable repetition (cf. (2b)):

(4) 1 2 → 1 1 2 2

In (4) either the underlined or the non-underlined numerals to the right of the arrow can be regarded as the reduplicative affix while the other part is regarded as the base. If reduplication is considered to be an affixation process, it would be necessary to decide whether Mandarin reduplication involves prefixation or suffixation. In view of a unified treatment of all Mandarin reduplication cases which will become clear later in this paper, it is assumed that the process involves prefixation rather than suffixation. Either way, however, the resulting reduplicative affix is discontinuous. Discontinuous affixes are handled neither by Marantz (1982) nor by McCarthy and Prince (1986).

A third problem concerns the possible domain of reduplication. Marantz' theory, which handles reduplication domains no larger than a morpheme, seems to be too restrictive for Mandarin cases such as shown in (3)⁵. To account for these formations, Marantz' theory has to extend the domain of reduplication to the unit of the syntactic phrase⁶.

4. TOWARD AN ANALYSIS

4.1. The Issue of the Affixation Process

Reduplication is an affixation process. This point is expressed explicitly in the two outstanding articles referred to above, namely those of Marantz (1982) and McCarthy and Prince (1986). However, in neither of these two articles do the authors devote much space to accounting for the affixation itself.

Both theories recognize three major steps in the derivation of new words via reduplication. These are affixation of a phonologically underspecified affix to the stem, copying of the rest of the tiers of the stem over the underspecified affix, and association between the affixed and the copied material. However, while much argument and discussion are devoted to issues concerning the copying and association processes (as well as the matter of the possible make-up of the affixes), relatively little is said about the first step, the process of attaching the affix to the stem.

The neglect of affixation as a process in these two articles seems to indicate that both models implicitly assume that there is no difference between the manner of attaching a reduplicative morpheme to the base and the way a normal (i.e. non-reduplicative) affix is attached to a stem. Such an assumption does not, however, seem well founded. Much evidence shows that the two may be different in a non-trivial way.

For instance, affixation in reduplication can be phonologically conditioned while phonological conditioning is not usually found in normal affixation. McCarthy and Prince (1986) argue with evidence from several languages that the locus of some reduplicative affixes is decided by the phonological environment. In Chamorro, they observe, the locus of the affix in continuative reduplication is before a main-stressed foot, while in Afar, the locus for the intensive reduplicative affix is before a final syllable. Another case is discussed by Broselow (1983) for Interior Salish. According to Broselow, "the diminutive in the Interior Salish languages is subcategorized to occur before a stressed syllable rather than before a stem" (p.345). She thus maintains that the infixing reduplication of the language is "the attachment of a morpheme to a phonological constituent rather than a morphological constituent" (p.345). Finally, as is argued later in this paper, the manner of Mandarin reduplication is actually governed by a phonological rule as well. In sum, all the reduplication processes mentioned above make crucial reference to some phonological information or are constrained by it, while non-reduplicative affixation processes in each of these languages do not necessarily refer to the same information or obey the same constraints.

It follows, then, that the process of attaching an affix to a stem can be quite different in reduplication from that in normal affixation. An adequate theory of reduplication should provide an analysis which accounts for this difference.

4.2. A Modular Theory of Affixation

The addition of a reduplicative affix to the base may be different from the attachment of normal affixes, and this difference is explained by the fact that the former may be licensed by phonological rather than morphological rules.

Thus, two kinds of affixation processes must be distinguished. One of these processes is generated by a set of context-free rewrite rules of a syntactic nature which makes reference to morphological categories such as stem and root, whereas the other one is licensed by rules of phonological conditioning or requirements which make reference to prosodic categories such as the syllable, the foot, and the prosodic word.

In the former case, the locus of the affix is only determined morphologically, and the shape of the affix is fundamentally independent of that of the base. In the latter case, however, the locus of the affix is phonologically identified, and the shape of the affix is based on the phonological structure of its stem. Normal affixation typically belongs to the former kind, but at least a subset of reduplication processes, such as those mentioned in the previous section (i.e. cases in Chamorro and Afar, etc.), belong to the latter.

A typical example of the former kind of affixation is English plural morpheme attachment. There, the morpheme is suffixed to the stem through certain morphological rules of plural word formation. In the course of the affixation, the locus of the affix is morphologically specified, having nothing to do with the phonological representation of the stem.⁷ The shape of the plural affix, too, is totally independent of the phonological make-up of the stem.

4.3. A Theory of Mandarin Reduplication

Mandarin reduplication can be understood as a phonological process of prosodic constituent formation. Specifically, the reduplicative affixation process is licensed by a phonological rule which attaches the necessary skeleton to the base to construct some target prosodic constituents. The rule in particular may be stated as follows:

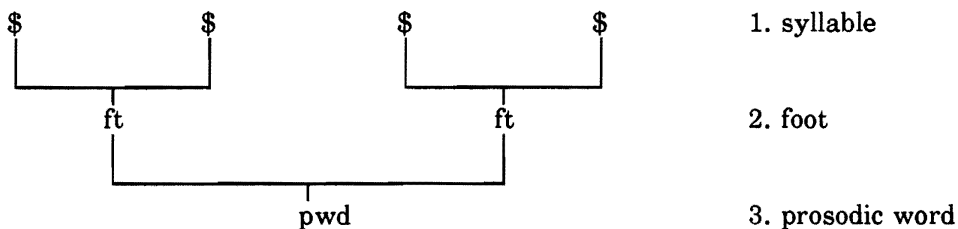
(5) Mandarin Reduplication Rule:

Construct a higher-level prosodic constituent on the prosodic structure of the base such that the output constitutes a metrical foot (ft) or a prosodic word (pwd).

Or, in a more formal way: $X^n \rightarrow X^{n+1}$,
 where: X^n = one prosodic constituent at level n;
 X^{n+1} = a foot or a prosodic word

As rule (5) implies, two prosodic constituents are observed which serve as the target constituents to be formed in Mandarin reduplication; namely, the foot, defined as a unit of two syllables, and the prosodic word, defined as a unit of two feet or a unit of four syllables. Thus the prosodic structure of Mandarin has at least three levels, the syllable (\$), the foot (ft) and the prosodic word (pwd).

(6) Mandarin Prosodic Structure



The existence of these prosodic constituents in Mandarin is empirically supported by other independent observations. For example, the target template of the Mandarin vocative form is a unit of a foot (7a). The same foot template is found in other Mandarin word formation processes (7b) as well.

(7) the prosodic foot

a. Vocative forms

i) on the name "Lin Hua"

- | | |
|-------------------------------------|---------|
| 1) Lin Hua | 4) *Lin |
| 2) Xiao/Lao Lin
"little/old Lin" | 5) *Hua |
| 3) Hua Hua | |

ii) on the name "Chen Shu-Zhen"

- | | |
|---------------------------------------|----------|
| 1) Shu-Zhen | 5) *Chen |
| 2) Xiao/Lao Chen
"little/old Chen" | 6) *Shu |
| 3) Ah Zhen | 7) *Zhen |
| 4) Zhen-Zhen | |

iii) on the name "Huang-pu Yi-Jun"

- | | |
|-------------|-----------------------|
| 1) Huang-pu | 4) *Xiao/Lao Huang-pu |
| 2) Yi-Jun | 5) *Yi |
| 3) Jun-Jun | 6) *Jun |

b. abbreviation

	<u>base</u>	<u>abbreviated</u>
i)	geerbaqiaofu "Gorbachev"	gerba "Gorbachev"
ii)	weiduoliya da-xue "University of Victoria"	wei-da "UVic"
iii)	zhong-guo gong-chan-dang "Communist Party of China"	zhong-gong "CPC"

The examples in (7b) show some very common word formation processes in Mandarin which shorten a name (proper or common) of almost any length to a foot, that is, to two syllables. In particular, (7bi) illustrates truncation, while (7bii & iii) are a mnemonic for the acronym formed by a process similar to that of English. (7a), on the other hand, contains three actually occurring names of Chinese people having two, three or four syllables⁸. Note that the vocative forms of these names (used in everyday and neutrally informal style) invariably contain a foot in each case regardless of the length of the underlying form.

It becomes clear here why kinship terms do not reduplicate to derive vocative forms when the base is dissyllabic (see 2d). It is because the vocative form is constrained by a specific template which is the foot. Once the base is the size of a foot, the target is already achieved and thus no reduplication occurs.

As for the existence of the four-syllable unit—the prosodic word, there are numerous Mandarin words, generally referred to as "four-character idioms", which provide abundant evidence. A few such words are given in (8) below together with their glosses, syllable structures and rough syntactic patterns.

(8) the prosodic word

- | | | |
|----|------------------------------------|----------------------------------------------------------------------------------------------------------|
| a. | huan-tian-xi-di
\$ \$ \$ \$ | "overjoyed;
literally, happy sky happy earth"
syntactic pattern: [A N A N] _{NP} |
| c. | da-cheng-yi-pian
\$ \$ \$ \$ | "merge with;
literally, beat into one piece"
syntactic pattern: [V Prep Num N] _{VP} |
| d. | fen-dao-yang-biao
\$ \$ \$ \$ | "part company;
literally, part route wave whip"
syntactic pattern: [V N V N] _{VP} |
| e. | xiong-you-cheng-zhu
\$ \$ \$ \$ | "very confident;
literally, bosom has finished bamboo"
syntactic pattern: [N V A N] _S |

Having confirmed the existence of the two prosodic constituents discussed above, the foot and the prosodic word, the operation of the reduplication rule in (5) is now considered. It is interesting to see that this simple rule generates all and only the actually occurring reduplication processes in Mandarin.

First, it correctly predicts that only a string of three or fewer syllables serves as the base for reduplication. This is due to the fact that a base of more than three syllables, if any of its components at any level of the phonological representation is reduplicated, yields a word which exceeds the size of a prosodic word—the maximal size of a licit reduplicated word, as stipulated in rule (5).

This rule also correctly predicts that, while a base of one or two syllables may undergo total reduplication, no total reduplication occurs on a base composed of three or more syllables because of the maximal size restriction. It also correctly predicts that a base of two syllables does not undergo partial reduplication since the result would not be a licit prosodic constituent of a reduplicated word by rule (5).

A further advantage of this phonologically based reduplication theory is that it avoids the difficulty a purely morphologically based reduplication theory faces in Mandarin. It ignores the internal syntactic structure of the base and thus accounts for unusual kinds of reduplication where the base is a phrase rather than a morpheme or a word. This approach to word formation based on phonological rules provides a way of accounting for some post-syntactic word formation processes. In such processes, the syntactic relations among the components are less crucial, since all that matters to the word-formation rule is the phonological representation of the relevant string.

The present analysis of Mandarin reduplication also solves the problem raised in analysing the discontinuous affix. The result of both "syntactic" and "phonological" affixation is the

addition of new material to the base. However, due to the distinction made in the rules that license the affixation, the added material is allowed to realize itself in different ways. In particular, affixation processes generated by morphological rewrite rules always result in the added material being of one whole continuous unit, while those generated by phonological rules can result in added material being "scattered" between the prosodic constituents of the base, even though that material represents a single affixal morpheme.

The theory also avoids the dilemma posed by the contradiction of the "shape-invariant" of a reduplicative morpheme which does, in fact, have variable shape. The phonological approach to affixation allows one to ignore the apparent variation but, at the same time, still be able to characterize the "shape-invariant" in each category. This is accomplished by a formula (stated in 9) which generates each of the "shape-invariants" (Y) in all Mandarin reduplication processes in a principled way.

$$(9) \quad Y = X^{n+1} - X^n$$

where X^n = the prosodic structure of the base

According to this formula, for any base of the shape X^n , the shape of its reduplicative affix Y is derivable through $X^{n+1} - X^n$. Indeed, by rules (5) and (9), we can not only characterize the shape of the reduplicative morpheme in a precise way but also account for the conditioned variation of the shape of the affixal morpheme.

In what follows, the derivations of Mandarin reduplication will be examined in some detail; not seriously addressed, however, are theoretical issues that obviously exist in the copying process and in the identification of possible shape-invariants of reduplicative morphemes. Instead, the assumptions, principles and techniques made in McCarthy and Prince (1986) are simply followed by and large.

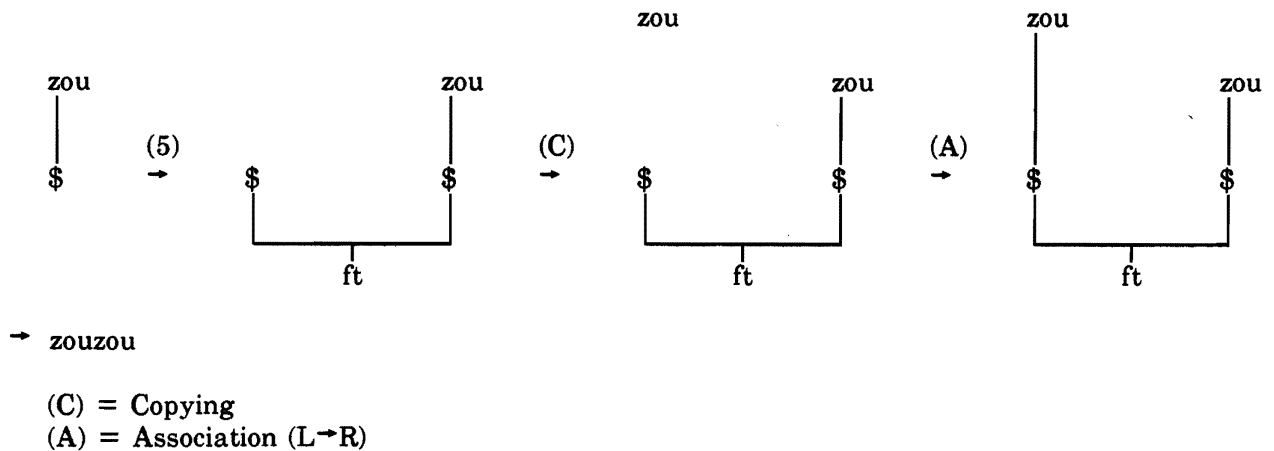
4.4. Exemplifications

4.4.1. The Attenuative Reduplication

As mentioned above, volitional-verb (i.e. attenuative) reduplication causes a serious problem for current reduplication models in that it is impossible to characterize the shape-invariant of the attenuative morpheme by any of the phonological categories defined in these models. This is because two prosodic skeleta rather than one are found for the same morpheme.

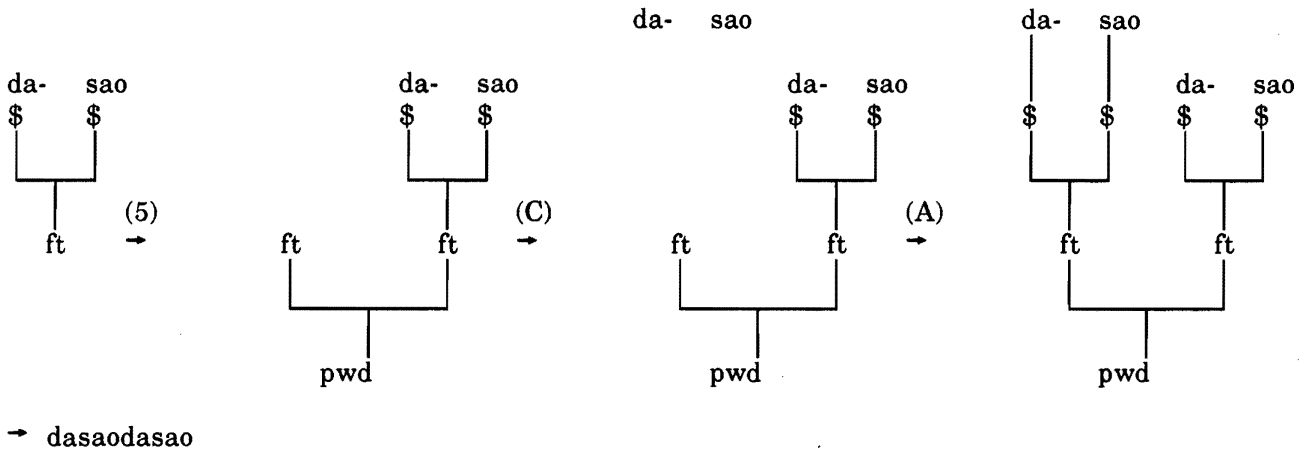
Under the theory of affixation purposed here, this problem disappears. The shape-invariant is now defined by a formula (as in 9). Hence, in the case of the monosyllabic verb reduplication, the base X^n = a syllable. According to rule (5), the output of the reduplication should have the skeleton X^{n+1} = foot. And, thus the reduplicative template is $Y = \text{foot} - \text{syllable} = \text{syllable}$. Following the assumption above that Mandarin reduplication involves prefixation, one can represent the derivational process of reduplication of the monosyllabic verbs like zou (walk, 1a-i) as follows:

(10)



A similar process applies to verbs of two syllables (or one foot). The base X^n is then be X^n = foot; the anticipated result of the reduplication is X^{n+1} = pwd; and the prefixing skeleton can be derived as Y = pwd - foot = foot. See the derivation of da-sao (to clean, 2a-i) as in (11).

(11)

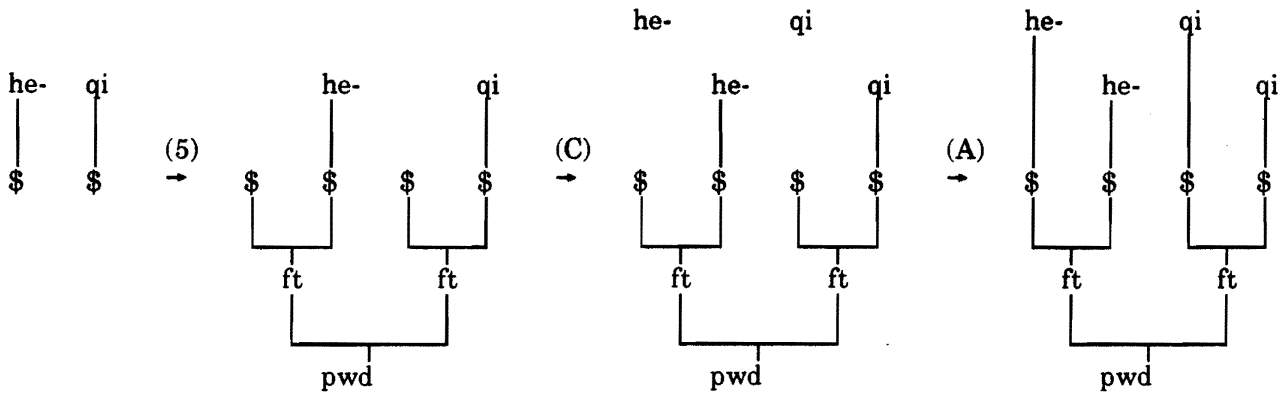


4.4.2. The Intensive and Repetitive Reduplication

The derivation process in intensive (or repetitive) reduplication is essentially the same as that in attenuative reduplication except that the locality of the reduplicative morpheme in the former is different in a predictable way from that in the latter when the base is a dissyllabic word.

It was noted previously that the discontinuous morpheme in dissyllabic adjective reduplication causes difficulty for current reduplication theory, but this difficulty disappears in the phonological account of affixation processes presented here. Moreover, what appears to be a fundamental difference between dissyllabic verb and dissyllabic adjective reduplication is reduced to a trivial difference in their underlying representation. Compare the URs of (11) and (12). The latter demonstrates the derivation of the descriptive adjective he-qi (polite) from (2b-ii).

(12)



→ heheqiqi

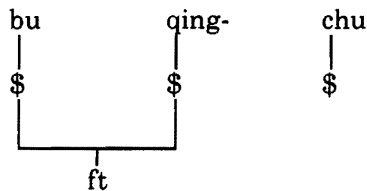
As shown in (12), the difference between dissyllabic verb and adjective reduplication is attributable to the difference in their underlying prosodic structures. It is a foot in the former and two individual syllables in the latter. In other words, the difference can be accounted for by the fact that the reduplication rule applies at the prosodic level of the syllable in intensive reduplication but at the prosodic word level in attenuative reduplication.

Thus, all reduplication processes illustrated in (1) and (2) are but one single process, namely, the process of prosodic constituent formation as formalized in (5).

4.4.3. Other Kinds of Reduplication

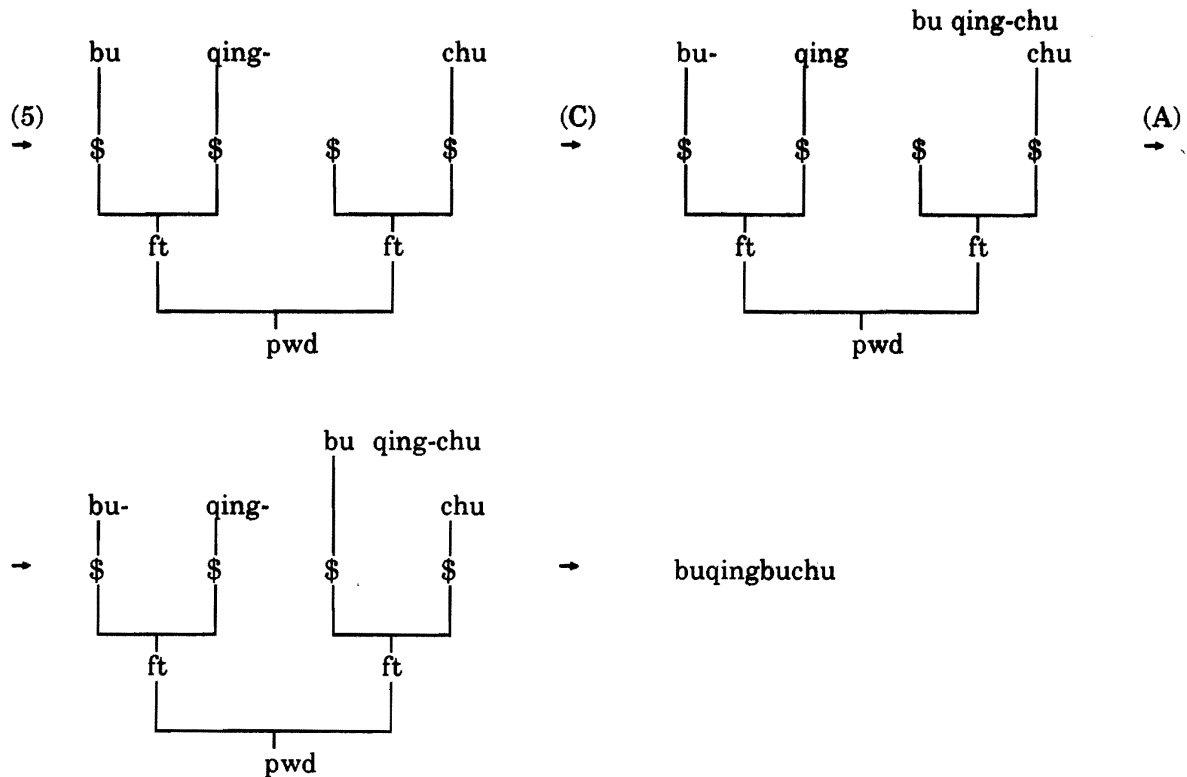
Following Selkirk (1984), the assumption is made that the prosodic structure of a phrase or a sentence is somehow derived from its syntactic structure.⁹ In addition, it is assumed that at some level of derivation, the prosodic structure for bu qing-chu (3a) is as follows.¹⁰

(13)



And the derivational process from this underlying structure is shown in (14).

(14)



5. SUMMARY

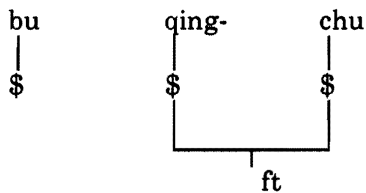
This paper has proposed a unified analysis for Mandarin reduplication processes. While in the traditional framework, several separate rules are needed to account for the data, this paper has shown that all these morphological processes are accountable in a single rule, a rule which stipulates that two target prosodic constituents be formed on the base. These target constituents are identified as the unit of two syllables (the foot) and the unit of two feet (the prosodic word).

This paper also argues for a distinction to be made between two types of affixation rules. In one the rules are context-free rewrite rules of a syntactic nature which make reference to such morphological categories as stem and root; in the other the rules are of a phonological nature making reference to prosodic categories and structures. This distinction provides a solution to such problem areas as discontinuous morphemes, morphological processes on domains larger than a word, and reduplicative affixes which have systematically variable shapes.

NOTES

- 1 The author wishes to thank Dr Barry Carlson for his unfailing help and support throughout the writing of this paper. Special thanks are due to Dr Thom Hess for his careful reading of this paper, generous assistance and very helpful comments. The author is also grateful to Dr James Arthurs who has read the paper and provided assistance.
- 2 Among the four reduplication processes, the attenuative and the intensive are very productive, while the repetitive and vocative are less so.

- 3 Although Chinese is a tone language, tonal information is not provided in the illustrations that follow, due to editorial complexity. In any event, tonal information is not crucial to the present discussion of Mandarin reduplication.
- 4 These monosyllabic bases are also monomorphemic. In fact, the vast majority of Chinese morphemes are monosyllabic.
- 5 It should be pointed out that McCarthy and Prince's (1986) account of affixation to a prosodic unit does not help here either, since the affixed syllable is not adjacent to the syllable it duplicates. The only apparent hypothesis is that the cases here involve the copying of the total base and then left to right association.
- 6 What is likely involved here is post-syntactic word formation, a phenomenon that has been discussed in several studies such as Shibatani & Kageyawa (1988) and Zwicky (1983).
- 7 By shape of the plural affix is meant the affix in its single underlying representation. The three different allophones of the morpheme are the result of an assimilation process which happens AFTER the affixation process.
- 8 It is rare, however, for a Chinese name to contain more than three syllables.
- 9 Unfortunately, it is not possible to include a discussion of such an approach here, for it would go far beyond the scope and focus of this paper.
- 10 It seems, rather, that the logical assumption should be the following (see Selkirk, 1984):



However, this configuration would yield the ungrammatical result *bu-bu-qing-chu in the theory presented here. Intuitively, it seems that at least at some level of derivation the prosodic structure should be the one in (13).

It is interesting to point out, though, that even if (13) is abandoned in favour of the present configuration, the present theory still makes correct predictions; that is, bu (not) rather than anything else in the phrase is what gets correctly reduplicated.

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