Reduplication in Optimality Theory: Evidence from Amis

Fang, Zhi-wei and Li, Thai-yen

1. Introduction

Reduplication is one of the principal means of word-formation in Austronesian languages. Despite this, it has received little explanatory attention. This paper aims to discuss reduplication in Amis[1] spoken in Taiwan, and addresses issues of the Optimality Theory (OT, Prince and Smolensky, 1993; McCarthy and Prince, 1995).

As a word formation device which involves phonological processes, reduplication has been a major subject of interest in the domains of both morphology and phonology (Chang, 1997:273). This paper argues that the various reduplicative patterns of Amis are better characterized by re-ranking of universal constraints under OT.

OT relies on the notion of constraint ranking to choose between a theoretically infinite number of possible output forms generated from an input. It is not necessary for an output form to satisfy every constraint; the only stipulation is that it must satisfy the constraints better than any other possible candidate, i.e. it must be optimal. Within this framework, Correspondence Theory (McCarthy and Prince, 1995) is a recent development and has its most well-known applications in reduplication. Therefore, the reduplicative forms in Amis will be carefully examined under the assumptions of this approach.

The rest of this paper is organized as follows. Section II describes that the multiple types of the reduplication in Amis. Section III provides an analysis on different reduplicative patterns through the OT approaches. Section IV summarizes the main explanation presented in this paper and illustrates the schematic interactions of constraint hierarchies.

2. Types of Reduplication in Amis

From a phonological viewpoint, "the special property of reduplication is that the reduplicative affix is not fully specified for segmental content" (Kager, 1999:194). The reduplication patterns in Amis can be classified into two main types. Each type has various patterns with different lexico-semantic functions or distinct phonotactic structures.

2.1 Prefixal Reduplication

Prefixal reduplication denotes a situation where a reduplicative constituent is placed before or in front of the base. This section introduces four types of prefixial reduplication exhibited in Amis. Types I and II involve complete reduplication[2] of the base, while types III and IV involve partial reduplication. The data in this paper come from Huang (1988:31-34) and

---

[1] Amis is one language of the Austronesian language family, which is spoken in the east plains and coast between Hualian and Taidong in Taiwan, having a population of 140,000. There are five dialects in Amis language: Northern Amis (Nanshi Amis), Central Amis (Haian Amis and Hsiukulan Amis), Tavalong-Vataan (Kuangfu), Southern Amis (Peinan Amis and Hengchun Amis), and Chengkong-Kuanshan (Wu, 2000:37). This paper is focused on the Central Amis dialect.

[2] Complete reduplication has been defined by Crystal (1987: 90) as "a type of compound in which both elements are the same…". This definition may be successfully applicable to complete reduplication. However, attention should be drawn to the fact that compounding occurs normally at the word level whereas complete reduplication is basically at the morphemic level. The difference, which is mainly theoretical, is still worthy of note.

Wu (2000:56-59), who have focused their fieldwork on Amis. Examples of prefixal reduplication are given as follows (with reduplicants underlined):

(1) Type I

Base		**Reduplication**	
siŋsi	'teacher'	siŋsi-siŋsi	'many teachers'
wawa	'child'	wawa-wawa	'children'
suni	'just now'	suni-suni	'often'

(2) Type II

Base		**Reduplication**	
kilaŋ	'tree'	kilaŋa-kilaŋ	'full of trees'
loma?	'house'	loma?a-loma?	'houseful'
nanom	'water'	nanoma-nanom	'full of water'
panaj	'rice'	panaja-panaj	'full of rice'

(3) Type III

Base		**Reduplication**	
loma?	'house'	loma-loma?-an	'village'
kilaŋ	'tree'	kila-kilaŋ-an	'forest'
kajiŋ	'lady'	kaji-kajiŋ	'many ladies'
widaŋ	'friend'	wida-widaŋ	'many friends'

(4) Type IV

Base		**Reduplication**	
loma?	'house'	la-loma?	'inside the house'
mipalu?	'to hit'	ma-mipalu?	'to be going to hit'
tusa	'two'	ta-tusa	'two people/animals'

Types I and II show that the base is copied in total. Type I is consecutive reduplication; that is, the reduplicant and the base are in direct contact. By contrast, type II is inconsecutive reduplication. There is vowel [a] invention between the reduplication and the base. In type III, the reduplicant copies all but the last consonant of the base. In type IV, the reduplicant has the fixed vowel [a], whatever the vowel of the base. The initial consonant of the base is copied normally, though.

According to the data collected, prefixal reduplication in Amis is generally used for several purposes: to form simple plurality and special plurality[3] on nouns, to mark the future tense of the verb, and to derive numbers of people or animals from numerals. These meanings generally agree with a semantic theory of reduplication proposed by Botha (1988: 142), who claims that the semantic content expressed by reduplication can be covered by one universal semantic feature [increased], which in turn is amalgamated with the semantic unit of the base form[4].

2.2 Suffixal Reduplication

In addition to prefixal reduplication, there is also a major class of the reduplicated

---

[3] As for special plurality, this is a type of pluralization which is more specific in that it expresses the concept either as "all X", "every X", "each X", "X each" or "(very) many X" and the like (Al-Hassan, 1997:164).

[4] The theory predicts the semantic feature [increase] to be realized as [increase in intensity] if the meaning unit of the base is [variable/gradable quality]. Continuation is formed by [increase in time] if the base is [unbounded event/act].

forms in Amis named suffixal reduplication. In this reduplication, one or two syllables are suffixed to the base which may lose its final consonant. The multiple types of suffixal reduplication can be illustrated as below:

(5) Type I

Base		**Reduplication**	
niaro?	'tribe'	niaro-<u>aro?</u>	'every tribe'
romi?ad	'day'	romi?a-<u>mi?ad</u>	'every day'
halafin	'long (time)'	halafi-<u>lafin</u>	'very long (time)'
tiliji	'to hate'	tiliji-<u>liji</u>	'to hate extremely'

(6) Type II

Base		**Reduplication**	
taŋkuj	'dong-gua'	taŋku-<u>ŋkuj</u>	'dong-gua piles'
kahŋaŋ	'red objects'	kahŋa-<u>hŋaŋ</u>	'many red objects'
daŋka	'sesame'	daŋka-<u>ŋka</u>	'sesames piles'
pawli	'banana'	pawli-<u>wli</u>	'every bunch of bananas'

(7) Type Ⅲ

Base		**Reduplication**	
tərak	'to fall'	tarak-<u>tak</u>	'look like falling'
məras	'to flutter'	maras-<u>mas</u>	'look like fluttering'
fəlat	'to flash'	falat-<u>fat</u>	'look like glittering'

Most of the suffixal reduplication bear the meaning of intensity or plurality. Type I shows that the duplicated part must be disyllabic, thus triggering the base to avoid coda in reduplicated forms. The lexico-semantic function of this reduplication type is generally to convey the degree adverb while the bases are nouns, adjectives or verbs. Secondly, Type II demands that the duplicated part be monosyllabic while the base is disyllabic, and the reduplicant should tolerate the complex onset. As for lexico-semantic properties, this special type of reduplication generally has the plural meaning of nouns. In Type III, the reduplicant is also monosyllabic and undergoes some truncated process. The reduplication forms denoting the adverbial phrases are derivatives of verbal bases. It is obviously that Type I demonstrates that trisyllabic bases have disyllabic reduplicants regardless of their different lexico-semantic function, but Type II and Type III exhibit the absolute correspondence between the form and function through distinct reduplicative processes.

It should be noted that both Type I and Type II may be regarded to infixal reduplication by the rule-based approach. For example, the reduplicant of *niaroaro?* may be derived from the infix [-aro-] rather than the suffix [-aro?]; the reduplicant of *taŋkuŋkuj* may be derived from the infix [-kuŋ-] rather than the suffix [-ŋkuj]. However, they are viewed as the suffixal reduplication with different phonotactic formation. One the one hand, in Amis grammar, there are few infixes[5] bearing semantic function, and the infixal reduplication is an indefinable derivation by the rule-based approach. On the other hand, the suffixal patterns can be better accounted for than the infixal ones by the constraint-based approach. This argument will be discussed in the following section 3.2.

---

[5] According to Wu (2000:53-54), there are only two infixes which can be affixed to the stem, one is *-um-* carrying agent focus of verbs or nouns; another is *-in-* conveying specific nominal formation.

3. Optimality-Theoretical Accounts

In this section, the claims of OT are examined, and the two major types of Amis reduplication are accounted for under this framework. The basic assumption of OT is that Universal Grammar contains a set of constraints, which are violable and ranked on a language-particular basis; all the well-formed output (i.e. surface forms) in a specific language are due to the minimal violations of these ranked constraints. In the OT framework, central to phonological processes and reduplicative phenomena is the Correspondence Theory which formally includes a set of constraints governing the correspondence (i.e. 'faithfulness') between the input and the output, and the identity between the reduplicant and the base (McCarthy and Prince, 1995: 249-55).

3.1 Correspondence Theory

Before the discussion of the reduplicative identity, the notions of 'reduplicant' and 'base' should be defined in a more precise way. First and foremost, both notions refer to strings of output segments rather than to input strings. The definition of 'reduplicant' and 'base' that are given by McCarthy and Prince (1994) are paraphrased in (8):

(8) The 'reduplicant' is the string of segments that is the phonological realization of some reduplicative morpheme RED, which is phonologically empty.
The 'base' is the output string of segments to which the reduplicant is attached, more specifically:
a. for reduplicative prefixes, it is the following string of segments
b. for reduplicative suffixes, the preceding string of segments

It should be noted that "the reduplicant need not to be identical to a unique morpheme, for example a root" (Kager, 1999: 202). Another important notion that requires to be mentioned is 'correspondence' in reduplication. McCarthy and Prince (1995: 262) defines the generalized notion of 'correspondence' as follows:

(9) **Correspondence**

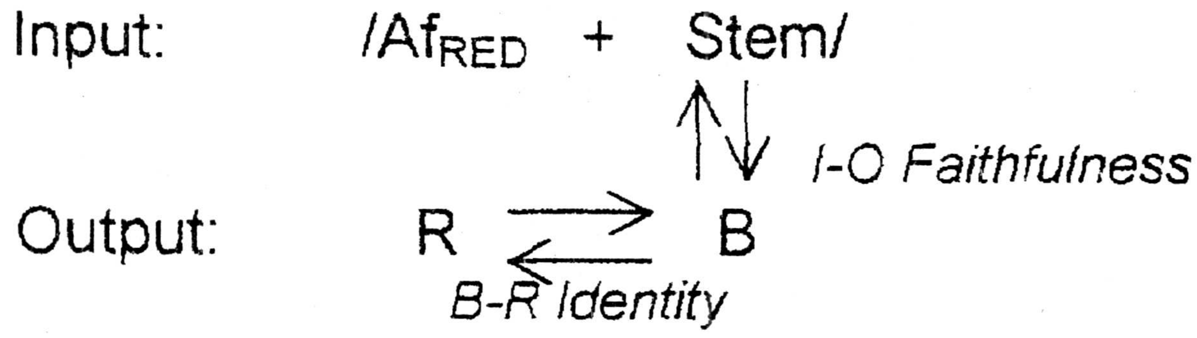
Given two strings S_1 and S_2, correspondence is the relation $\mathcal{R}$ from the elements of S_1 to those of S_2. Elements $\alpha \in S_1$ and $\beta \in S_2$ are referred to as corrrespondents of one another when $\alpha \mathcal{R} \beta$.

Correspondence is a type of relation between two strings, such as hold between a base and its reduplicant. This relation can be restricted in various ways by the use of constraints such as Max-IO and Max-BR. For example, an undominated Max-BR requires that every element in the Base have a correspondent in the reduplicant, resulting in a full copy of the base. This notion can be extend to the 'Correspondence Theory' in OT.

Correspondence theory is the part of OT that accounts for faithfulness between input and output. First used to account for reduplication by showing a correspondence between the base and the reduplicant, it was then generalized to show faithfulness between input and output, replacing the original approach of containment theory. The full correspondence relations are, in fact, fourfold. There are input-output (I-O), base-reduplicant (B-R), reduplicant-stem (I-R), and Output-Output (O-O)[6] correspondence relations. The reader is referred to McCarthy and Prince (1995) for a full explanation of the relations called on to account for reduplicated forms and to Benua (1995) for O-O correspondence. In this Paper, however, we will only focus on the triangle relations of I-O, B-R, and I-R correspondence. The basic model of Correspondence Theory is illustrated as follows:

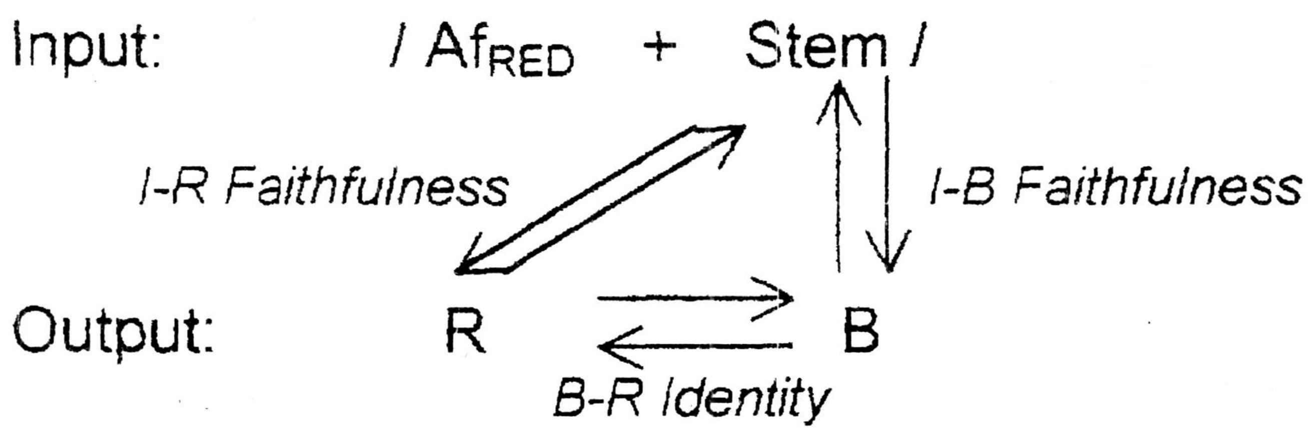
[6] Output-Output (O-O) was proposed by Benua (1995), to account for the correspondence between derivational forms. Output-Output can be used to show correspondence between the prosodic levels between different morphological forms of the same root (McCarthy, 1995).

(10) **Basic Model:**



The double-headed arrows in (10) represent correspondence relations. The Full Model of Correspondence Theory should be yielded since the correspondence between input stem and the output reduplicant can be seen from the suffixal reduplication forms in this paper. There are faithfulness constraints on three distinct dimension of correspondence, expressed diagrammatically as follows (McCarthy and Prince, 1995: 358):

(11) **Full Model**



As shown in (11), there must also be a link between the reduplicant and the input (I-R correspondence), since the reduplicant may be more faithful to the input string than the base is.

Before the analysis of OT, there are some relevant constraints activated in the multiple reduplication patterns in Amis. They can be formalized as follows:

(12) **Max-BR** (McCarthy and Prince, 1995: 264):
every segment of the base (B) has a correspondent in the reduplicant (R).

(13) **Max-IB** (McCarthy and Prince, 1995: 358-60):
input segments must have output base correspondents.

(14) **Max-IR** (McCarthy and Prince, 1995: 358-60):
input segments must have output reduplicant correspondents.

(15) **RED≤σ** (Chang, 1997: 289):
the reduplicant is no longer than one syllable. (revised from **Affix≤σ**).

(16) **RED≤2σ** (Chang, 1997: 289):
the reduplicant is no longer than two syllable. (revised from **Affix≤σ**).

(17) **Onset** (Prince and Smolensky, 1993: 16):
syllables must have onsets.

(18) **No-Coda** (Prince and Smolensky, 1993: 85):
syllables must not have codas.

(19) **N/a** (Chang, 1997: 289):
[a] must be parsed as the nucleus.
(It is a parallel constraint of **V/low** proposed by Chang).

(20) ***Complex** (Prince and Smolensky, 1993: 87):
no more than one C or V may associate to any syllable position node.

(21) **Contig-BR** (Kager, 1999: 214):
the reduplicant is a contiguous substring of the base.

(22) **R-Anchor** (Kager, 1999: 213):
the right peripheral element of R corresponds to the right peripheral element of B, if R is to the right of B.

First, constraints (12) to (14) are component constraints of the Max constraint family that relates S_1 to S_2 in the generalization of correspondence. Max-BR belongs to base-reduplicant-identity constraint; Max-IB and Max-IR belong to faithfulness constraints.

The reduplication forms in Amis show that the B-R identity and I-O faithfulness are relative to some phonological constraints, which can be dubbed 'Phono-Constraints'. According to Kager (1999: 201), "well-formedness constraints require that the output meet certain unmarked structures". The 'Phono-Constraints' can include well-formedness constraints. Thus, constraints (15) to (22) can be viewed as 'Phono-Constraints'. The 'Correspondence Theory of reduplication' claims that reduplication patterns arise by interactions of three constraint types: (a) phono-constraints, encoding markedness principles; (b) faithfulness constraints, requiring lexical forms and surface forms to be identical; and (c) base-reduplicant-identity constraints, requiring identity between the reduplicant and its base. Our analysis shows that reduplications in Amis are formed by the interactions of the members of these three constraint types. Therefore, the following issue will be raised in our discussion throughout this paper:

What interaction of well-formedness, faithfulness, and base-reduplicant identity underlines the pattern of reduplication in Amis?

3.2 Prefixal Reduplication

Following OT tableau conventions (Prince and Smolensky, 1993: 18), the constraints are placed on the top row from left, the highest ranked, to right, the lowest ranked. The leftmost column exhibits all output candidates. The symbol * indicates a violation, and ! a fatal violation by which a candidate is eliminated. Shading emphasizes the irrelevance of the constraint to the fate of the candidate. A loser's cells are shaded after the fatal confrontation. The symbol ☞ refers to the optimal output. Prefixal reduplications in Amis are illustrated with the analysis of OT as follows:

(24) Type I: **Max-IO » Max-BR » Onset, No-Coda » RED≤2σ**

Input: RED-siŋsi	Max-IO	Max-BR	Onset	No-Coda	RED≤2σ
a. ☞siŋ.si-siŋsi				**	
b. siŋ.si.a-siŋsi			*!	**	*
c. si-siŋsi		*!**		*	

In tableau (24), Max-IO ranks the highest to avoid losing any element of the base, which is constant in each type of prefixal reduplication. Moreover, the consequence of ranking MAX-BR higher than Onset, No-Coda, and RED≤2σ is the selection of candidate (a) over candidates (b) and (c) as the optimal output. And Max-BR suggests that the reduplicant copy the base in total, therefore complete reduplication. It is clear that there is nothing wrong with candidate (a) in complete reduplication besides the common violation of No-Coda. The other candidates both violate some higher constraints. Candidate (c) fatally violates the highest-ranking Max-BR. Candidate (b) reduplicates the base completely, thus avoiding a violation of Max-BR. However, it incurs a fatal violation of the Onset constraint. Tableau (24) successfully predicts the optimal output.

(25) Type II: **Max-IO » Max-BR » Onset, No-Coda » RED≤2σ**

Input: RED-lomaʔ	Max-IO	Max-BR	Onset	No-Coda	RED≤2σ
a. ☞lomaʔa-lomaʔ				*	*
b. lomaʔ- lomaʔ				*!*	
c. loma-lomaʔ		*!		*	
d. lomaa-lomaʔ		*!	*	*	*
e. lo-lomaʔ		*!**		*	

In tableau (25), candidates (c), (d), and (e) all fatally violate the highest-ranking Max-BR constraint. Both candidates (a) and (b) do not violate the Onset constraint.

However, candidate (a) wins out due to violating the No-Coda constraint less than candidate (b), even though it violates the lower RED≤2σ constraint once.

As seen from tableaux (24) and (25), exactly the same set of constraints accounts for all the cases of complete reduplication, including those with a vowel-final base (Type I) and those with a consonant-final base (Type II). With regard to the choice between Type I and Type II, it should be noted that the Onset constraint is crucial in shaping the reduplication form of Type I, while the No-Coda constraint plays a crucial role to shape the reduplication form of Type II.

(26) Type III: **Max-IO » RED≤2σ » Onset, No-Coda » Max-BR**

Input: RED-loma?	Max-IO	RED≤2σ	Onset	No-Coda	Max-BR
a. ☞loma-loma?an				*	*
b. lo-loma?an				*	*!**
c. loma?-loma?an				*!*	
d. loma?a-loma?an		*!		*	

In tableau (26), the Max-BR does not occupy the second highest position, and therefore, the reduplicant in type III copies only part of the base. No-Coda and Max-BR are crucial in determining the correct output. Candidate (c) is eliminated due to a greater violation of the No-Coda constraint than candidates (a) and (b). Both Candidate (a) and Candidate (b) violate the No-Coda constraint. Nevertheless, Candidate (b) violates the Max-BR constraint greater than Candidate (a), and therefore, Candidate (a) is the optimal output.

Compared with the three types discussed above, type IV requires more provisions in constraint ranking.

(27) Type IV: **Max-IO » RED≤σ » Onset, No-Coda » N/a » Max-BR**

Input: RED-loma?	Max-IO	RED≤σ	Onset	No-Coda	N/a	Max-BR
a. ☞la-loma?				*	*	****
b. lo-loma?				*	**!	!***
c. lam-loma?				*!*	*	***
d. a-loma?			*!	*	*	*****
e. loma-loma?		*!		*	**	***

In tableau (27), the RED≤σ constraint is crucial to reject candidate (e) and ensures that only a monosyllabic reduplicant is expected in type IV. Candidate (d) is eliminated due to a fatal violation of Onset. For candidate (c), the violation of No-Coda is fatal. As for candidate (b), OT treats the fixed vowel [a] of the reduplicant in type IV as a fill-in of an unmarked (default) low vowel, and the markedness constraint N/a ensures that the correct output is for candidate (a) to win over (b). Candidate (a), in spite of four violations of Max-BR, is selected as optimal.

3.3 Suffixal Reduplication

Unlike the prefixal reduplication, the suffixal reduplication requires more phonological constraints. Max-IR is significant in the tableaux since the reduplicants are more faithful to the input strings than the bases are. In addition, Max-IO should be renamed 'Max-IB' since the correspondence between input stem and output base are active in some suffixal reduplications. It shows that the constraint ranking is considerably different from the prefixal reduplication. Suffixal reduplications can be illustrated as follows:

(28) Type I: **RED≤2σ » Max-IR » Max-BR » No-Coda » Max-IB » Onset**

Input: niaro?-RED	RED≤2σ	Max-IR	Max-BR	No-Coda	Max-IB	Onset
a.☞ ni.a.ro-a.ro?		**	**	*	*	**
b. ni.a.ro?-a.ro?		**	**	**!		*
c. ni.a.r-a.ro?		**	***!	*	**	*
d. ni.a.ro-ro?		***!	***	*	*	*
e. ni.a.ro-a.ro		***!	**		*	**
f. ni.a.ro-ni.a.ro?	*!			*	*	**

In tableau (28), RED≤2σ plays a crucial role to reject candidate (f) and ensures that the rediplicant in Type I is no longer than two syllables. However, candidate (d) with the monosyllabic reduplicant is ruled out by Max-IR, which requires that input segments have maximal output reduplicant correspondents. Candidate (e) is also eliminated by Max-IR, although it satisfies other constraints. Candidate (c) is ruled out by three violations of Max-BR, while candidate (b) is ruled out by the fatal violation of No-Coda. It thus becomes clear that candidate (a), in spite of violations of Max-IB and Onset, is the optimal selection. Similarly, tableau (29) displays that candidate (a) is correctly predicted as the optimal output through the same constraint ranking. Therefore, the constraint RED≤2σ is undominated in Type I, and Max-IR dominates Max-BR and Max-IB.

(29) Type I: **RED≤2σ » Max-IR » Max-BR » No-Coda » Max-IB » Onset**

Input: halafin-RED	RED≤2σ	Max-IR	Max-BR	No-Coda	Max-IB	Onset
a.☞ ha.la.fi-la.fin		**	**	*	*	
b. ha.la.fin-la.fin		**	**	**!		
c. ha.la.fi-a.fin		***	***!	*	*	*
d. ha.la.fi-fin		***!*	****	*	*	
e. ha.la.fi-ha.la.fin	*!			*	*	

In Type II, the reduplicant can be regarded as either infixal or suffixal processes. However, as shown in tableau (30), the infixal analysis of Type II is not sufficiently accounted for by constraint-based approach.

(30) Infixal Analysis of Type II

Input: taŋ-RED-kuj	RED≤σ	Max-IB	Max-IR	Max-BR	No-Coda	Contig-BR
a.☞ taŋ-kuŋ-kuj			***	***	***	*
b.☹ ta-kuŋ-ŋkuj			***	***	**	*
c.☹ taŋ-kuj-kuj			***	***	***	
d.☹ taŋ-kuaŋ-kuj			**	**	***	*
e. taŋ-kujŋ-kuj			**	**	****!	*
f. taŋ-ku-kuj			****!	****	**	
g. taŋ-ku-ku		*!	****	***	*	
h. taŋ-kuj.taŋ-kuj	*!				****	

The evaluation in (30) leads to an erroneous prediction: the actual optimal output should be candidate (a) only, but the candidate (b), (c), and (d) cannot be left out by the same constraint ranking (the symbol ☹ points to the wrong output selection). However, alternative tableau (31) can solve this problem by viewing the reduplicants as suffixal forms. The difference between tableaux (30) and (31) are the constraints Contig-BR and *Complex.

(31) Type II: **RED≤σ » Max-IR » Max-BR » No-Coda » Max-IB » *Complex**

Input: taŋkuj-RED	RED≤σ	Max-IR	Max-BR	No-Coda	Max-IB	*Complex
a.☞ ta.ŋku-ŋkuj		**	**	*	*	**
b. ta.ŋkuŋ-ŋkuj		**	**	**!	*	**
c. ta.ŋkuj-ŋkuj		**	**	**!		**
d. ta.ŋkuj-kuj		***!	***	**		*
e. ta.ŋku-kuj		***!	***	*	*	*
f. ta.ŋku-ku		***!*	***		*	*
g. ta.ŋku-a.ŋkuj	*!	*	*	*	*	**
h. ta.ŋkuj-ta.ŋkuj	*!			**		**

In tableau (31), both candidates (g) and (h) are ruled out by the highest RED≤σ. Candidate (d), (e), and (f) are eliminated by Max-IR although they violates the lowest *Complex less times. No-Coda efficiently excludes candidate (b) and (c), and enables candidate (a) to emerge as the winner. The suffixal reduplicant can be geminate consonants since *Complex is the lowest constraint.

Tableau (32) also exhibits the same constraint ranking and the vowel-final words thus can be classified into the unified type as consonant-final words as (31).

(32) Type II: **RED≤σ » Max-IR » Max-BR » No-Coda » Max-IB » *Complex**

Input: pawli-RED	RED≤σ	Max-IR	Max-BR	No-Coda	Max-IB	*Complex
a.☞ pa.wli-wli		**	**			**
b. pa.wl-wli		**	**	*!	*	**
c. pa.wliw-wli		**	***!			**
d. pa.wli-li		***!	***			*
e. pa.wli-a.wli	*!	*	*			**
f. pa.wli-pa.wli	*!					**

Candidate (a) is preferred over candidate (b) in tableau (32), since the latter incurs a fatal violation of No-Coda. Candidate (c) and candidate (d) are ruled out by Max-BR and Max-IR individually. Both candidate (e) and (f), as expected, are left out by RED≤σ that demands monosyllabic reduplicant output.

However, the constraint-ranking of Type III is different from the former types. Consider tableau (33) below.

(33) Type III:

R-Anchor » RED≤σ » *Complex » N/a » Max-IB » Max-BR » Max-IR » Contig-BR

Input: tərak-RED	R-Anchor	RED≤σ	*Complex	N/a	Max-IB	Max-BR	Max-IR	Contig-BR
a.☞ tarak-tak					*	**	**	**
b. tak-tak					**!		**	
c. tərak-tək				*!*		**	**	**
d. tərak-tak				*!		**	**	**
e. tarak-trak			*!		*	*	*	*
f. tarak-ta.rak		*!			*		*	
g. tarak-tar	*!				*	**	***	

As shown in tableau (33), the R-Anchor constraint is activated and occupies the undominated. Candidate (a) wins out due to violating Max-IB less than (b). N/a is also important constraint since the nucleus are demanded to be [a]. Candidate (e) violates *Complex. Candidate (f) is eliminated since it violates the higher RED≤σ. It is interesting to notice that the Contig-BR constraint is the lowest constraint in this reduplicative type, which is rarely seen in other types in Amis. The previous studies on reduplication in other languages show that the reduplicants usually leave no medial gap in the bases, which means that the Contig-BR constraint usually occupies a high-ranked position. However, the Contig-BR constraint is considered to be violable in the examples of Sanskrit perfective reduplication (Kager, 1999: 214).

3.4 Summary

Based on the OT analysis above, the constraint interaction in Amis reduplication is summarized as in tables (34) and (35).

(34) **Prefixal reduplication**

Type I	Schema	I-O Faithfulness » B-R Identity » Phono-Constraint
	Instantiation	Max-IO » Max-BR » Onset, No-Coda » RED≤2σ
Type II	Schema	I-O Faithfulness » B-R Identity » Phono-Constraint
	Instantiation	Max-IO » Max-BR » Onset, No-Coda » RED≤2σ
Type III	Schema	I-O Faithfulness » Phono-Constraint » B-R Identity
	Instantiation	Max-IO » RED≤2σ » Onset, No-Coda » Max-BR
Type IV	Schema	I-O Faithfulness » Phono-Constraint » B-R Identity
	Instantiation	Max-IO » RED≤σ » Onset, No-Coda » N/a » Max-BR

(35) **Suffixal reduplication**

Type I	Schema	Phono-Constraint » I-R Faithfulness » B-R Identity » I-B Faithfulness
	Instantiation	RED≤2σ » Max-IR » Max-BR » No-Coda » Max-IB » Onset
Type II	Schema	Phono-Constraint » I-R Faithfulness » B-R Identity » I-B Faithfulness
	Instantiation	RED≤σ » Max-IR » Max-BR » No-Coda » Max-IB » *Complex
Type III	Schema	Phono-Constraint » I-B Faithfulness » B-R Identity » I-R Faithfulness
	Instantiation	R-Anchor » RED≤σ » *Complex » N/a » Max-IB » Max-BR » Max-IR » Contig-BR

4. Conclusions

Based on the constraint-based Optimality Theory, it is argued in this paper that the multiple patterns of prefixal and suffixal reduplications can be perfectly accounted for by this approach. It provides sufficient evidence for the OT analysis in studying reduplication phenomena in Amis language.

Under Correspondence Theory, reduplication involves multiple, simultaneous correspondences, including a relation between the input and the output (IO-correspondence), and a relation between the base and reduplicant (BR-correspondence). Identity of the pairs of corresponding strings is regulated by hierarchical sets of Max constraints (MAX-IB, MaxBR, and MAX-IR), which are referred to by the cover terms IB-Faithfulness, BR-Identity, and IR-Faithfulness. The schematic interaction of the prefixal and suffixal reduplications can be illustrated as the following:

(36) Schematic interaction of the prefixal and suffixal reduplications

Prefixal Reduplication

Schema 1: I-O Faithfulness » B-R Identity » Phono-Constraint

Schema 2: I-O Faithfulness » Phono-Constraint » B-R Identity

Suffixal Reduplication

Schema 1: Phono-Constraint » I-R Faithfulness » B-R Identity » I-B Faithfulness

Schema 2: Phono-Constraint » I-B Faithfulness » B-R Identity » I-R Faithfulness

The theoretical assumption of constraint ranking facilitates a flesh angle to observe the complicated reduplication in Amis. Under the Optimality Theory, the prefixal and suffixal reduplication are correctly submitted by re-ranking of constraints.

REFERENCES

Al-Hassan, Bello S. Y. 1998. Reduplication in the Chadic languages: a study of form and function. Frankfurt am Main: Peter Lang.

Benua, Laura. 1995. Identity effects in morphological truncation. Jill Beckman et al, ed. [Online] Available through Rutgers Optimality Archive (ROA-74).

Botha, Rudolf P. 1988. Form and meaning in word formation: a study of Afrikaans reduplication. Cambridge: CUP.

Chang, Laura M. 1997. Thao reduplication. Paper presented at Eighth International Conference on Austronesian Languages. Taipei: Academia Sinica, 273-97.

Carlson, Katy. 1997. Sonority and reduplication in Nakanai and Nuxalk (Bella Coola). [Online] Available through Rutgers Optimality Archive (ROA-230).

Crystal, David. 1987. The Cambridge encyclopedia of language. Cambridge: CUP.

Huang, Tian-lai. 1988. 台灣阿美語的語法 [The grammar of Amis in Taiwan] Fongyuan: the author.

Kager, René. 1999. Optimality Theory. Cambridge: CUP.

Kiparsky, Paul. 1986. The phonology of reduplication. Ms. Stanford: Stanford University.

McCarthy, John J. 1995. Faithfulness in prosodic morphology and phonology: Rotuman revisited. Ms. [Online] Available through Rutgers Optimality Archive (ROA-110).

McCarthy, John and A. Prince. 1993. Prosodic morphology I: constraint interaction and satisfaction. Ms. Amherst: University of Massachusetts.

____. 1994. Two Lectures on Overview of Prosodic Morphology. Handouts of two lectures at the OTS/HIL Workshop on Prosodic Morphology, Utrecht University. [Online] Available through Rutgers Optimality Archive (ROA-59).

____. 1995. Faithfulness and reduplicative identity. Beckman, J., S. Ubranczyk and L.W. Dickey, eds. University of Massachusetts Occasional Paper in Linguistics 18: papers in Optimality Theory. Amherst Mass.: Graduate Linguistics Students Association, 249-384.

Prince, Alan and Paul Smolensky. 1993. Optimality Theory: constraint interaction in generative grammar. Ms. New Brunswick: Rutgers University.

Struijke, Caro. 2000. Why constraint conflict can disappear in reduplication. [Online] Available through Rutgers Optimality Archive (ROA-373).

Wu, Jing-lan. 2000. 阿美語參考語法 [Grammar of Amis]. Taipei: Yuan-Liu.